

The fifth essay of D.M. a friend of truth and physick, against the circulation of the blood : in two parts. The first, shewing its absurdity and impossibility three several ways ... The second, shews the true cause of the motion of the heart ... / [Oliver Hill].

Contributors

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The Fifth E S S A Y of D.M.

A Friend of Truth and Physick,

Against the

Circulation of the Blood.

In Two Parts.

THE FIRST,

Shewing its Absurdity and Impossibility
three several ways.

- I. By the Disagreement and Lameness of the Reasons its own Authors give for it.
- II. By many strong Demonstrations against it.
- III. By making void all the Causes they assign of this pretended Effect.

And this last by shewing,

That there is no Use in Nature for such Circulation; nor any Cause Efficient capable to produce it, and to cause it to exist.

THE SECOND,

Shews the true Cause of the Motion of the Heart, and the Blood and Arteries, by that which constitutes Life, to wit, the Spirits making a Flash in the Left Ventricle; and a Puff which swells the Heart at every Pulsation; and pervades and moves the Blood.

The Wise Man's Eyes are in his Head; but the Eyes of the Fool are at the ends of the Earth. Prov. 17. 24. Eccl. 2. 14.

LONDON: Printed for the Author: and are to be Sold by *Edm. Evetts*, at the *Green Dragon* in *St. Paul's Church-Yard*; and other Bookfellers in Town. 1700.

A Table of all the ESSAYS.

1. **A** Gainst the Gravitation and the Pressure of the Air, being the Cause of Fluids rising in the Pomp, and the Syphon, and Barometer.
 2. Of the true Ground and Principles of the Christian Religion.
 3. Of the Cause of the Motion of the Earth.
 4. Of refined Politicks for all the Christian Princes.
 5. Of the Non-Circulation of the Blood.
 6. Of a Trinity in God; and how a Trinity comes to be in the Unity.
 7. Of the first Matter of Metals.
 8. How to encrease Trade and Coin in any Kingdom or State.
 9. Of the three Scholastick Trades, Divinity, Law, Physick; and of what they are come to.
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The Fifth
Essay of D.M.

A Friend of Truth and Physick,
Against the
Circulation of the Blood.
Shewing its
Absurdity & Impossibility,
AND THE
Cause of Pulsation;
AND OF
The Motion is seen by means of the
Microscopes in the Blood, and its Vessels.

Ovid. Metamorph.

*juvat ire per alta
Astra; juvat, terris & inani sede relicta,
Nube vehi: cœloque sedens immotus, ab alto
Palantes homines passim ac rationis egentes
Despectare procul.*

Prov. 17. 24. Eccl. 2. 14.

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The Fifth
ESSAY
 OF THE

Non-Circulation of the BLOOD.

The Introduction.

*Ille Ego qui quondam Clerum confodere multis
 Ausus sum telis ; jam nunc foetentia pure
 Arma ciere juvat Medicantis raro Cohortis.*

QUack and Clerk ; Doctor, Bishop ; *nullo discrimine habetur*, when *amica Veritas* is concerned : and therefore have at the Physicians now, as well as at those before derive their Name from that Trade which they call *Divinity* : and at their Master-piece too ; the Circulation of the Blood ; the most useful (if we will but take their word, and believe all that they say, without *looking well to it*, Prov. 14. 15.) of Modern Discoveries : without which no Man knew how to live in Health before

A 3

them,

them, if Health depends upon it, as from their Hypothesis it follows that it must do.

you'll say, A bold Man indeed!
O Disturber of the Peace and Quiet of Physicians!
Who lay Supine under a Notion by none attempted.

2. To which my Answer is, That tho' I am for Inventions and Improvements of Knowledge, yet being at the same time for old Truths and for old Ways, old Nature and the old World, against the Innovations which some Men would make in them; and against making new ones, and applauding new Whymfies, except when good for something; I dare here attempt this in behalf of the Ancients: for I am of Opinion, that both Nature and Knowledge being the same in old Times as they are in our Days, (and Knowledge being God's Gift, he always distributes it impartially to good Men) all they that had it of old, saw as far as we by it into Nature and the Wold, and were as able, and better to find Truth by it than we; as more in the way to it, because less prejudiced, and taking a better Course than we to find Knowledge by; seeking it *a Priori* by the Reason and Causes, then looking on the Effects, to confirm their Theory: whereas the Modern Sages seek *a Posteriori*, looking first on the Effects or Experiments they make, and then deducing from them the Cause which they made them for, and which they had in their Eye: for Instance, in our Case, where the Motion of the Blood is the thing they look into, and make their Tryals to prove, without regard to the Cause efficient of that Motion.

3. I am for a Theory confirmed by Experience, but not for framing of one by Experiments only, especially in Phyſick, which depends upon Principles inviſible and ſpiritual, to wit, the Spirits themſelves, leſs obvious to the Senſes than to the Underſtanding; and in ſuch Point as this, where the very Source of Life, *viz.* the Heart and its Motion, is the main Thing in queſtion. *Experimentum fallax, Judicium difficile* to the great Maſters themſelves who knew things *a Priori*, ſuch as was Hippocrates; and much more to their Scholars, that neither know nor will learn; and who, looking no further and higher than the Effects, are apt to miſtake the Cauſe, and to conclude on Miſtakes, taking what they find and ſee for what they ſeek and would ſee; juſt like thoſe that make the *Bible* to ſay as they would have it, inſtead of examining their Opinion by the *Bible*

4. Invention is a great thing, becauſe *there is nothing new to be found under the Sun*, Eccl. 1. 9. and they that are ſo happy as to light upon new things Beneficial to Mankind, very well deſerve a Name, which I would have no hand in taking away from them. For being of Opinion, that out of the ſame Motive as put *Luther* upon that which they call *Reformation*, that is, out of Contention; and becauſe Man would be wiſe and ſingular in ſomething to be taken notice of, *Job 11. 12. Prov. 13. 10.* ſome Modern Reformators and Improvers of Knowledge affect to be Inventors; I muſt beg their Pardon, if I applaud them not in every Invention, and if I make bold here to queſtion the Truth of this.

Quicquid id eſt timeo Medicos Inventa ferentes.

5. And justly might others have the same Opinion of me, for offering at a thing is so well established, if I did not stand here for old things, and for old Men long since Dead, against the new; at whose hands I expect, instead of Fame and Applause, the same as he that pulls down an old House about his Ears may promise himself from it, for his Labour and his Pains; and who will own this is Truth, when the World prefers the Light to Darknes and Ignorance, *John* 3. 19. and *Wisdom is justified by others than her Children*, *Mat.* 11. 12. He that knows more than others, and shews it, gets more Envy than Thanks, or Favour, or Fame, *Eccl.* 9. 11. especially when none but the Fautors and Abettors of the Error he refutes are to be, as in this case, his Jury and his Judges. In short, *he that encreaseth Knowledge, encreaseth Sorrow*, *Ch.* 1. 18.

6. One Reason, I suppose, why this Invention of theirs hath so far prevailed with most Men in so short a time, is, that it being absurd, it agrees best with the World. Another, that Men will take for granted what they are told, rather than to go to see. And when things are intricate and deep, as this, which depends of the Knowledge of Nature, and of Life, Heat and Motion; and is of so large extent, that those few, which have a Head capable, have not time enough to search in, and sum up all that it is related to, and pass their Judgment on it; they do like the Leopard, which lets go what he cannot catch at second or third leap; that is, they let them alone, and will not be at the trouble of searching them out thoroughly: so that none going about to oppose such new Notion it passeth uncontrouled, *cum omnibus reliquis mundi erroribus*, and
so

so becomes curreant, eipoused by as many as would seem as quick-sighted as the rest.

7. That the Knowledge of this thing is abstruse and difficult to be attained unto, Doctor *Harvey* shews himself, saying in his first Chapter, That *he did almost believe it was known to God only; and was so troubled in Mind after a long Enquiry, by reason of the quickness of the Motion, appearing like Lightning on a sudden, which hindred him to discern which way the Diaſtole and Syſtole came to be, and when and where they begun, that he knew not what to think, and what to resolve upon; nor how to believe others in so arduous a case.* The Syſtole appearing, adds he, *sometimes from this place, and the Diaſtole from that, and sometimes just contrary; and sometimes the Motion was so various and confused, that he could conclude nothing.* And Doctor *de Back*, his Friend, and a Friend of his Notion, finding the same thing as he, saith, *The Motion of the Heart was not yet thoroughly searched.* Doctor *Lower* adds to this, *That to know of its Motion, being God's Prerogative, the Apprehension thereof was a thing too high for him:* at the 85th Page of his *Treatise of the Heart*.

8. How they came to extricate themselves from this Labyrinth, is what *Harvey* declares not, but saith only, *He believed that he had done it at last.* His great Eagerness to find, or to be an Inventor, making him so fond of what help'd forwards his Invention, and unwilling to bawke it, that he dasht out of his mind all the Considerations which might occur, and rise Scruples and Objections against it. But if he had considered, that it is no more possible to come at the Heart, to see its Functions and its Working whilst Life is in its full force, and able to perform

perform them, than at the Orbe of the Sun, to see the Light spring therein; because its Motion must be not only interrupted and confused, as he saith, but sometimes faint, sometimes strong, and violent and forced, and wholly unnatural when they cut open the Breast and the *Pericardium*, and other Parts and Vessels about it, to come at it, to see it and to feel it, and thrust their Fingers in it; he had not, I believe, been so nimble at *Believing*, and crying a *Εἴρηνα* upon such uncertain Grounds as the Experiments made at such time stand upon; but had despai'd as much as at first of finishing by their means his Invention, and of being the Author of a new Hypothesis.

9. If but pricking, nay, touching of the Heart or its pieces, when taken out and cut small, and the pieces having been lying still a pretty while, and their Life as good as gone, sets them in motion again, and beating, as *Waleus* and *Harvey* confess they do, into what a violent and unnatural Motion must the tying of a Dog, or of a Sheep, for Instance, by the four Legs stretcht out; and cutting open his Breast, and his Heart off with the Veins and Arteries about it; set his Heart before they can come at it to see it move; every body may judge who hath taken notice of the Effect, the fear alone of being beaten or hurt worketh in a Dog, who trembles at the very Threats of it; and of that the Pangs of Death work in a Sheep or a Pig, which voideth his Excrements both ways when they cut his Throat. If the retentive Powers be so much out of order at that time in the Bladder, which is the Extremity, as to let go what it held and would have held in longer; how can they be otherwise in the Centre, or the Heart which Life it self derives from,

from, and perform Actions duly in the part is set upon, when they cannot perform them in those are not affected? and the Expulsive may then cease to act their part likewise, that is to say, cease to keep off Blood from the left Ventricle, and to deny it Entrance, as it will be seen in time, the Spirits that rise in it and blow the Blood off of it, do whilst Life and Health endure. And no great wonder therefore if being then distracted, and in a hurly burly, they give the Blood Admittance; and if when it is let in, they muster up all their Force and Posses to let it out again, and fling it away through any Wound or Hole made in the Substance of the Heart, as far as *Waleus* saith, three or four Foot, or more, to help Life at a dead Lift; or to turn out of the place the Blood which, if suffer'd there, would doubtless suffocate it, and put out the Light of Life which breaks out in that Ventricle, whilst Life it self continueth.

10. So that it appearing hence how uncertain and doubtful the Judgements they pass upon the Observations they make in all such Dissections, tho' of living Animals, must of necessity be, we may judge and see how far the Conclusions built upon those Judgements, are like to hold; and how much we may depend upon them, and trust to them. And we may draw from the same a Conclusion contrary to that of Doctor *Harvey*; that we are as far to seek in the Motion of the Heart, notwithstanding their Tryals, as ever we were before he concluded upon them. And to conclude this Proem, with the words of a Great Man, as wise as Doctor *Harvey*: I say as I said, *Experimentum fallax, in the best Experiments multum imperitiæ peritiâ ipsa præstat.*

The First Chapter.

The Reasons of the Author's Dissent, and what he approves and disproves of this Notion.

1. **N**OW my speaking so of their Tryals and Experiments, tends not to invalidate the Reality thereof, nor their Skill in making them; but the Conclusions only, and Judgements made upon them; for all of them together amount not to a full proof of what they deduce from them, to wit, a Circulation of the Blood; and its being driven through the whole Body from one Ear and one Ventricle of the Heart to another; and to a Demonstration of the Hearts distinct Motion, or beating by Intervals; and of that nothing but Blood passeth away from the Heart when it dilates and contracts; all amounting to no more than shewing of a Motion in the Blood, which all Men grant, not one of the Blood it self, which is a dead passive thing, nor of the thing moves the Heart and the Blood by Intervals; for Doctor *Lower* himself, after all his apparatus and long Series of Notions, to make a Muscle of the Heart, confesseth his Ignorance of this last Point, to wit, *pag. 85.* of his *Treatise of the Heart*, and answers nothing at all to the Objections made him, that a Muscle is an Organ of voluntary Motion, the Heart moving even whilst we are not willing

willing it should, and so cannot be a Muscle: and as for Doctor *Harvey*, he doth as good as confess, *viz.* in the Experiment made of a streight Ligature turned to a middle one, in his 11. *Chapter* and at *page* 66. that something besides the Blood passeth away from the Heart, which occasions, or at least contributes to its Motion.

2. And really I am so far from thinking their Tryals false, that I make use of them my self against their Notions, and allow of what they shew, *viz.* a Motion in the Blood, and a progressive Motion from the Heart, where it begins (for it is the first Mover) through the Arteries and Veins to all parts of the Body as far as the Veins extend; and a filling and emptying of the Heart every Pulse; and that the *Vena Cava* and *Vena Arteriosa* convey Blood into the Heart, and into the Lungs also; and that the Blood which this last receives from the right Ventricle, may well find its way and pass through the Streiner of the Lungs; and that upon the binding of the Venous Artery, it doth swell towards the Lungs and empty towards the Heart, and in fine, of all that which is shewed by the Ligatures.

3. But a Motion of the Blood it self, and such Motion as they say, *viz.* circular, and in such quantity as amounts to six times more than the whole Mass of the Blood, that is, to near six score Pounds every hour of the day; and Blood in both the Ventricles; and the Passage of so much through the Streiner of the Lungs; and that nothing else than Blood passeth away from the Heart into the great Artery, and upon its Contraction or its Systole only; and that the Blood is the thing which worketh all the Effects which they do ascribe to it, is what I here gainsay; because all they say for Blood, may
by

by far better Reasons, as shall be shewed hereafter be concluded of Spirits ; and because the left Ventricle cannot suffer any Blood or any Liquor in it, and the Lungs cannot transmit such quantity of Blood through themselves or their Substance, and the Venous Artery suck it up again so fast into all its small Branches ; but the Lungs must be bloody, as the Liver and the Flesh, and more too ; which we don't see : and because this circular Motion were to no purpose, and without necessity ; and that they can shew no Cause efficient of this Effect, all those they have assigned hitherto being not able to produce one half of it, and having for the most part no Existence in Nature. And, in fine, because we can shew them an adequate Cause of the whole *Phænomenon* which answers every thing, and which is more natural, or according to Nature, than are all the fetched and forced Reasons they give and invent for their Notion ; and however not so much as it is against common Sense ; of all which in time and place.

The Second Chapter.

An Account of the Modern and Ancient Hypothesis ; and of the difference between one and the other.

I. **A**ND to make things the plainer to those who are not thoroughly acquainted with the

this matter, and have not time to consult the Books of Anatomy ; before I go further, I think fit to give here a rough draught of the Ancient and the Modern Opinion : that every one that reads may carry along with him a general Idea of both Notions together, and so apply the better what he reads to its due place, and compare things together, and judge of them, and come to some conclusion of himself, upon reading of the whole ; which is the end of reading, and of writing of Books. And such are to take notice, That there are four Vessels coming out, or inserted in the Heart, no matter which ; through which all that doth go in or out of it must needs pass ; two Veins and two Arteries ; viz. out of the Right Ventricle *Vena Cava* bringing in, and the Arterial Vein carrying Blood out of it ; and *Arteria Magna*, and the Venous Artery bringing in, and carrying Spirits and Blood from the Left.

2. First, the Ancient Opinion, which I own myself, is, that the Blood moves not it self of it self, nor Circulates ; but that that portion of it which is made every day from the Chylus, and the Victuals, goeth from the *Vena Porta* through the Liver, and *Vena Cava*, into the right Ear, and right Ventricle of the Heart ; thence into the whole Body, through *Arteria Venosa*, or what other way you please, (for it is not my business to find out a way for it) except through the left Ventricle, into which, that which recurs from the Lungs doth not enter ; and there, in the Parts, it stays, and taking up its quarters in the same, goeth no further, and returns not to the Heart. In the mean while part of the *pura abundantia ex secretione sanguinis orta*, as saith Great Hippocrates, *de Corde* ; that is, of that Blood which comes from the Chylus, through *Vena Cava*

Cava to the right Ventricle, & *radios immittens*, through the holes in the *Septum*, which are made for that purpose ; *Alimentum suppetit & distribuit*, adds he, *sinistro* ; that is, Spirits, for the Aliment, saith he, doth not become Aliment till it becomes a Spirit ; and these Spirits joining there, with those that come from the Air, which the Heart draws through the Lungs, and the Venous Artery, they kindle in that left Ventricle the Light and Fire of Life ; and feed it by breaking out from time to time into Flames, or into the flash of Life, and sending forth a Spirit (made then Vital, but being but Natural in the right) which swells and distends the Heart ; and in its dilatation (which is its *Diafiole*) thrusts open the *Valvula* (*intus foras spectantes* for this very same purpose) of *Arteria Magna*, and pass away into it, and into other small ones ; with some part of that Blood which lays, saith *Harvey*, in great store and abundance in the Ears. Upon which the Heart subsides, and comes to its *Systole* as fast as the said Spirits pass out and evaporate. And so passing, and beating, or making a Pulsation every time it dilates. This, whether the Ancients did make the thing so plain or not, is the Opinion we take upon us here to maintain.

3. The Modern Opinion is, That the Ears contract themselves, and throw in that contraction, the Blood which they abound with, *as the head Springs of the Veins, and the Cellar and Cistern of Blood*, saith Doctor *Harvey*, in their respective Ventricles : Which being filled with it, by the stretching of their Nerves (as Doctor *Lower* calls them, though they are properly but *omnis generis fibræ*) they, and the whole Heart dilates upon this filling with Blood : then straightways when they are full, pulling

ling in their Nerves again, and contracting of themselves, they press out, by expulsion, the Blood they had received and taken in from the Ears, upon which the Heart contracts, and maketh a Pulsation; by which Pulsation it thrusts and drives the Blood from one Ear, and from the great Artery through the small ones, and the Veins, into the *Vena Cava* again, and the other Ear: where joining with the new Blood daily made from the Chylus, it returns into the Lungs through the Arterial Vein; and losing it self therein, and streining through their substance, as some Rivers in *Africk*, and in *Spain*, do in quick Sands, it is suck'd up out of it by the Venous Artery, where reuniting it self, it runs together again into one Head, and one Stream, and breaks out like a Torrent into the left Ear again, and into the left Ventricle; and so round continually, galloping in great post haste, (to do what no Body knows,) to the quantity of more than two thousand pounds a day; which is as much as would run out of a Pipe of about a quarter of an Inch bore. This is the State and Account of their Opinion and mine. And if they find any thing is wanting to this Account, let them supply it themselves; for the truth is, this Notion is so far from being brought by them to its perfection, that they are not yet so much as agreed on the main thing, to wit, the cause efficient of the motion of the Heart; each offering a new one, and finding fault with the old: And the last to stop the holes which the first have left open, denying what these affirm: and all say so many things which are Contradictory, as by the Contents of the sixth Chapter it will appear, that it is no easie task to reduce them to a Head.

4. The Difference between us, and the Mistake
 B of

of one side, consisteth especially in that one side affirms that there is Blood in both Ventricles, the other in one only; one saith that nothing but Blood passeth away from the Heart, and the other adds Spirits; one that such quantity of Blood passeth through the Lungs and Portals, or *Valvulae* of *Arteria Venosa* and *Arteria Magna*, which neither of them can hold, or however, can transmit; the other is for no more than that which is daily made, which the Lungs and *Valvulae* can well contain and admit: one that the Heart expels Blood, and drives it through all the Veins by a Force and Faculty the other shews it hath not, and which would not be capable of driving it at the rate which they say, tho' it had it: one that both Ventricles expel and drive Blood at the same time, and contribute together to the Dilatation or *Diastole* of the Heart; and that the Motion of it cometh from its Contraction, the *Diastole* being but a Return of the Heart to its State, or a *Motus Resitutionis* only: whereas the other denies those three things altogether, and saith the Blood is sucked up by the Venous Artery and the Lungs (when they dilate) from the right Ear of the Heart, so that it needs not expel any Blood from that Ventricle; that the swelling of the Heart comes but from the left Ventricle, which is placed in the middle, the Heart seeming to be made wholly for it, as *Harvey* himself grants and confesseth in his 17 chap. pag. 95. and that its Motion is both a rising and a falling, to which end Fibres may serve, without making Nerves of them with Learned Doctor *Lower*: which Fibers stretch and relaxe whilst the Flash is a rising and distending of the Heart, and whilst the Spirits which flow from the Flash or Flame in it are a passing out of it into the great Artery. And there
being

being in the right no light, Flame, or Flash of Life, and no Spirits proceeding from that Light to pass away, there is no such Expulsion nor Dilatation in it or from it, as in the left. And if the Reader will judge as he shall read and go on, he will easily discern on which side the Mistake lyes.

The Third Chapter.

The chief Ground of the Mistake, and the way which the Author will take to rectify it.

1. **B**UT the Dispute ariseth chiefly from this their Mistake, to wit, that in Dissection finding Blood in both Ventricles, they think it is always there as well when the life prevails, as when it is overcome: and seeing that the Blood moves, and that something doth always pass into it from the Heart, they think that the same is Blood; and that there is nothing else passing with it and moving; and so conclude with *Harvey*, that this Blood being sent forth in far greater quantity than the Aliments produce, and then is wasted and spent in nourishing of the Parts, it must needs return again, and go round continually, lest it should, like *Euripus*, ebb and flow, dance up and down, and weary it self in vain: But, if I shew fully,

(1.) That the Motion in the Blood is not from the Blood it self, nor from the Heart, either by the expulsive Faculty, all of them ascribe to it; or by its being a Muscle, as *Dr. Willis*, *Lower*, and some others will have it. (2.) That they are Spirits,

not Blood, which pass away from the Heart at every Pulsation: the Heart containing no Blood at all in the left Ventricle whilst the Body is in Health; and therefore sending forth none. (3.) That there is no efficient nor final Cause of the Blood circulating at their rate: and *lastly*, If I shew an adequate Cause for all the Phenomenon can shew, that will answer not only to a Motion in the Blood, (which is all their Cause can do) but to the distinct Motion of the Heart by Intervals, (which their Causes cannot do.) I hope, or however have Ground to hope, I say, that every Man of Parts will grant that their Conclusion, and the whole Hypothesis itself is quite out of doors.

2. And without going further, common Sense itself, without the help of Experiments or Authority, shews them, that since all Motion ceaseth in the Heart, and in the Blood, as soon as the Body dies; and lasteth but during Life, they do not move of themselves, but by that which comes with Life, and goeth away when we Die, to wit, the Vital Spirits, which the Blood doth abound with; and which arise in the Heart, and go from it to the Head, and into the Blood also directly at the same time, without rising to the Head; and returning down from it. We have the Authority of *Hippocrates*, *Galen*, *Foesius*, and many more, for the Coldness of the Blood, and its Incapacity therefore of Heat and Motion, but by accident, from that which Heat and Motion come from. *Sanguis*, saith *Hippocrates* in *Libello de Corde*, *non calidus natura sua, sed calefcit*. *Galen* in *lib. primo Salub.* saith, *The Blood hath much of both the earthy and watry Substances in it, therefore is cold of it self*, and so moves not of it self, for all Motion goeth with Heat; and it hath

hath neither Motion nor Heat in a dead Body, but grows cold and stands still there; whereas it is hot, and thin, and moveable in living things, *per Accidens*, saith *Foesius*; *Præter naturam suam*, saith again the same *Galen lib. de Tumoribus, quod beneficio Spirituum incalescat, & eorum impetu motuque agitur*: all Motion, as I said, and Impetuosity in the World coming from them, and that of the Blood therefore, and of the Heart and the Parts; as by Experiments drawn from the Inventors themselves shall be made out in the next.

3. *Harvey, Walæus, Willis*, and all but Doctor *de Back*, own these Spirits in the Blood, whither they go from the Heart; for from whence can they come else, since the Blood is of it self a cold and congealed thing, which having them not it self, cannot give or produce them? And it is strange these great Men, with all their Ingenious Tribe, should own Spirits in the Blood, and that the Heart and the Blood move but whilst Life subsisteth; and yet should take no notice of either Life or Spirits in treating of the Motion of the Blood and of the Heart: but fall straight upon the Parts, to wit, the Heart, and its Nerves, and the Blood and its Vessels, and catch hold, some of its Muscles, or its Musculosity; some of a force in the Blood from an imaginary Faculty of expelling in the Ventricles of the Heart; and some of any thing else, rather than have any thought or regard for that thing which they move by, to wit, Spirits: and should be so much in haste to vote for their Invention, and to ascribe to the Blood the swift violent Motion which they say it doth run with, as to over-see the Cause and Agent of all Motion and Impetuosity in the World, to wit, Spirits, which all *Impetus* comes

from; (whence *Hippocrates* calls them *Impetum facientes*) and never so much as ask these Questions, *Per quid, ad quid*; to what End, and by what Cause efficient the Blood should move and can move *in circulum* to the Quantity, and with the Swiftneſſs they ſay it doth: and this whilſt they ſee themſelves ſuch other things in the Blood as are moſt evident Proofs, not only of the being of theſe Spirits in the Blood, but alſo of their being the true Cauſe of its Motion.

4. It is true, that both *Willis* and *Lower* allow of them, in making the Heart a Muſcle, and endeavouring to prove that it moves, as other Muſcles, by the animal Spirits: but theſe are in, and muſt come from the Head into the Blood; whereas they that move the Blood, being in the Blood it ſelf, and ariſing in the Heart, come from the Heart into it, and by no means from the Head; nay, ſupply the Head it ſelf, and the Brain with their Spirits, which become Animal there, that is to ſay, fit to be *Instrumenta Animæ*; Tools of the Will of the Soul. For the Heart doth, like the Sun, which ſends his Beams or Spirits upwards as well as downwards through the whole Circle of Heaven, ſupply the Brain and the Blood at once with the ſame Spirits, which in the Blood are Vital, and in the Brain Animal. This, I ſay, theſe great Men, being unwilling to ſee, take no notice that Spirits in the Heart and in the Blood are Vital, not Animal, (being (as they grant) to feed and convey Life to the Parts) and that the Blood is Vital but as being the Vehicle of the ſame Vital Spirits; and this their oversight is to the end they may deduce their Circulation, from thoſe that move the Muſcles and the Parts.

The Fourth Chapter.

Shews from the Authors themselves of the new Hypothesis, the Existence of Spirits in the Blood and its Vessels ; and a Motion of the Blood by their means independent of the Motion of the Heart.

NOW these Spirits, tho' the Cause of the Motion of all things, and consequently of that of the Blood and of the Heart, being not only taken no notice of by those Men, but their Existence being disputed by some of them, of the Corpuscular Tribe ; I think it convenient to shew here, that they exist in the Body and the Blood, and that they impel the Blood, and cause a Motion in it ; and to begin to shew this out of their own Authors first.

1. Great Doctor *Harvey* himself in his *Proem*, pag. 5. owns them to be in the Blood ; *No Man can deny*, saith he, *that the Blood, as Blood, and as it is flowing in the Veins, is both imbued with Spirits, and swells in the Arteries with a greater store of them than in the other Vessels.* And grants, that they are Vital and not Animal Spirits : saying pag. 51. *That all the Parts are quickened, nourished and cherished by the Blood being made warm, vaporous, full of Spirits ; and so alimentative.* Yet without considering whence they come into the Blood, and

what they have to do there; he drops them there, and goeth on in his way of Expulsion.

2. Doctor *Willis* not only confesseth them in the Blood, but allows a *Flammula* in every part of it; which is more than bare Spirits: for a *Flammula* implies both the Spirits which it is composed and formed of, and their kindling or breaking out into a flash or flame, which they never do but when they gather in quantity: and that in the left Ventricle, but not in the Blood at all: that Light which is in the Blood being but the Beams of that which flasheth out in the Heart, by a Coacervation of the Spirits in that part, as shall be shewed in its place; and thence disperseth again in the Blood and its Vessels, where therefore it can not shine.

3. The Spirits, saith *Walæus*, called Vital, by reason that they come out of the Heart, *cum Sanguine permisti*, move with the Blood, *eadem ratione moventur*, or the same way from the Heart. And therefore are in the Blood, since they move in and with it.

4. They grant all with one accord, that the Blood in the Vessels near the Heart is Spiritual, hotter, thinner and more full of Steams than that in the Veins which are more remote from it, and is made moveable by it. *Quod fit*, saith *Walæus*, *à spiritu um majori minorive copia, prout magis minusve Sanguis à Corde distat. Spiritus Fluxionem atque motum exhibent*, saith another of their Tribe; perceiving that the Blood stands, and congealeth and grows cold when it hath lost its Spirits.

5. That the Vessels near the Heart pulse and beat, the others not; because those being nearer than these to the Seat of Life and the Store-house of Spirits, those become more exposed to their *Impetus* and Force, than

than these which are more remote, and receive a Force from them, I mean from the Spirits, capable to make them beat: which Force growing less and less, as it removes from the Heart, and comes to remoter parts, is too weak to make these beat, when it is come into them.

6. They grant, *Harvey* amongst them *pag.* 104 and 106, That the Reason the Tunics of the Arteries are thick, and stronger than in the Veins, is the same, *viz.* to resist the great Force and Violence they are more exposed to, than other remote Vessels; and to hold in the Spirits, that they may not sweat away, as they do through thinner Skins; and thereby may be convey'd as far as necessary. *Harvey* owns the Force of that Impulse, tho' he derives it from another thing than we; but as soon as it appears, that the Heart doth not expel, and that the Spirits, not Blood, is that which comes out of it, it will be clear that this Force proceedeth from the Spirits; and that Spirits exist there, and occasion that Motion.

7. That Air and Blood run and flow out of a cut Artery with a continual Motion; (it is *Harvey* that shews this *pag.* 3. of his *Proem*) and so are there together, or they could not both come out. Now, the Air being it self Spiritual, and a Spirit; or however the Vehicle of the Spirit of the World, which cometh down from Heaven: it is the same as to grant the Existence of Spirits in the Blood, or with the Blood.

8. That *Vena Cava* doth beat whilst the interjacent Veins, through which, according to them, Motion should come into it, and the Venous Artery it self, tho' an Artery and that brings Blood to the Heart as well as *Vena Cava*, do not beat, (*Harvey* him-

himself saith ſo of that Artery *pag.* 104.) which ſhews that this Impulſion and Beating of the *Cava* comes not from that of the Blood, but from ſome other Agent, (to wit, the Spirits in it,) than in all the other Veins; which Spirits come into it from the *Chylus* and the Viſtuals, being more diſſipated and looſed from their Matter, and ſo acting more freely and powerfully in it than in the *Vena Porta*: whereas all the other Veins and the Venous Artery being remote from the Heart, and having not this ſupply of Spirits, cannot ſhew it by a Beating and Motion.

9. That the Veins and Arteries, when bound, ſwell to a Hardneſs, and feel hard in that Swelling, which cannot come from the Blood without the help of Spirits: *Non enim tendi poſſent in talem duritiem*, and eſpecially upwards, as *Walæus* himſelf ſaith, *a tenui liquida Sanguinis materia, niſi a ſpiritibus ſuſum impelleretur*.

10. That the Veins cannot let out Blood without a Ligature, but the Arteries do it; becauſe thoſe have not Spirits in them enough to drive it; whereas theſe have a great many, which make out their way themſelves in their progreſſive Motion from the Heart to other parts; and carry along with them their Vehicle, or impel it with Impetuofity, according to their nature, (which is *impetum faciens*) whence it gulleth and leaps out of any cut Artery without any Ligature. But the Blood in other Veins being not ſo Spiritual, cannot run out of it ſelf; its few Spirits being not capable to impel it, except they be reſtrained, and by that Reſtraint gather and muſter up Strength enough together to impel it. Whence, when a Vein is cut off, it ſhrinks in and the Blood ſtops; whereas in an Artery it happens

pens quite otherwise, all the Blood in the Body running out when it is cut, in less than half an hours time: as *Harvey* saith pag. 57.

11. That by the Experiment pag. 66. of *Harvey*, of loosing the Ligature when the Arm is bound up straight, or, as he calls it, *changing it into a middle one*, they shew us the Existence and Motion of the Spirits in the Blood and Arteries, tho' unwilling to name it; his Observation being, *One might see the Heart and Blood (the Impediment, saith he, being as it were removed) enter in by Pulsation, and something breathed into the Hand from the Arteries, and dispersed all over that part immediately*, it being on a sudden heated and swelled by it. That something breathed into, and accompanied with Heat, what can it be but Spirits? for nothing can be breathed but a Breath or a Spirit; and the very heat denotes the Spirits there in Motion: and this sudden Intrusion and Heating is an Effect and Proof of their *Impetus*, and flashing out, as it were; the Blood being incapable of moving, and of heating, and causing such swelling without the said *Impetus* of the Spirits within it.

12. That the Heart being cut out of the Breast, and to pieces, it moves for an hour after distinctly, if it be whole: see *Harvey* pag. 61. but however a good while when it is cut to pieces, and the pieces beat and wriggle like the Flesh of a Viper which is dead alive and cut after all the Blood is gone, and when they have left beating, if they be gently warmed, they begin to beat again: which comes first, saith *Waleus*, from that the Spirits therein, *a calore vegetiores facti melius ei cause possunt inservire quæ in Cordis Pulsu facit*. Secondly, That *Spiritus in carne Cordis contentus & queritans exitum exemp-*
tas

tas & dissectas à Corde partes movet: whereby they own both Spirits and the Motion of the Heart by them, and not from the Blood, nor by its Nerves and Fibres; for being cut to pieces with the pieces of the Heart, how can they draw any more, and cause the Heart to contract?

13. That upon the *Systole* the Heart grows pale and whitish, but red and fiery again upon the *Dia-stole*; which comes not from the absence and the presence of the Blood, which *Harvey* derives it from; but from that of the Spirits which flash in the *Dia-stole*, and pervade every Pore; and then retire and pass away in the *Systole*, appearing there in the Heart, and disappearing again, as in the Lips in the Face, and in the privy Members in case of Fear, and Anger, and Shame; and Lust in the last. For tho' they commonly say, that the Blood flies in the Face when we Blush or grow Angry, yet it being a plain case that it is not Blood which makes the other red and fiery, for no Blood comes into it when it encreaseth in Bulk, but store of Spirits only; we may conclude the same thing of the Face and of the Heart; especially seeing that there is never the more Blood in any inflamed Part for its looking very red; nor the less in a pale Face, for its looking wan and pale: the Spirits and the Tincture in sound Blood being the cause of the Redness of the Face by their Irradiation. Neither can the Blood appear through the thick and massy sides of the Ventricles of the Heart, tho' never so full of it, as it doth through the thin Veins; which yet look blew, and not red: nor can the Blood penetrate so far into the Substance of the Heart as to be seen, and make it look red without; this penetrative Virtue belonging to the Spirits: where-
with

with the Blood boils and sparkles; and whereby *tota sua natura agitatur*; saith the Prince of Physicians.

14. Add to this that by-saying *pag. 74.* That if in Phlebotomy any Passion of the Mind which causeth Fear and Swooning, intervene, the Blood will stop, and run out but drop by drop; they do tacitely confess that the Blood moves, goeth and stops, by the means of the Spirits; for how can any Passion of the Mind have an Impulse and Influence on the Blood and the Heart but by their means? as shall be shewed in answer to Doctor *de Back's* Reasons. And it is the Mind moved by the Imagination of that which she hopes or fears, that doth either strike a damp upon them, or stir them up: nor is the Blood susceptible of Fear and Sadness, or Joy. As the Blood leaps from the Heart and the Arteries, when cut, by the means of the Spirits, and moves by them in the Veins after the Heart is cut off and taken from the Body; so it is for want of them, or of their Function, therefore, that it stops its Course, and comes from the Veins but drop by drop.

15. And in fine, they confess all that the Parts grow lean, and cease to receive their Aliment when the Arteries are bound; *Inhibito aliquo modo per Ligaturam influxu Spirituum*, saith *Waleus*; the Spirits being their true Aliment: for *Alimentum non est tale*, saith Hippocrates, *antequam in tennes vapores convertatur*. And so it follows from hence, that as the want of Spirits is the cause of their Leanness, so the abundance of them is what makes them fat and plump. And this shews their Existence and their Motion from the Heart, through the Blood, into the Parts, to feed and to make them fat; all Fatness coming from them, as appears from that it yields a Flame, and burns all away, as all spiritual things do.

16. All

16. All these things, and many such, too long to be brought in here, which are Proofs and Arguments of Spirits in the Body, moving the Heart and the Blood, they see, I say, and own; nay, make use of them themselves in answer to Objections, and to prove their own Notions, (for they are all excerpted from *Walsus* and *Harvey*, and are their own Suggestions :) But it seems they are so fond of their darling Invention, that rather than to forego,

Quæ authoris tacitum pertendant gaudia pectus.

the hopes of being Authors, which so tickleth their Fancy; they shut their Eyes against them, and whilst they deny Motion, by taking away the true and the only Cause of it, they establish a new one which never was in Nature; and cry out an *Εὑρηκα* of a thing which exists but in their deluded Fancy. And without Cause efficient of their new-found Entity, they declare right or wrong for it; and right or wrong will make it out of the Blood and its Vessels, sticking there without further Enquiries; and without raising their Thoughts higher for the Cause of it, than what they can feel and touch, they conclude as Children do, that the Blood and the Heart move, because they see them moving; as if Life, Heat and Spirits, and all that they own themselves, were nothing to their Motion, and were not to be thought of, whilst they have the Cause of it under Consideration.

The Fifth Chapter.

*A further Proof of Spirits in the Blood,
and in the Heart, from others than
their Authors.*

HAVING shew'd from their Authors the Existence of Spirits in the Body and the Blood; and their Influence upon the Blood and all its Vessels; it will be necessary for the better convincing of those Men that know no more of these things than what they hear, to demonstrate those two things, by Reasons drawn from Nature, and from the Authority of others than their Authors.

1. And first, all Ancient Authors, and most of the Modern ones are unanimous in it: And *Moses*, one of the first, and who was a Scholar bred in the *Egyptian* Learning, and so knew what was Sense, faith, That God breathed into Man the Breath or Spirit of Life, and gave Life by that Spirit. *Gen.* 2. 7. which is called ever since, of all, the Spirit of Life. And faith further, That the Blood, (which according to *St. Johns* 1. Ep. 5. 8. being the third in order, answereth to Gods Spirit) is the Vehicle of the Life of Man, nay, the Life it self. *Gen.* 9. 5. as containing the Spirit that gives Life and maintains it.

2. And *St. Paul*, *St. James*, and Christ himself Teach, That the Spirits give Life and Motion, quicken, and keep the Body alive. *John* 6. 63. *2 Cor.* 3. 6. all things dying without them, and falling into decay

decay when they are bereft of them. *Jam. 2. 26. Ps. 104. 29. 30.* And the same with all Wise Men, make mention of the Spirit, and of the Soul and Body. *1 Thes. 5. 23.*

3. But supposing Christ, St. Paul, St. James, and Antiquity, and the Inventors themselves, understood not what they said, or Spake after the usual manner and common Notion, the last may see them themselves, and by their own Eyes convince themselves of their existence in the Blood and the Body, if they will but look upon the steams that rise from the Blood, and from their Legs and their Arms and their Hands when they are hot, and put them out of their Bed in the cold Air in Winter; those steams being but Spirits issuing and exhaling at the Pores with their moisture, which they never go without, but carry along with them, and turn it to a Vapor that they may raise it with them.

4. And if they will not believe that God breathed into Man the Breath or Spirit of Life, they may see we still breath it, and Live by breathing it in, and Dye without Remedy when we are kept from the Air and the Spirit it transmits; and as soon as we draw it no more in, or respire: And they may smell it besides, when let out at the back Door, or coming out at the Mouth of one hath a stinking Breath; and taste it and feel it too by its heat, and the swelling it produceth in the Veins, and its passage under their Fingers in the Arteries, and by eating things Toothsome and pleasant to their Palate. *Tanta enim omnibus Spiritus necessitas, ut si absque omnibus cibis per plures dies Vitam ducere possint, ipsis pereundum sit si quis Spiritus vias exiguo tempore in eos intercludat: Spiritum accipimus tam Ore quam Naribus, qui ad Cor delatus in sinistro illius Ventriculo*

culo majori quam in dextro assultu impetit et propulsat; unde non mirum est, continet Hippocrates, cum non nisi Spiritus et Aer in sinistro Cordis conceptaculo quidem contineatur, id esse a Natura solidius conditam, ut magis accommodum ad impetum ejusdem Spiritus sustinendum; atque calidi robur melius asservandum than the other; which being mollior & laxior, is fitter to contain Blood, as it doth; and is therefore called by Anatomists, which knew well the difference between them, Sanguineus.

5. And whatever they believe, it is certain, that the World, having its Being from God, who is a Spirit himself, *John 4. 24.* must be Spiritual also in its Birth and Beginning, and draw its Original from invisible Principles, that is to say, from Spirits; as the Heathen own themselves, amongst them *Lucretius*. And accordingly we read, That the Spirit of God was upon the face of the Deep; and rising from the Centre, where God was breathing it out towards the Circumference; not fluttering over it, as those that know little of God, and of his Works, translate it; for God is in the Centre, and the Centre of all things; and as he hath produced all the Worlds out of himself by the Virtue or Spirit, which issues always from him, *Psal. 23. 6. Luke 8. 46.* so he hath produced this from the Breath rising from him, as from the Centre, upwards. This Spirit thus infused from God into our World, is that which gives Life to it, and to all things within it; and is the *Cibus Vitæ* of all its living Creatures, as proceeding from the Mouth of that God, *Mat. 4. 4.* that upholds them, *Heb. 1. 3.* that is, gives them Sustenance. And it comes down from Heaven in the Air and the Water; whence it goeth into the Earth

Earth by its Chinks and Crevisses at the bottom of the Sea, with the Water its Vehicle, of which Minerals are made; and coming down from Heaven, it brings both Food and *Healing* to the Soul and the Body. The Spirit that heals the Soul, or brings it Health or *Healing*, being the Wings or Efflux of the Sun of Righteousness, *Mat.* 4. 2. and differing from that which comes from the Sun of this World, but in degrees of Pureness; this being mixt with Water; but this unmixt, pure and simple. That which was breathed in Man, *Gen.* 2. 7. being but the same with that which was breathed in the World, *ch.* 1, 2. and both these Spirits but one and the same Spirit of God.

6. The Steams rising from the Blood, and from the Limbs, when sweating, as it is said in the 3d Paragraph of this Chapter; and the very words themselves (which are the Work and Effects of the Spirit of the Heart sent forth, and beating the Air by the Agitation of the Tongue within the Mouth, as appears from that the Voice, is according to the Strength of the Body, high or low) are sufficient Proofs of the Existence of the Spirits within us the little World; as all fermented Spirits of Herbs, Corn, Sugar and Wine, made so subtil and refined by often rectifying or separating their Flegm, that when cast up in the Air, they will not fall down again, are the same in the great World. By their Heat, we can feel them when they come down from the Sun; and from the Fire or Heat of any living Creature. Every Candle burning and sending forth of its Rays, Inflammations and Swellings, Anger, and Blushing for Shame, and Lust burning in the Parts; all Odours, sweet and stinking, Exhalations and Vapours, Magnetisms and Sympathies; loss of Strength.

Strength by hard Labour, swooning Fits, the Palsy, Fear, which come for want of Spirits, proclaim all their Existence. And in fine, saith an Author, *In Physica & tota rerum natura Authores semper Spiritus allegandi; Vita Morbus, Sanitas, & totus visibilis mundus ab his regitur. Et nullam naturalis & præter naturalis actionis solidam causam reddere potes, nisi ex Spirituum esse seu Essentia.*

7. *Quare.* What is a Spirit? *Answer.* It is a Substance invifible, immaterial, incorporeal, and fimple and pure, or unmixt in God: but in the World, where it was at first mixed with Water, *Gen. 1. 2.* it is become a Concrete, and hath the three Dimenfions which all other Bodies have. And in every Body it is a Spark of that which God infused in the World, and into *Adam's* Body; the Substance of Substances, that actuates all Substance, being that alone exifts; for God, of whom that is faid, *Exod. 3. 14.* is but a Spirit himfelf; and all other things vanifh in a while, and difappear.

8. Of Spirit and of Water results Matter, Earth, Body; thefe three things being the fame, produced by the fame means, *viz.* by the Spirit turning the Water into Vapour; then, by working upon it, in-
 fiffating it to Oil; and concocting of that Oil, or that Sulphureity, by continuing to work and act longer upon it, into a Salt or Body; for *ejus ope totum cum toto compactum est*; which Salt is Earth, and Matter: faith Doctor *Hippocrates*, who makes Water and Fire, that is, Water and Spirit, (which he calls *πῦρ ἀκρόν*, and faith, that *sicut ignis ex internis rerum Spiritibus elicitur, sic & ignis iterum in invisibiles Spiritus resolvitur*) the first Matter of the World. *Zeno* made God and Matter the two Principles of all things; which is very found Do-

Strine: for God being a Spirit, and this Spirit the Substance, and Ground, and Stock of all things, all things must proceed from it, and Water joined with it, (which is the other Principle) makes Matter, as I said: the Matter of all Bodies being a Concrete of both God and Water, at this rate. And the Truth is, that Nature is but God himself *Nascens*, or bringing forth of himself: God is not at all cut off, nor so far gone from his Works, as the Corpuscular Tribe, which are Heathen, imagine. *Aqua dicitur quasi à quâ fiunt omnia*: all things growing together out of it, and God's Spirit, working always upon it whilst in the form of Vapour, and giving it a closer or a more compact Texture.

9. Take May Dew which hath been long circulated in the Air, by rising and by falling often in a hot Summer; this Liquor so sublimed, which is as clear as Crystal, should have neither Salt nor Oil, yet in five Pounds of it it yields three Spoonfuls of Oil, (which burns like all other Oils) and a pretty deal of Salt, distilled in Ashes or Sand. Whence comes this Oil and this Salt in this circulated Dew, which by its Circulation should have left them both behind; but from the Spirit in it, that work't upon its Vehicle whilst in the form of Vapour; and thickened it by degrees to an Oil, and to a Salt: never found in Snow or Hail, tho' but a Vapour themselves contain'd in the Atmosphere, and congealed by the Cold; because being congealed, the Spirit they abound with, is bound up in them also, and so benumm'd by the Cold and astringent Quality that predominates in them: that it cannot work in them; and produce a Salt and Oil.

10. To conclude, they may gather from that there is neither Pulse nor Breath in any Creature but whilst they live and draw Breath, that the Breath which they draw in doth contribute to their Pulse and Motion, and is in them. Especially, seeing that we are refreshed by Sleep, and by taking Rest and Breath when we run fast or work hard; the Spirits which we had lost, and had within us therefore, being restored in Sleep, because we breath freely then, and suffer no loss of them, as we do when we work hard.

11. From these things, and the Roughness which is in the left Ventricle, (which is rougher than the right, being crumpled almost like *Arteria Aspera*) they may conclude upon Air and Spirits in that Ventricle; that Roughness being caused by the Air which we breath in, coming by puffs into it, and giving it that Figure whilst its Substance is tender; that Air making its Substance as it were to undulate and configurate it self, as Water doth when frozen whilst the Air agitates it: or it may proceed also from the flash rising in it by Puffs, and by Intervals; as shall be shewed hereafter. The Reason *Hippocrates* gives of this greater Roughness in the left than in the right, is, that the left *continet*, saith he, *ignem innatum*, & *ita est trahendi facultate præditum*; drawing the Air to feed it, as all other Fires do. Whereas the right being not the Seat of the innate Heat, *non multum almodum aerem ad se trahit*; *nec, quia imbecillus, cum assultu impetit*: and therefore remains smoother, like that of those Animals, which having no Lungs, breath not.

12. And likewise from that the Lungs keep Pace and Correspondence with the Ventricles of the Heart in their rising and falling; and are parted in the

middle by the *Mediaſtinum*, that like a double Bel-
lows they may ſend out of both ſides to both Ven-
tricles of the Heart, the Air they draw in by turns ;
to which end the *Valvula* of the Venous Artery, and
of the Arterial Vein open and ſhut contrary ; to wit,
one towards the Lungs, the other towards the Heart,
that theſe may ſhut and keep cloſe whilſt the other
ſide opens ; from the which Correſpondence and A-
daptation of Parts, they may gather, I ſay, that the
Air the Lungs draw in, is to be ſent to the Heart,
to feed it and reſreſh it, and that the Heart moves
by it, and ſends it into the Blood ; and that the
Heart and the Blood therefore have Spirits in them ;
all Air containing Spirits ; and being, as hath been
ſaid, the Vehicle of that Spirit which cometh down
from Heaven, to the Center of the Sphere.

13. Well, what then ? what are all theſe Pream-
bles to the Buſineſs ? Yes, they are, for they ſhew
that there is a Spirit in Man, *Job* 32. 8. in his Heart
and in his Blood ; and that theſe Spirits being the
Agent of all Motion, and the only thing that moves,
you ſhould take notice of them in ſearching into the
Cause of the Motion of the Blood, and raiſe your
Mind and your Thoughts higher than the Heart it
ſelf, and the Blood, and its Veſſels, (where you ſee
the Motion is) in ſearching out that Motion : and
Query within your ſelves, whether theſe Spirits
might not have ſome Influence in it. For as tho'
God had breathed no Spirits into the Deep when he
created this World ; and tho' we breathed none in,
you run on with Expulſion, and expelling Faculties,
by what, you know not your ſelves, as ſhall be
ſhewed in its place ; and as tho' there were nothing
done by Spirits in Nature, you turn them out of
Phyſick, (as others have done likewise of late in
Divinity,

Divinity ; so that now we may both live and be saved without them, contrary to the Scriptures) and build a whole Theory of Nature, not in the Air, for then it were pretty well, the Air being full of them; but upon nothing at all but *Chimeras* and Conceits. What a rare World should we have, if in creating of it, God had taken your Advice ! And some of you have the Face to deny their Existence ; nay, and on no better Ground than that they cannot see them in the Vessels when opened. As tho' they could see the Air when it tosseth up huge Ships, with the Waves they ride upon ! and throws down Towers and Trees, pulling these up by the Roots ! and the Souls of their Patients flying away when they die ! This is the Philosophy of a certain *Dutch* Head-piece, called Doctor *James de Back*, and the Fruit he hath yielded to the Town of *Rotterdam*, for the Pensions they gave him, to teach to Philosophise. But yet which Doctor *Harvey* makes use of in his Proem, for an Argument against the Air passing to the Heart through the Venous Artery : as shall be said in the next.

14. You Heathen Philosophers, hear a wise Heathen speaking : *Id omne quod cælum & terram interjacet, spiritu refertum est : Idque hyemis & æstatis causa existit ; per hyemem quidem condensatum & frigidum, per æstatem vero leve & tranquillum. Quin etiam Lunæ solis & astrorum viam Spiritus dirigit. Igni enim Spiritus nutrimentum præbet, eoque privatus ignis vivere non potest ; atque adeo perennis solis cursus, aerem perennem & tenuem esse facit. Quin & in mari ipso Spiritus esse quandam communionem, inquit, natantibus in illo, cuius manifestum : sine spiritu enim nihil vivere potest. Et Lunæ in eo sedes est ac fundamentum : hicque terræ*

*vehiculum; neque quicquam spiritu est vacuum. For
vis omnia plena. Atque hæc quidem causa est cur
in omnibus aer tantum possit.* I hope there is more
Sense in this than in your Particles of Matter, Ma-
terialists.

The Sixth Chapter.

The Lameness of the Reasons, Arguments and Conclusions of all the Circulators.

HAVING seen their Over-sights, or what they
have over-seen, in treating of the Motion of
the Heart and of the Blood, we will now, to give
a guess at what we are to expect from the rare Ge-
nius and Skill of our Circulators, see what it hath
produced in drawing Consequences, and making the
Conclusions, which their new Discovery and No-
tion is built upon. And we will begin by their
Ring-leader, *Harvey* himself: and by that which
hath been said of him in the last Chapter.

1. *First*, He saith in his Proem at the top of
pag. 10. these words; *Why, when we cut up Arterial
Venosa, can we find no Air nor Fumes, if Air and
Fumes go through it? Because they are invisible;*
and tho' visible, were gone through, and did not
tarry within till your Eyes could perceive them; for,
pray, are they to be seen when they cause the Head
to ach, and the Tongue and Throat to swell? Fumes
or Smoak are but Spirits exhaling from some Mat-
ter, which hath not Moisture enough to make of
it a Vapour.

2. And

2. And he saith in the same page, *If a Man cut the Wind-pipe of a Dog, being alive, and forcibly fill the Lungs with Air; then binding that Pipe, cut up the Breast; he shall find great store of Air in the Lungs, but none in the left Ventricle and the Venous Artery: therefore, saith he, if the Heart did either attract the Air; or the Lungs did pulse it through when the Body is alive, they should have done it much more in this same Experiment; and some Air would have been found in that Ventricle, &c.* Yes, if you had shut the Door, that is, the great Artery, by binding of it also: for if you can bottle up Air in a Vessel hath a crack, or is open at one end, you are a great *Apollo* above all your Companions: and if undigested Air was to be at any time admitted into the Heart! *Qua enim ratione, saith the Great Hippocrates, ventus & aer, cruda cum sint, in alimentum cedant?* And tho' the Air did not pass from the Lungs into the Heart so fast as into the Lungs, yet it doth not exclude that thin Breath which can't be withheld; and finds its way through the Pores of the Substance of the Lungs, when the Body is in Health; as well as the Blood it self to the Venous Artery. *Quandiu corpus Sanum est, est totum, saith my Master, pervium, & transpirabile, atque permeabile, spiritibus scilicet:* but not after it is dead: and blowing in of crude Air, is enough to constipe it.

3. In the same Proem he saith, (to shew that the *Diastole* of the Heart and Arteries cannot be at the same time) if the Heart and Arteries be distended together; how can these draw from the Heart, and the Heart expel and press the Blood out at the same time? *Answer,* And what needs one draw, if the other doth expel? and it expels the better

better for their being distended : and if the Force of the Heart is able to drive the Blood, as you say, from place to place ; I see no Reason why the Arteries should not be always full and distended ? and what Occasion they have to come to a *Systole*.

4. By his own Hypothesis both the Ventricles expel Blood, and both thrust and expel it by their Beating and Motion : and pag. 40. he saith, that *the Heart brings forth the Blood out of the Vena Cava by the drawing*, they are his own words, *of both its Ventricles* : and so *by its Pulsation, and its Beating and Motion brings it forth and transfuseth it from the Vena Cava into the great Artery* ; which is a peculiar way to draw by beating about ; besides the Contradiction of drawing and expelling by one and the same Action.

5. In the same Proem he saith, that the Constitution of both Ventricles are alike, that both serve for the same Use, *viz.* to expel and receive, *are almost all together*, both after the same manner in their Form and Position, and their Parts, Vessels, Portals, Ears, Fibers, framed alike ; and both of them equally full of Blood in Dissection. But pag. 95, 98. he saith, *That the left Ventricle being placed in the middle, possessing the middle of it, seems to make up the Heart of it self ; and by reason that it needs more Force to pursue the Blood further through the whole Body, it is stronger than the right ; hath a Wall three fold thicker, and Fibers stronger, and more in number than in the right ; and is fenced with higher Ditches, and in fine, framed with so much greater Diligence, that the Heart seems to have been made for the left Ventricles sake.* Whereas the right doth not reach to the top, and is made up of a three times thinner Wall, and is more capacious
for

for administering Matter and Nourishment to the left; is smoother in its inside, and hath no Fibers at all, or else fewer and weaker; and seems, as it were, to be but a Servant to the left. How this agrees together, let the Circulators shew. The Truth is, the left Ventricle is round and wrinkled within, bossed on the *septum* side, or protuberating like the boss of a Buckler: but the other is oval and smooth, or smoother at least; concave on the *septum* side, and full of small holes in it, which go acuminating, and ending like a Funnel in the boss of the other, for transmitting into it the thin Vapours and Spirits extracted out of the Blood, which the right (witness *Harvey* just now) doth nourish him with, these holes being in the left so small, that they are not seen. Then the right Ear is larger, and of a looser Texture, and much softer than the left: and the Vessels coming out of the right, are two large Veins; and those come out of the left are two smaller Arteries. All which are strong Arguments of two different Uses; and proves, that *nullo modo*, according to my Master, *sunt inter se similes*.

6. He saith pag. 58. that in Anatomy a great deal of Blood is found always in the right Ventricle, but very little in the left: whereas pag. 8. he saith, that both are found full of Blood; and pag. 27. he found no Blood in either.

7. Pag. 3. of his Proem he saith, That in the *section* of an Artery the Air comes out of it with the Blood by a continual Motion; nay, and that Air, I add, sometimes blows out a Candle; but pag. 5. he teacheth, That Blood and Spirits make both but one and the same Body, as Whey and Butter in Milk, and that this Body is Blood it self, *and nothing but Blood*. Which if so, how comes that Air to be distinct

finct from the Blood, and shew it self distinctly at its running out with it? and note, That what he calls Air in the Blood, is a Spirit; for crude and untemper'd Air is not suffered in the Blood, before it hath acquired the due Nature of Spirits.

8. He affirms pag. 30. That *the Ears abound with Blood, as the head Spring of the Veins, and the Cistern and Cellar of Blood, and that they give and supply the two Ventricles with it.* But pag. 96 and 107 he saith, *That the Heart and its Ventricles are the Well-spring, the Store-house, Fountain and Cellar of Blood;* tho' supplied with it themselves from the Ears. Now, which of them is the Fountain it springs from?

9. He saith pag. 48. That wise Nature was forced to add a second Ventricle to force the Blood through the Lungs out of the *Vena Cava*, because she desireth that it should be streined through them; yet without shewing for what Nature should desire it, and by what the Heart expels, and from whence it comes to have an expulsive Faculty. But this, tho' *gratis dictum*, is enough to serve their turn. Many other things want proof, which are taken for granted, because alledged by them: as that of nothing but Blood passing away from the Heart: and that whilst Life is in force, there is Blood in both Ventricles.

10. He concludes, that the Vessels and the Heart swell to Hardness, because they fill up with Blood. But *Walens*, the other great Prop of this Invention, saith this hard Swelling is *à vehementia motus, quæ spiritu venit.*

11. He and *Walens* assert a stronger impulse of Blood, and a greater Expulsion of it from the left Ventricle than from the other: see pag. 106. of *Harpey*:

vey : yet he saith in the next page, That the Arterious Vein hath a wider Orifice than the Venous Artery, *to carry more Blood than it*, as if, according to him, *Arteria Venosa* were not to bring back the same in the self-same space of time ; and if a Stoppage of Blood, or of the Motion of it, would not ensue and happen by that Inequality, in case of Circulation. And why is the right Ventricle supplied from larger Vessels, and the left from smaller ones, if the left doth expel more, or both expel equally ?

12. And he, with all the rest, saith, That the Blood doth circulate or go often through the Heart, to condense and rarefy ; *ut per eam frequentem rarefactionem & condensationem, ad generationem spirituum vitalium sanguis aptior fiat*. Whereas *aspiritibus ipsis jam generatis sanguis rarescit ipse* : as they confess, see § 4. of ch. 4. A pardonable Mistake, forsooth, in Philosophers, to make the Effect the Cause, and to send Blood to the Heart for Heat and Rarefaction ; when one of them saith the Heart borrows his Heat from the Blood, and not the Blood from the Heart. Doctor *Willis* is the Man hath found out this new Reason.

13. They say the Blood is expelled because it is offensive and troublesome to the Heart after it hath been alter'd, or made hot and thin by it ; whereas to the contrary it is not fit for the Heart, nor for any other part, before it is hot and thin : for *alimentum non est alimentum* before that it becomes a thin Vapour. And if grievous to the Heart, why do they make it to be its Store-house, and its Cistern ? and fill both Ventricles with it ?

14. They say a Suffocation of *calidum innatum*, or innate heat of the Parts, and a Gangren thereupon

on may happen, as it is true, by the Blood running in them when they are bound up too streight. But whilst they fill up the Heart, and both its Ventricles with Blood; and especially the left, which is the Seat of that Heat, they are not at all afraid of that Inconveniency; nor of another greater; to wit, of Suffocating the Light and the Flame of Life it self, which springs in the left.

15. They alledge for their reason, why the Arm, when bound up so that the Arteries may beat, doth not swell to a great bulk towards the Hand, by the Blood continuing its Circuit, and returning from the Hand; that it is because the Blood can return *per latebras & cuniculos quosdam qui sunt sub ligatura*. Whereas they might rather say, that if it cannot go through those streight chinks in its return, it doth it not in going, and so doth not go thither, and occasions no swelling. And that the Spirits which are the cause of all those swellings (as they acknowledge themselves, *ch. 4. §. 9.*) being fitter than the Blood to go through those Passages, may go in and out through them; as they do; which is the cause that *ad plures menses annos ve pars constricta*, may be fed and nourished: the reason *Walens* gives of this, being frivolous.

16. They say one of the causes of the motion of the Blood is its weight or gravity. Whereas its moving upwards by the ascending branches cannot proceed from that Cause. But they did not think of this, because *Bonus homerus jam non dormitat* sometimes, but is now always asleep. It may be they think the Blood grows lighter when it ascends; and changeth its Qualities as fast as it shifts places.

17. *Willis* saith, pag. 51. of his kindling of the Blood, *Quod cor asanguine & non sanguis a corde, calorem mutuatur.* Whereas the Blood being cold and without heat of it self, as hath been shewed from *Galen*, *Hippocrates*, &c. it can't give what it hath not; nor kindle or yield from it self Fewel for a *Flammula*. And Doctor *Lower* denys this *Flammula* in the Blood, pag. 163. of his Treatise of the Heart.

18. And saith, both in the same page, and in page 61. that tho' the Heart be a Muscle, *& motu animali tantum exerceatur, solummodo sanguinis circulationi inservire videtur; & ab hujus visceris motu circulatio dependere fatendum.* Now, the Heart being the Seat, and Centre, and Circle of Life, from which all Life flows and springs, if it hath no other Use than to circulate the Blood; Life, it seems, depends wholly upon this Circulation, and cannot be without it. But it subsists without it, as shall be shewed in the next chapter § 4. And if Life depends on it, how could any before them restore Health and preserve Life?

19. Doctor *Lower*, in his Tract pag. 81. asserts, That *Cordis Diastole libratis adeo vicibus non succedit nisi a sanguine in illud irruente:* and pag. 74. That the Motion of the Heart doth not depend on the Blood. But if the *Diastole*, which is the principal part of the Motion of the Heart, be from the Blood running in, its Motion depends on that, and so depends of the Blood. And I doubt the Doctor could no more reconcile this, than shew us from whence proceeds the heat which is in the Heart; from the Performance of which he hath excused himself, pag. 74. putting it upon *Willis*.

20. They

20. They grant, That the Heart it self, and the pieces cut from it, move and beat by their Spirits *exitum queritantes*, and that the Blood is more apt to move in the Arteries, because hotter and thinner than the other in the Veins: and all this from their Spirits; which the Heart and its pieces have, tho' out of the Body: and they will not allow this to their Heart, and to their Blood, whilst whole and in their Body. But casting their Eyes far off to t'other end of the Earth, and over-looking of that which is standing before them, they seek for the Cause of that Motion they see in the Blood, not only out of the Blood, but in things where it is not, and where it can never be.

21. One will have a *Flammula* in the Blood, the other not: one ascribes that to the Blood which the other grants is done and performed by Spirits: one admits the Existence of Spirits in the Body, and the other denies it; and they contradict themselves; say, unsay, and take and leave; and after every one, and all have said what they can, they shew and make out no more than a Motion in the Blood, which no Man ever deny'd: but for a distinct Motion, by orderly Pulsation; nay, and a Motion it self of the Blood *in circulum*, *hoc nimis arduum est*, it is God's Prerogative, *de hoc quid concipere*. And many other such Scraps of their Learning and Wisdom might be pickt out of their Books, and produced against them; but these few are sufficient to give a true *Specimen* of what their Lyncean Eyes have spied out in this Matter; and of the Solidity of the Ground and Foundation of their Building and Structure.

The Seventh Chapter.

Arguments of the Author against the Circulation.

HAVING done with the Weakness of the Reasons they offer for Proofs of their Invention, and made Objections against the Particulars of it; I will here suggest some against it in general, to shew the Unlikelihood and Impossibility of the Invention it self.

1. *First*, They have not yet proved, that whilst Life is in its force, there is Blood in both Ventricles; nor that it is Blood only passeth away from the Heart; and till this appears fully, their Notion is not proved: and all their Reasons therefore standing upon no sure Ground, are far from Demonstrations; and but lip Labour, or Talk.

2. All their Arguments prove but a bare Motion of the Blood, and a Dilatation and Pulsation of the Heart; but for its pulsing always orderly by Intervals, they freely confess themselves, that they are not quick-sighted enough to dive into it. So that their Discovery being but of a thing which was known to every Man, and denyed by no body, is in Reality but much ado about nothing.

3. Cutting the Arterial Vein, and Syringing some hot Blood through the same into the Lungs, none of that Blood will be found in the Venous Artery; nay, nor in the Lungs themselves in passing through their Substance, as they say it ought to do. And if all the Blood they say should pass, in circulating,
D through

through the Streiner of the Lungs, their Substance would be at least as bloody as the Liver, or any part of the Flesh: but we see it is not so, and no Blood is found in it after Syringing of it: therefore it doth not appear that any Blood goeth through it: and so their Circulation must stop and stay there a while, till they find another way for it than that is. If they say that this happens by the Reason I give against the Air Syringed in the foregoing Chapter, because the Lungs after Death ceasing to be pervious, admit neither Air nor Blood; I answer, however, this Experiment of mine stands upon the same Reasons, and is as valid as theirs, and more too, because the Blood being not Syringed cold, is not so apt to constipe the Lungs as their cold Air was.

4. They say the Blood circulates to convey Life to the Parts; if so, the Life of the Parts, and that of the whole Body, which is made up of the Parts, doth consequently depend upon that Circulation, and can't subsist without it. But we see the contrary; for when both Legs are cut off, and even above the Knees, we see Life and Health subsist, for all the remaining parts look fresh, and are in good case; and yet the Circulation ceaseth then; as it appears from that the descending Veins and Arteries are cut off, and closed up at the end by the healing of the Part; and keep at the same distance from the ascending Vessels as before they were cut off; so that the Blood can neither go down further through the one, nor return through the other: and it hath happened sometimes, that in a mortified Limb, not a drop of Blood came out of the Artery it self, when that Member was cut off. You say, that it doth return through the interjacent Flesh and the Anastomoses: in which case it must work out its way,
first

first through the Tunicles of the descending Vessels ; then through the adjacent Flesh ; and thirdly, through the Tunicles of the other ascending Vessels, to get into them : which would require more time than the Parts could allow of, and the Life could dispense with ; because the Patient being in a Fever all that time, his Life could not struggle so long with the want of Nourishment, and the force of the Disease preying upon its Vitals. And supposing that the Blood could run through the thick and strong Tunicles of the Arteries, (when thinner Spirits themselves, as was said, cannot do it) it must come into the Flesh as hot and full of Spirits as the Arterial Blood is, and there cause the same Symptoms as when the Spirits break loose, and gather into some Parts ; such as Inflammations are ; which have never been seen there upon cutting off the Leg. So that neither loss of Life nor these Accidents happening when the two Legs are cut off, and Circulation ceasing, Life can subsist without it, and doth not depend of it ; and it doth not convey Life, and is of no use to it ; and so hath no existence in the Body and the Blood. As for Anastomoses to afford it presently a passage another way, is it what you ought to prove : for to say, that all the Blood finds its way in half an hour out of a cut Artery, is nothing to the Purpose ; because in that case the Blood runs clear out of the Body, and must follow from all parts, as in a Crane or Syphon *propter fugam vacui* : but in this staying within and following each other, for the whole is in Motion, it can leave no space empty ; so that there being in this no fear of a *vacuum*, as is in the other case, there is not the same Reason for the Blood forcing its way either forwards or backwards through

all chinks, to supply it. Moreover, half an hours time for the whole Mass of the Blood to run out of the Body, is four times longer than they allow for its running when it is circulating.

5. To this the Experiment in the 15th Paragraph of the precedent chapter, of the Arm being banded up, and yet the Hand not swelling by the abundance of Blood, which cannot return upwards because of the Ligature, may be subjoined, to shew that the Blood keeps not running from the Arteries into the Veins, and forwards, or circulating about: but that it stays and remains in the Vessels where it lays.

6. If the Blood circulated, being as they say it is the Aliment of the Parts, Life would subsist without Victuals so long as the World endures: for then it would, like the World, by the same means it uses, of circulating its Food or Aliment or Spirits from the Sun into all things, and from them into the Sun again, perennate it self; for the same Blood returning to the Heart continually, would feed it continually, without drawing from without, other Aliment or Food; as the Spirits enclosed in the World nourish the Sun without supply from abroad: and the Heart being supply'd, would send Supplies to the Parts, and so on continually to the end of the Chapter, so long as the World it self, from which it first received its Blood and Body, endures. For pray, to what other end should the Blood thus circulate, than to that which the Spirits circulate for in the World? And if to the same Purpose, it must have the same effect: and so Life in Animals must still be re-producing, or perpetuating it self, without supply from the World. But we see it draws Supplies continually from without, and decays for want of them; so that having not its Food and Aliment

ment from its Sphere, it doth not circulate it; and so the Circulation of the Blood is to no end: or if it exist, it is as an *ens rationis vestrae*, in your own Fancy.

7. And if it hath no final nor efficient Cause at all, it is no where in Nature: for nothing hath a Being without, *first*, some End and Use; for God doth nothing in vain, and multiplies not Entities without some necessity: and *secondly*, doth nothing without a Cause efficient capable to produce it. But you can assign neither, as shall be demonstrated; all those you have assigned being insignificant. So that *cessante causa, cessat effectus quoque*.

8. Whilst we live, there is no Blood at all in the left Ventricle; for there would be neither Heat nor Spirits in the Vessels, if both the Ventricles were full; because tho' the Spirits be generated from the Blood, it is not done but by Heat; and Heat is not producible but by a Fermentation or an Effervescency; which requireth, saith *Willis de Accensione Sanguinis*, pag. 52. a convenient empty space into which *Effluvia vaporosa, caloris suffocationem aliàs minantia, foras convehantur, & perpetim decedant*; which space it would have no where, if the Ventricles and Vessels annexed to them were full. *Secondly*, If there were Blood always in the left Ventricle, no Flammula, Light or Flash of Life would break out in it; for no Light ever breaks out where Humidity abounds; but where the Spirits prevail, and are sufficient to turn the Moisture into Vapour; and the prevalent Moisture would (as you confess yourselves, see the 14 parag. of the preceeding Chapter) suffocate the Heat and Flame which ariseth in the Heart. And so if there were no Heat nor Flame in the left Ventricle, there would be no Life in us;

for our Life is a Light and Fire flashing out there, from the Spirits and thin Steams meeting together in it, as shall be made out anon.

9. But that there is no such thing as Blood in the left Ventricle whilst Life is in its vigour; the Experiment describ'd in *Libello de Corde*, by *Hippocrates*, shews you: *Fugulati*, saith he there, *animalis aperto sinistro ventriculo, in totum solitudo apparet, præterquam serosi humoris alicujus*. Which Humour is but the Smoak or Vapour that makes the Flame, condensed into Water by the Suffocation of the Heat on a sudden. Doctor *Harvey* confessing less Blood in the left Ventricle than in the other, too wit, at pag. 58. nay, and none at all sometimes, at pag. 27. seems to acknowledge this Truth. And for a Groat you may have Hearts enough from the Poulterers, to try whether it be true: but they must be of such Fouls as have been suffocated, the word of *Hippocrates* being ἀποφάγιος from ἀποφάγω, to Strangle. And the Reason is, because in Death by Suffocation and Strangling, Motion ceaseth all over on a sudden, yet the Heart being the last mover, as *Harvey* himself argues pag. 58. and the Motion in the Blood ceasing before its Motion, the Blood stands still in its place whilst the Heart is still beating, and therefore doth not run in when the Spring of the Spirits in the Heart, whereby it moves, and keeps the Blood in the Ear from running into the Ventricle, (as a strong Easterly Wind keeps the *Thames* from going down, and causeth the Tyde to swell, and to flow thrice in one day) becomes so relaxed, that it hath not Force enough to keep the Blood out of it: whereas in other cases, where a living Creature dies by Weakness or loss of Blood, or in any other way and manner than by Strangling, Motion

Motion ceasing by degrees, and growing weak in the Heart as well as in other parts, the Heat, saith *Hippocrates*, that is to say, the Spirits, *in moribundis locis, coacervantur*, that is, run towards the Heart, the Seat of Life, to help it; and carry some Blood with them towards it at the same time; which (the Spirits in the Heart being then become too weak and too few to keep it out) is admitted and let in; and that is the Blood is found and seen in the left Ventricle in dissecting of Bodies. The Reason that *Harvey* gives of the Heart continuing to expel some Blood after the Lungs cease to send it in, is next kin to no Reason; *first*, because the Heart hath not the expulsive Faculty which they attribute to it, as shall be fully made out in the four next Chapters: *secondly*, it were so weak (supposing that it had it) after the Lungs cease to beat, that it could expel nothing.

10. If Blood in the left Ventricle, why are not the Walls of it fed and nourished by it, as those of the right Ventricle? And we may see they are not, because the Vessel called the Coronal Artery conveys more Blood into them (to that end, as is agreed and confessed on all hands) than into those of the right: sending many more Branches to the *Septum* and the Walls of the Ventricle on that side, than on the side of the right; the Walls thereof being not so firm as those of the left, are more apt to draw their Food and Nourishment from the Blood; and so need not so many Branches of that Artery, to feed and to supply them, as the sides of the left do.

11. The *Valvulae* of the Heart (waving the Porosity of the Substance of the Lungs) are too straight to let through them that great quantity of Blood

in so short a space of time as they say passeth through it: opening but just like small chinks, fit for the Spirits only to slip in and go out at. *Eaque præcipue*, (saith Doctor Hippocrates, who never took a Degree) *Et justa ratione in vasis sinistrae partis exactiorem sunt molitionem adeptæ*, that they may shut the closer. And if, as *Waleus* saith, they let out pretty large Streams when *Arteria Magna* is clean cut off from the Heart, that quantity answers not to that they say ought to pass; for according to *Harvey*, the Mass of the Blood, which is at the most but 20 Pounds, runs out then in half an hour; and according to *Lower*, who makes it to go round six or seven times in an hour, there ought to pass through at least 60 Pounds in that half hour. Besides, as I have said in the 4th Verse of this, there is a great difference between the Blood running out and forcing good of its way up and down through any chink *propter fugam vacui*; and running in full Vessels upon no other account than *animi gratia*, or to please the Inventors.

12. Cold seizing more readily upon the Extremities than upon the middle parts, is another of my Proofs against the Circulation: for if the whole Mass of Blood runs throughout uniformly, being, as they say it is, the Seat of the innate Heat, it ought to heat all the Parts of the Body, and arm them, and defend them against Cold, every where equally: but we see no such thing; and therefore, till we see it, we suspend our Belief.

13. If the Blood be expelled only in the *Systole*, its Motion is at a stand during the *Diastole*; as in blowing the Fire but with a single Bellows, Experience shews it happens: and if that Interruption of Motion be admitted, it cannot run so swiftly, nor pass,

pass, in that quantity they say, through the narrow chinks of the Lungs and *Valvula*, where a continual Force is required to impel and drive the Blood always through.

14. In fine, if the driving Force be able to drive the Blood throughout, from the left Ventricle as far as the right again; why doth it stop in the middle when a Vein is cut in two? why doth not that Force drive it at least as far as the end of the first half of that Vein, or the place where it is cut; and where we see that Force ends? for there the Bloods Motion stops, nay, stops before it comes there; being not able to keep that Vein open to the end, but suffering it to shrink in the Flesh, and to shut up.

15. For the cause of Expulsion, by making the Heart a Muscle, which Doctor *Lower* pretends to Salve all, and mend the Faults of his Predecessors by, it is fully refuted and exploded in the 10th Chapter of this fifth Essay; so that the Circulation by it will be found groundless. And from all this it is plain, that this excellent Notion is not yet so well grounded, but that any Man of Parts, that hath his Eyes in his Head, may shake it and throw it down.

The Eighth Chapter.

A further Refutation, by Questions and by Answers: and first of their final Cause.

NOW, Mr. Circulator, having thus given a pull to your Building and Structure, the next step
to

to make an end of pulling down your Notion, is to call up your Causes, and bring them to a Tryal, and hear what you have to say and offer in their behalf; that upon hearing your Proofs, every Reader may judge and discover the Mistakes, and upon the whole Matter give his Judgement for the Truth. And to perform this the more intelligibly to all, I will proceed by way of Questions and of Answers: and in the first place call up the final Cause, or the End and Use of Circulation; in the second, the Agent and efficient Cause of it; and in the third, those Causes which you pretend the Heart moves both it self and the Blood by: and namely, that of *Lower*, of the Heart being a Muscle.

And to begin with the first, to what End and for what Use your Circulation should be; tell me to what End is it? for if it be in Nature, it is not without some End and Use, and Necessity: for God doth nothing in vain: and a thing of this nature, where Life it self, as it seems by the stress you lay on it, is so much concerned in, must be (in case it exist) to some other End and Use, than to make you write Books of the Invention of it. And that we may know what good you and we are like to find by this great Discovery; please to put on your Spectacles, or to take your Microscopes, Telescopes, or what you will; and look out sharp for the best of all that the Inventors have devised and urged in the behalf of its Use.

Author. And so, pray, tell your Reasons concerning the Use of it: to what End, and for what Use doth the Blood thus circulate, pass and repass through the Heart so often, and so swiftly?

Invent. First, To convey Life it self and Aliment to the Parts; and to bring them fresh Supplies of that
Substance

Substance which wasteth and recedes from them daily. *Ut partes*, saith Walæus, *dum sanguis ad singulas defertur & perreptat, melius accipere id alimentum possint, quod maximè ad earum nutrimentum & robur facit; atque calefieri*: for the Life is in the Blood, Gen. 9.4. which is the Vehicle of it. Secondly, It circulates that by its Motion it may keep wholesom, and not corrupt,

Ut vitium capiant nō moveantur aque.

so the Blood, saith he again, would grow foul and putrify, if it did not circulate. *Sanè motus sanguinis indiscontinuus requiritur*, saith Willis, de Accens. Sanguinis pag. 47. *tum propter ipsius sanguinis crasin conservandam; cuius liquor alioqui stagnationi & putredini obnoxius foret; tūn præterea ut in toto corpore circumactus, tributa partibus singulis debita erogare possit.* Add to this what Harvey saith pag. 48. That Nature desireth that all the Blood should be streined through the Substance of the Lungs; but without shewing for what.

A. Very learnedly spoken; but as much to the purpose as if you had said nothing: for *first*, If to convey Life, it is essential to Life, and Life can't be without it. But it can very well be without it, as hath been shewed. Then, *secondly*, if to be the Aliment of the Parts, they are nourished by it; but they are not nourished by it, but by the Spirits which are in it, giving Life, 2 Cor. 3.6. for *alimentum non est alimentum*, saith the Great Doctor in his Aphorisms, *antequam intenuēs vapores convertatur*: that is, it is not the Food and Aliment of the Parts before it becomes a thin or a Spiritual Vapour. And as the Spirits give Life, so by them alone the Parts and Body are kept alive, that is, nourished and fed; for *iisdem nutrimur rebus quibus constamus.* And
it

it is on this account of their conveying both Life and Aliment to the Parts, that they are called Vital. *Thirdly*, If to feed the Parts, what needs the Blood circulate when it is already spread and distributed through all the Vessels to all the Parts? and when that which circulates is not the same as becomes the Aliment of the Parts, but that only, as they say, which stays behind in the Parts; and which, if left once a Week, might answer that end as well? *Fourthly*, How can the Parts be calied by the Blood, which is cold of its Nature, and hot but from the Spirits, as hath been shewed from *Galen*? And why not rather by that which gives the Blood all the heat it hath, *viz.* by the Spirits? And the Blood is not that which keeps us warm, and gives us Heat, since we suffer more from Cold in the Legs and in the Hands, through which all the Blood passeth, according to their Notion, than about the middle Parts, where the general Store-house and Spring of the Spirits is, and from whence they are dispers'd and sent forth into the Parts.

And for a Motion of Blood to prevent its Corruption: my Answer to it, is, that it might move in its own place by the Spirits within it; and thereby be kept as free from Foulness, and from spoiling, as by being Foot-balled from one place to another. Wine it self doth keep sound so, tho' stagnant in its Vessels. And the Waters of the Sea are not kept from corrupting by their ebbing and flowing: for this Motion of the Sea is only in its Surface, it never moving in its deep places at the bottom. What keeps them from corrupting, is, by becoming Saline; and they become such by the Influences of Heaven; which are nothing but Spirits corporifying themselves, and becoming Salt in them: nay,
all

all the running Waters keep wholsom but by their means; and are better than other stagnant Pump or Well Water, but by laying exposed to the said Influences that is, open to the Air. And so, by this very means of the Spirits we breath in from Heaven and from the Air, and become Salt in the Blood, as appears from that it yields a deal of Spiritual Salt, (which Chymists call Volatile) the Blood may keep sweet and sound without running round about. In the Plague, the *French Disease*, the Biting of a Viper, and in all putrid Fevers, the whole Mass of Blood corrupts by the contagious Spirit or Influence from the Air, from the venomous Creature, or venereal Poyson, which infects and suffocates the *Spiritus Custodem*, or the Spirits natural to the Blood or to the Parts (properly the innate Heat) as far as the Heart it self, and *drinks up*, to use the words of *Job* 6. 4. the Vital Spirits, notwithstanding their Motion, and the Motion of the Blood; which is not therefore that thing which keeps them from corrupting, and from being infected. Now, as they are infected, notwithstanding their Motion, so they may keep, and do keep free from it, without Motion.

I. Then it moves in *circulum* to re-impregnate it self with new Spirits as often as it passeth through the Heart; becoming barren and cold by feeding and by warming the Parts, saith Doctor *Harvey* pag. 51.

A. But if the Spirits can go of themselves into the Blood, and through it to all the Parts without your Circulation; the Blood needs not circulate nor go for them, to become well impregnated with them.

I. When

I. When you shew that we will Vote its Circulation needless.

A. Whether you Vote it or not, it is already proved such. You confess them in the Blood : and Blood being a cold thing it self, cannot produce them ; so that since they are in it, they must come from somewhere else, and something else than the Blood, if the Blood doth not fetch them. A proof they come of themselves, is, that the Blood moves by them ; and they may as easy come of themselves as move the Blood. They come, saith Doctor *Harvey*, out of a cut Artery with a continual Motion ; and they make the Blood to leap out of it and of the Heart with great force and *impetus* ; therefore they come of themselves, or are sent out of the Heart. But if the Heart sent them forth, their Motion and coming out would not be continual, but like that wherewith the Heart pulseth, *viz.* by Intervals ; so the Heart doth not send them. And the Blood cannot leap out with *impetus* of it self, but only by the Impulse of that which all *impetus* or force of Motion comes from.

The Beams of the Sun come down of themselves into the Air, making the Air a Spirit ; or, however, a Vapour spiritual, uncondensable, and next kin to a Spirit. This Air runs towards the Flames and any Vacuity ; and moves swift when it blows hard of it self ; and by the Force and the Elasticity of the Spirits within it, since we see no other Force or Belows to impel it.

The Heart heaves, the Arteries beat and pulse, and the Blood leaps out of them by the Spirits ; and all Force and *Impetus* in the World proceeds from them ; and shall that which moves all things be denyed the Faculty of agitating it self, and of coming into that, which as we see, moves by it ?

But

But Fermentation alone can make out, that this Motion of theirs is spontaneous: for what sets them in motion when they work in new Liquors, and cause Wine to boil over and run out of its Vessels? What makes a Serpent nimbler than any other Creature? and his Heart, and the pieces of his Heart and of his Flesh, to beat and wriggle a great while after all the Blood is out; but the great store of Spirits they are imbued and boile with, as appears from their being full of a spiritual Salt?

And by what doth that part which *Solomon* saith is hanging as a *Burthen* in old Age, *Eccel.* 12. 5. become so active and brisk, and so ready to leap out of its own Skin in young Men, that for this Reason, it seems, he calls it a Grasshopper, but from the Spirits that run of themselves into its Nerves? for the Blood doth not bring them, since no Blood is in those Nerves when they are so distended. And if the Heart sends them forth through the Blood into those Nerves, the Blood, as was said before, hath no need to go for them.

And whence in Phlebotomy, as *Harvey* himself urgeth pag. 74. doth the Blood that was running, stop its course or run briskly upon either Fear or Hope? but by means of the Spirits; upon which there comes a Damp, or an elevating Fit, by the Imagination struck with the Apprehension of either Evil or Good. For the Imagination cannot work upon the Blood, but upon the Mind only, which determinates the Will; and the Will determinates the Motion of the Spirits either forwards or backwards; making them to run forwards or to shrink up and stay in, giving them the Impression which it receives from the Mind and the Imagination: So that by striking a Damp upon them, in case of Fear,
the

the Heart finds it self in streights, bound up, and dull and heavy ; no light can break out therein and send out Beams or Spirits ; and the Spirits and the Blood stop their Motion upon it. And in case of Hope, the Heart becomes light, free and open, and full of Light and Gladness, *Esther* 8. 16. and yields its Spirits freely, upon which the Blood runs on merrily, saith *Aristotle* to *Alexander* the Great. The Poets, without your Skill in the Art of Dissenting, knew better than you the Cause of the Blood standing with Fear, and of its being lively by the access and recess of that which stirs up all things.

*Spiritus intus alens per quos diffunditur artus,
Hos agitat. . . Gelidusq; stetit formidine sanguis.*

Spiritus est organum & manus summi Dei, quo agitantur omnes in hoc mundo species ; & cujus absentia & otio quiescunt, saith Divine *Trismegistus*. I wonder that *Harvey* could see that the Heart grows faint, and the Pulse slack its beating, and the Blood ceaseth to move when Fear comes upon the Heart ; and should, without more adoe, and all further Enquiry, ascribe the Cause of all this, in the page above cited, to the Faintness of the Pulse ; which is it self the Effect of that Fear, and of the Damp of the Spirits in the Heart : which therefore, as it appears from all this, move of themselves. But adjourning what remains of this to the second Part we will end this Chapter here.

The

The Ninth Chapter.

Refutes the next thing to be lookt in, to wit, the efficient Cause which the Inventors assign of the Motion of the Blood, by Expulsion from the Heart.

A. **H**AVING done with the first thing, *viz.* the final Cause or End, and Use of Circulation; let us hear what you can say for the Efficient of it. Doth the Blood move of it self, or is there another Cause efficient of its Motion?

I. No Body, that I know, saith that it moves of it self; being, as you have urged, but a cold unactive thing, and receiving its Motion from the Impulse of the Heart.

A. Yes; *Harvey* seems to say so in affirming, that the Heart moves and dilates by filling with the Blood that runs to it, and assigning no other Cause of its Dilatation. And Doctor *Willis* also, by making the Blood the Seat and *Focus* of our Heat, saying pag. 51. of his *Accension of Blood*, That *non sanguis a corde, sed cor a sanguine calorem mutuatur*. For if it borrows not Heat from the Heart or other things, it must have it in it self, and consequently Motion, which is the Cause of all Heat. Doctor *Lower* seems likewise to ascribe Motion to it, saying pag. 81. That the Hearts *Diastole librat*is adeo *vicibus non succedit nisi a sanguine in illud irrudente*. But what is than the Agent of the Motion of the Blood? from whence comes its turning round, and

its Truſſion through the Veins, with the Force and the Swiftneſs which you ſay it doth it with?

I. From the Heart, by virtue of its expulſive Faculty, whereby its Ventricles ſtretch and diſtend to receive Blood, and contract to expel it; like the Bladder and Stomach, and the other Cavities, when they let out the Urine and other things they contain; according to *Walaus*, who ſaith, *Eandem eſſe conſtrictionis cordis ac ventriculi atque veſicæ rationem.*

A. How are the Ventricles filled? do they fill up of themſelves? or doth the Blood run into them?

I. They fill like Sachels or Bags, which lye open to receive, as Doctor *Harvey* teacheth: *Vel extendunturab hoc quod illis immittitur*, as ſaith *Walaus* again; *Et quando expulſere ad naturalem ſuum ſtatum redeunt.* So that if the Blood runs not into the Heart of it ſelf, it is drawn in by the Heart, either by ſome attractive Faculty of its Ventricles, or by their beating about, as *Harvey* ſaith pag. 40.

A. A cunning way of drawing newly found out in the Heart! whereby it draws and expels like thoſe Magnets which are ſaid to have a Theamediſm, that is, repel with one end what they draw with the other. But if they fill up like Bags, why don't they empty themſelves like Bags, by running over, without pulling in their Strings, and making uſe of their Nerves to contract and to expel? The Stomach and the Bladder, we ſee, have Nerves and Sphincters, to draw them cloſe together, and gather them like a Purſe: but in the whole Heart we ſee none but a ſingle Soul one: which belongs, ſaith *Bartholin*, to the VI Conjugation; all the Filaments *Lower* doth give the name of Nerves to, being really

ly but Fibers: and besides, this Nerve serves but to its motrice Faculty; for we see when it is cut, the Heart moves nevertheless. And the expulsive Virtue of the Stomach and Bladder consisteth in expulſing, and then drawing themselves close, or contracting of themselves at their Mouth or Orifice, after they have turned out: and not in contracting first, and afterwards expulſing. Then the Mouth or Orifice of the Ventricles lies open as well in the Contraction as in the Dilatation; and is never drawn so close as is that of the Bladder; the Contraction of the Heart being of the whole inside; and (by an Observation of Doctor *Lower* himself, pag. 154.) of the whole sides of the left Ventricle, coming together. And if the pretended Nerves can shut and open the Heart, what are their *Valvulae* for, shutting and opening of it, and letting things out of it at every Pulsation? Moreover, if it expel like the Stomach and Bladder, what is that sends Blood upwards through the ascending Branches? for the Stomach and Bladder send and thrust nothing upwards; at least with the usual Force; as if one Piss'd through a Pipe going directly upwards, he would find that he must put more Force than ordinary to it, if he would have it to run over at the top; more Force being required to thrust up, than to let out: and we do not feel we put more Force to this pretended Expulsion of the Ventricles, than we do in letting out Urine, or Pissing a Bed: nay, we never felt the Blood coming out of the Ventricles, tho' we mind it carefully: whereas we can feel Urine coming out, tho' fast asleep. So that the Heart expels not like the Bladder and Stomach, in case it expel at all.

As for its being capable to impel the Blood forwards by Truſion through the Veſſels, give me leave to deny it: for it muſt then be equal or ſuperior to the weight of the whole Maſs of the Blood; which you ſay is from 20 to 25 pounds; and ſuch Force as that is,

*per rumpere poſſet
Saxa, potentior icſu fulmineo.*

would be equal to the Force, not only of a Croſs-Bow, but of a Demy-Canon. Whereas we ſee it is not equivalent to one half, or any part of that weight: for when Veins are cut in two, the Blood ſtops, and runs no more; and is not thruſt by that Force ſo far as the very end or place where the Vein is cut; for the ſame Vein doth ſhrink vp; and cloſing, ſtops up it ſelf, (as it is notorious to all the Practitioners, who cut bleeding Veins in two, when they cannot ſtop the Blood in them any other way) but it ſhould be kept open, and the Blood ſhould run and ſpout out of it, if the ſaid Force were able to drive it through: which we ſee it never doth; and therefore is not a Cauſe ſufficient for this Effect; that is, to thruſt the Blood through from the left ſide to the right.

But, ſuppoſe that Force were ſuch as could drive the Blood throughout all the way continually, it ought to keep conſtantly and continually open the *Valvula* of the Heart; in which caſe there would be none of that opening and ſhutting by Intervals which they have. And if they open and ſhut, you muſt grant a ſtop or pauſe in the Motion of the Blood all the while they remain ſhut: which ſtop would prevent its ſpeed, and its gallopping ſo faſt, and in ſuch quantity, as you imagine it doth.

And

And if the Blood moves only by Expulsion from the Heart, how comes the *Vena Cava* to beat, as it hath been said, whilst the interjacent Veins which lie nearer to that side of the Heart which expulseth; and through which Motion should come from the Heart to the *Cava*, never move or beat at all.

A Snake, when she darts her self, thrusts forwards her whole Body, which lyes even in her Skin, as the Blood doth in the Veins. Now, doth her Tail thrust her Head and Body? or doth each part thrust and help it self forwards by its own Strength and Spirits, (which you know they abound with?) By the last, you must needs say; for tho' her Tail lye along on the Ground without Motion, she can dart and thrust her Head nimbly this way and that way, and raise it up with a part of her Body from the Ground. So that if each part of her moves and thrusts it self forwards by the Strength of its Spirits; why may not the Blood do it, being as full of Spirits? And why can you not see that it doth actually do it, being just under your Nose? *Eccl. 2. 14.* or at least acknowledge it when another shews it you? And if you have more to say for your Expulsion, say on; and shew some other new Cause efficient of your Notion.

The Tenth Chapter.

Refutes the other Causes assigned by some others: and amongst them that offered by Lower and by Willis, of a Musculosity.

A. **G**O on, Mr. Innovator, gird up your Loins like a Man, and muster up all the strength
 E 3 of

of your Modern Wit and Skill to prop up your Invention, which, if I mistake not, is in a tottering Case, and falling down already. Have you any more to say concerning your Expulsion?

I. Yes. But you must give me leave to follow my own Method, and answer you my own way, by telling you what *des Cartes*, and other great Authors say.

A. Do so: take it, and prosper.

I. *Des Cartes* is of Opinion, that two drops falling at once (one from the *Vena Cava*, and one from *Arteria Venosa*) in each Ventricle, are both rarefied therein by the great Heat of the Heart: and turning to a Vapour, which swells and dilates the Heart, they thrust open in the puff its Portals or *Valvula*, and make their way out of it (when it can stretch out no more) into the Arterial Vein and *Arteria Magna*; upon which the Heart maketh a Pulsation, and Subsides.

Cremoninus deduceth his own partly from the same, to wit, a Rarefaction; partly from Ebullition, and a Resistance of the massy Substance of the Heart, which lets not the Vapour through; and subsides by its own weight after the Dilatation: as the Earth doth in Earth-quakes, swelling and bursting open by the Force of the Vapour, then falling to and closing, after the Vapour is spent.

Hofman ascribes Pulsation to an Inequality of the said Ebullition, which, as in boiling Water, causing some Parts to ascend, and some others to descend; because condensed again, or not rarified enough, makes the Heart to rise and fall, and to beat by Intervals.

Doctor *Willis* and *Lower* rejecting these Opinions, stick to that of Expulsion; but being unsatisfied

fied with the blind Account given by all others before them ; and forced by Truth it self, to acknowledge the Concourse and Influence of Spirits in the Motion of the Heart, they say the Heart is a Muscle, and all its Fibers Sinews, which draw, dilate and contract, and move, like all other Nerves, by the Animal Spirits : so that when the Heart is full, it expels the Blood by them, and drives it in the manner that was expressed before. *Willis* adds to Expulsion a Flammula in the Blood, burning all the Blood over ; saying pag. 51. of his kindling of the Blood, that *licet cordis motus sit tantum animalis, atque a continuo visceris hujus motu circulatio dependeat, cor tamen a sanguine, & non sanguis a corde, calorem omnem suum mutuari videtur.*

Here are Causes of all sorts ; and if these are not enough, seek another where you please ; for I have done my part, that is, told you the divers Opinions of the Authors, as all Professors do now in reading of their Lectures ; and if none of them please you, you will never be pleased.

A. You have shew'd, that you can Read, and remember what you Read : but if they play no better the part of Philosophers, who read in the publick Schools, than you have in this Answer, we are like to learn the Truth better without, than by them. But if, as it hath been shew'd in the last Chapter but one, there is no Blood in the left Ventricle whilst we are in Health, what will become of all your Authors ? and why should any of their Causes please me then ? And, truly, without this Cause and Reason of my dislike, none of them all please me well : upon some other Accounts, which are,

First, That a Motion by an Effervescency, and by an Ebullition, caused by a Heat capable to set the

Blood a boiling, and turning to a Vapour, of that force and *impetus* as is capable to drive the whole Mass of the Blood through the Habit of the Body, from one side to the other; supposeth a Heat that would parch up and burn all the Parts, beyond drinking of Brandy, and any burning Fevers. Then this Blood would become Blood again presently after mixing with the other: and to what end should the Blood rarefy in the Ventricles, and there become a Vapour, to condense again to Blood in the very next Vessels? *Thirdly*, This Rarefaction of the Blood in the Ventricles would in time fill them quite up with the gross and earthy Parts which must of necessity be left in great quantity (the Blood, witness Experience, having abundance of them) behind in the two Ventricles; as in the Distillation of all other liquid things, there is a Settlement seen of *Feces*, or earthly Parts.

Secondly, The Opinion of *Lower* and of *Willis*, tho' cry'd up and admired as salving every thing, doth rather perplex, and serve to intricate the Notion, than add any light to it. And with the many Reasons they bring *ordine longo*, with a word of apparat, to make of the Heart a Muscle, they have set the Invention as far back and behind hand, as it was in former days, before it was thought upon.

For the Invention it self, of making the Heart a Muscle, and all its Fibers Sinews, is due to *Hippocrates*; who in his Book *de Corde* expresseth it in these words: *Cor musculus validus*, saith he, *membranas habet, quæ in solidam cordis carnem & substantiam filamenta immittunt; & quæ mihi videntur visceris esse nervi*. But the Use they make of it being rather an Abuse than an Improvement of it, sets it back more than it was in *Hippocrates* his days, and

and leaves us further to seek than if we had not known it. The Use which *Hippocrates* himself did make of it, is, that by its being a Muscle, it keeps in the Heat better; & *vasorum aortis principia exhibet. Cor musculus, non nervis, sed carnis spissamento, validus: & crassitudo ista intus illi extructa ut calidi robur melius custodiat.* So that if the Heart be such, it is more on the account of its moveable Substance, (which, saith he, moves of it self all over without the help of any Nerves or Fibers; *Siquidem tota sua natura agitatur*) than of its Fibers or Nerves. And by his Definition of a Muscle, which is *caro in orbem circumacta*, it appears, that when he gave the Heart the name of a Muscle, he did it more in regard of its Form and Consistence, than of its Fibers or Nerves. And, truly, the Nerves are not that which constitutes a Muscle, nor so much as part of it.

And that the *Parenchyma* or the Substance of the Heart moves not by means of its Nerves or Filaments, or Fibers, but by the Spirits lurking in each part and pore of it, appears most evidently from its moving a great while after it is cut and flasht, with all its pretended Nerves, into a thousand pieces; for the said pretended Nerves being cut, can draw no more: and the truth is, that they are, and serve for no other Use than like the Skins which are seen in coagulated Blood, to keep the *Parenchyma* (which is composed of Blood and of the Vital Spirits) together; and to give way, or yield when the Heart riseth, *atque ut principia vasorum exhibeant.* And if their Use was to draw, and cause the Heart to contract, they would gather together the whole Substance into plaits, like a Purse, or the *Anus*, or the Mouth of the Stomach: but they never did it
yet;

yet ; the Heart being too massy, and the Walls of its Ventricles a great deal too thick for that. And Doctor *Lower* hath shew'd pag. 154. that it doth not gather so ; for keeping his Finger in the left whilst it contracted, he, instead of such Plaits, saith he felt that the whole sides brought themselves close together, and compressed his Finger, as if press'd between both Hands. And *Walæus* confirms this, finding by Experience, that the *Septum* doth not move at all in the Constriction, the Motion of the Ventricle being of its Walls only, that is, of its Anterior and Posterior Parts clapping and coming close together : and not, as *Harvey* asserts, of the *Septum* and the side which is opposite to it : the words of *Harvey* are, That it contracts every way, especially on the sides, pag. 18.

And the Palpitation felt in the *Septum*, is a Prooff that the Substance of the Heart moves by the Spirits lurking and running into its Pores ; for tho' the Agitation was felt only in that part, by reason of the Passage of the Spirits through its holes from one side to the other ; yet so long as the Spirits being yet but natural, (or courser than the Vital) can run from the right Ventricle through the Pores of the *Septum*, and move and agitate it ; it shews, that they can also run and insinuate themselves into the Pores (tho' streighter) of the rest of its Substance, when they are become Vital, (finer than the natural) and move and agitate it without the help of its Nerves. And its wriggling and beating when all the said Nerves are cut, puts this thing beyond all doubt : as also that it moves not like a Muscle by its Fibers ; but more like a Nerve it self, and like every Particle of the Substance of the Sun, which is all Spirit and Light. If the Heart, as both *Harvey* and *Hippocrates*

pocrates affirm, be nourished from within by the Spirits which the left Ventricle attracts from the right, these Spirits must insinuate themselves and run into it at the Pores of its Substance.

This is a strong Argument against you, *Innovator*, to wit, the Heart moving on, tho' that which you call its Nerves, and the only Nerve it hath, be cut into small pieces; nay, and flirting out the Blood three or four Foot from it after Gashes are made in't, and its point cut off from it. But, tho' it be strong enough of it self to run you down, and put you to a *nonplus*; yet I have more great Guns to batter you to ruine. For granting the Heart a Muscle, and as many Nerves to it as you think you found in it by your Microscopizing, what then if they do not move by the Animal Spirits?

I. But they do, like other Nerves, as *Lower* demonstrates it.

A. And why not by the Vital which the Heart sparkles and boils with?

I. Because he saith they are Nerves; and the Nerves, as all say, move by the Animal Spirits.

A. I thought Inventors were above the Rules and Method prescribed by other Men. But now, that all things are done according to *la Methode* in Church, State, Law and Physick, the Fashion may be likewise followed by Inventors. A Preacher sings at the Desk a long *Oremus fratres*, which, after a Psalm is sung, he repeats in the Pulpit; then takes and divides a Text into as many Members as he can spy out in it; and so the next, and the next, and as many more as come: and there is preaching, hearing; and hearing, and no doing; and the more *Pater Nosters*, or the more Sermons one hears, the better God is served, tho' the Hearers mend upon't

as much as the Papists do for hearing many Masses : for it is turning, turning, and the way to turn, and come to the Birth of the Spirit which Preachers should inculcate, *Joh. 3. 5. Gal. 6. 15.* for what signifies to one to inveigh against his way, to wit, the Love of the World, whilst his Mind runs upon it, and he doth not turn from it ; and so hath no Heart nor Ears for it, to hear and obey in hearing, *Mat. 13. 15.* or to believe : and they preach as to Hearers which are already turned. Because one translates *moving on the face of the Waters*, and *Hypostasis* Person, others must translate so too : and because one saith he seeth a Circulation in Blood, the other must see it too : all Physick and Chymistry, and all Trades and Sciences are brought to meer Terms of Art, meer Receipts, a meer Method : all things are done *proforma*, formally ; Formality is now the Soul of the World. And had it been so of old, what Inventions should we have ? But, without going to work according to your Method ; without going to see you cut the Throats of Cats and Dogs, and Butcher Men and Women, I will shew you in them that which you will never find by cutting up of their Breasts, *viz.* that the Heart doth not pulse by the Animal Spirits, but by those which we draw in Life and Respiration from.

I. Pray do ; and all the Surgeons and Physicians will thank you.

A. If they do, it will not be according to *la Methode* ; the World is not so civil : the usual way of the World being to Stone its Prophets, or those that would instruct it ; and to be as much in Love with its Plague and Ignorance ; as the *English* with their Laws, and *Spaniards* and *Portuguese* with their *Abriga da fe* ? that is, their Inquisition. The Shepherds,

herds, that understand nothing, are the most in Vogue. *Isa. 56. 11.* But without any prospect of Thanks, I'll shew it you. You know, that when we run fast, or work hard, or are in pain, we are out of Breath, in Streights in the Breast and in the Heart, and grow faint, and cannot speak, for want of Respiration; and the Motion of the Heart grows then weaker and quicker by reason of this Faintness, as *Lower* doth acknowledge pag. 161. and both the Heart and the Lungs being then hard put to it, beat and belabour themselves, as may be seen by the Flanks of a Horse, which heave and beat faster than ordinary after he hath been Rid hard. The Reason of this Faintness and hard Labour of the Heart, is, that by the violent and swift Motion of the Parts, great Loss and Deperdition of Vital Spirits is made, (as it appears by the Froth which a running Horse, after a Race, is cover'd over with; that Froth being but his Sweat divided into Particles by the long Hairs of his Skin, and blown into minute Bubbles by the Spirits exhaling from him so abundantly, that they can rarefy it; as Boys do soapy Water by their blowing into it) so that the Lungs and the Heart, from which the Parts are supplied, must rise and fall, pulse and draw, and make their greatest Efforts to supply that wast and loss, and bring both sides together, (whence came the hard Compression of Doctor *Lower's* Finger, pag. 154.) to press and squeeze out as much as possible all the Spirits they suck in by dilating: but their not coming so fast as they are sent forth, and as they are wanted in the Parts, is the cause of want of Breath, and that we must stop to breath, being ready to drop down when we outrun our Breath: which drawing in of the Air is more sensible in frosty and cold, than in hot Weather.

Now,

Now, it being plain from hence, that this Motion of the Heart is caused by breathing in and expulſing theſe Spirits ; and that theſe Spirits coming from the Lungs and from the Air, without paſſing through the Brain, are not Animal Spirits ; it is plain and manifeſt alſo, that the Heart moves not, that is, dilates and contracts not, attracts not and expels not, by the Animal Spirits. And from that the Head is cleared of that Labour which the Heart and Lungs ſuffer all the while, it appears it hath no ſhare in ſupplying of the Parts and of the Heart with Spirits. But, that the Heart, like the Sun, being a Centre of Life, and its Subſtance like to that of the Body of the Sun, whereof every Particle is Fire, Light and Spirit ; doth ſupply every Part with the Spirits which it draws through the Lungs and through the right Ventricle, from the great World, or the Air, and from the Viſtuals.

Since the Heart ſupplies the Head and all the Parts with Spirits, and moves before the Head is, or at leaſt before it ſends any Spirits into it, for it is the firſt Mover, what need hath it to receive Spirits from the Head to move ? or of Animal Spirits ? All Spirits come from Heaven into the Air, as was ſaid ; and from the Air into us, immediately through the Lungs, and mediately from the Viſtuals through the Stomach and Liver. In the Chyle and the Liver, as far as the right Ventricle, they are called Natural ; in the left they are Vital, and Animal in the Head : ſo that the Vital Spirits are before the Animal ; and there are Vital Spirits in the Seed, and in the Bags of which Embryos are made ; before the Embryos come to have Animal Spirits, and a Head to make them ſuch : and to make them Animal, there muſt be an *Anima* or a Soul fit to uſe them, which they derive their

their Name from, and is not in the Body before the Head is formed. And, therefore the Animal proceeding from the Vital, which the Heart sends to the Head, are not those which it moves by when it draws and sends them forth. I wonder at three things : *first*, That Doctors, of all Men, know so little of their own Trade. *Secondly*, Who will pay me for thus teaching you Phisick ? *Thirdly*, How many have you cured by Anatomy, and by helping forward the Circulation of their Blood ?

A Muscle is an Instrument of voluntary Motion, being moved by the Will, a Faculty of the Soul ; which sends Spirits into it through their Channels from the Head, where the Soul sits in its Throne, and where it acts according to the Reports which are made before it by the Senses. The Thoughts arise in the Heart, but the Notions and Conceits, which determinate the Will from the Objects, in the Head. Now, the Heart doth move without, nay, and against our Will ; and therefore not as a Muscle, nor by that which moves a Muscle, to wit, the Nerves or Fibers, and the Animal Spirits.

The Lungs are not Musculous, yet they move and heave, and rise and fall as well as the Heart ; and without Fibers or Nerves keep Pace and Correspondence with the Motion of the Heart. And so may the Heart therefore, without being Musculous, move and heave as well as they by the same means as they do, *viz.* the Breath or the Spirits which they draw by dilating.

To make an end of Beating and Playing you with great Guns, I'll add but one thing more, which *Lower* hath alledged pag. 126. *viz.* That *mirum in modum à potu vini boni, sive spirituosì, cordis motus augetur* : that the Spirits of the Wine we drink help
the

the Heart's Motion in a wonderful manner : so that the Heart moves by them , seeing they help it to move. Now, the Spirits of that Wine are but natural Spirits before they come to the Heart, and but Vital when in it : therefore, since it moves by them, it moves but by the Vital, not by Animal Spirits.

But, it seems, you suppose that they get up into the Head, and so become Animal before they go to the Heart : for he saith in the same place, *Has partes spirituosas in caput exstillatas, spiritus cerebri incolas in similes tumultus incitare* : and hence in his Opinion ; *first*, They go into the Head before they get to the Heart : Then they help the Heart to move *magna sua copia*, because of their abundance, and because their abundance raiseth Uproars in the Head ; and so make it always light, and never dull and heavy : And *thirdly*, That those Spirits are tumultuous before they rise up in our Heads, since *alios incitant in similes tumultus* : which is Low-Country, that is, *Dutch* Modern Philosophy.

And to begin by the last ; if they are tumultuous before they get in the Head, how come strong Wine and Brandy to be quiet in their Bottles, even in a greater heat than is that of the Stomach ? And if by their quantity they become tempestuous, and so help the Heart to move, then the more, the merrier ; the greater the Disturbance, the better should the Heart move. But we see the contrary ; for after a Drinking-bout the Head is out of order, and the Heart dull and drowsy. And the Schools by Experience, declared in their Proverb, have found, that *Bonum vinum acuit ingenium*, when taken moderately ; for when in great quantity, it makes one look like a Sot, and helps neither Heart nor Head. If *famem vini potus solvit*, the Heart may be help'd by drinking

drinking a Glafs or two. And Doctor *Willis* affirms pag. 65. de Accenf. Sang. *Se noviffe virum ingeniofum, qui a pleniore vini potu literas clarè fub atra nocte perlegere poterat* : which, if true, fhews it was done without Uproars in his Head ; or elfe, inftead of feeing diftinctly, he had feen double.

And if the Spirits of what we drink rife into the Head before they get to the Heart, then they take a way to it divers from that of the Viſtuals ; for theſe go firſt to the Heart, becauſe the Heart being that which ſupplies all other Parts with Spirits and Aliment, is the firſt that muſt be fed ; (according to the Prophet, *Lament. i. ii. they fought for Meat to bring back their Souls*, which, as they took it, *Gen. 9. 5.* and as you take it your ſelves, by making the Heart the Spring, Fountain and Ciftern of Blood, was in the Heart and the Blood) ſparing none of its Spirits to the Head and other Parts before it be fully fed. And if they go directly from the Stomach to the Head, why do we feed at the Mouth, and not rather at the Noſe with ſweet Encenſe, like the Gods ; or with Snuff, like the *Spaniards* ? *Citius vini potu reficimur quam cibo*, faith Doctor *Hippocrates* : therefore the Spirits of Wine take the ſhorteſt way thither, not a longer way about than thoſe of all other Viſtuals ; and ſo riſe not to the Head before they go to the Heart. You ſay, that all that we drink paſſeth through both the Ventracles before it can get into the Kidneys and the Bladder ; and that you have known a Man, who having drunk two Gallons of Water in a Morning, voided the ſame quantity in three or four hours time, pag. 159. If ſo, pray Mr. Doctor, did all that Water go through his Head in that three hours time, without cauſing it to ake, and occaſioning a *Rheum* ?

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But,

But, to conclude the Dispute; let the Heart be musculous, and move, as you will have it, by the Animal Spirits: you cannot, as hath been said, deduce from thence its constant reiterated Motion; that is to say, shew by it how the Animal Spirits, which move but by the Consent and the Determination of the Will, go constantly from the Head into the Heart as often as it pulseth, whether we will it or not: for you say it is too high for Man to understand it; for your selves, you should have said, for I know one who doth: So that all your Endeavours of making the Heart a Muscle, and all its Fibers Sinews, ending in an Expulsion and expulsive Faculty, (which is null, as hath been shew'd) leave the thing *in statu quo* you found it when you begun, shewing no more than what was well known to others before, and denyed by no Body, *viz.* a Motion in the Blood, and nothing of its true Cause.

And, as for Doctor *Willis* his kindling or accension of Flames in the Blood it self, it is a thing impossible; because no Light can break out where Moisture predominates, and where the Spirits cannot concenter, as shall be shew'd. Now, the Moisture abounding, and the Spirits being spread and diffused in the Blood, and the Vessels it runs through; no Flame, tho' never so small, can kindle or break out in it: this breaking out being done only in the left Ventricle, which being round like a Sphere, and smaller than the other, and without Blood, or empty, is fit to coacervate and concenter the Spirits; and thereby to make them flash and break out into a Flame. And as the Veins and Vessels which the Blood runs through, are full, no flash can be made in them; for, as *Willis* grants himself, no Flash or Flame is kindled but in a convenient space, where
 it

it can fend out its Fumes, such as is the left Ventricle: nor are the other two things he offers pag. 52. as sufficient to produce and to keep a Light burning, capable of effecting it; as shall be shew'd in its place.

To what he saith, that the Heart borrows its Heat from the Blood, and the Blood notwithstanding hath its Motion from the Heart, it is so inconsistent with Reason and with Nature, that it deserves not Answer. For the Blood, in the first place, having no Heat of it self, cannot give Heat to the Heart; and if Motion comes from Heat, or is no where without it; the Heart borrows with its Heat Motion from the Blood also, and so gives it not the Blood. Or, if it gives it to that whence it receives it it self, it is a Discovery, which, if it could be made good, would actually put an end to all further search after a perpetual Motion.

From all which it appearing, that all the Causes you give of the Motion in the Blood, and of its Circulation, are null'd and of none effect, being either deficient or inconsistent with Life, or having neither Being nor Existence in Nature, I will in conclusion stop your Mouth with Christ's Answer to your Fellow Inventors of a Non-Resurrection, *Mat. 22. 29. You err, not knowing Scripture* (the Writings of the Ancients) *nor the Powers of Nature*, (which is God manifested) *viz. Spirit, Heat and Motion.* The Spirit being *the Arm*, the Tool and Power of God, *Joh. 12. 38.* whereby he produceth all, and sets all things in Motion. And there being no Reason why we should like or admit any of them for the Cause of your pretended Effect, and why you should not desist of an Effect hath no Cause, you must now give up the Cause; because *cessante causa cessat ef-*

fectus quoque, or exhibit another more adequate or better.

I. Why so? why should not the Cause which *Harvey*, *Willis*, *Lower*, and all the *Virtuosi* and the Learned of the Age approve of as adequate, to wit, the expulsive Force of the Heart, satisfy you? Why should you find fault with it, when all judge it to be good? *Are you greater than our Father Harvey, and Galen (whom Harvey borrows Proofs from) who gave us this Well, from which so much hidden Truth is drawn, and drank of thee same himself, and all his Children with him?*

A. *And his Cattle also*, good Sir, not to forget your own self; for so it is in the Text, *Joh. 4. 12.* But, if the thing must be so, because your Fathers say so; and a *sic dixit* is like to be your *nonplus ultra*, great Improvements of Knowledge are to be made by your means!! *Si ipsa terrestria quæ sunt in sanguine ante oculos vestros nondum intelligitis, quomodo coelestia, quæ sunt in animæ & in lumine ipso vitæ cognoscere?* *Joh. 3. 12.* But we won't be put off so: and now, you have had your Way, and taken your own Method; I will have mine also, which is, to know if you have any other Cause to shew, and if you will yield or not, in case you can produce none; for if your Philosophy, which is, to know *per causas*, be at an end with this Cause, how can you hold out longer in Argumenting for it?

The Eleventh Chapter.

The Refutation of another Opinion; which is, that the Soul acting upon the Parts without Mean, that is, without the Spirits, is the Cause of Expulsion.

A. **T**Herefore, Mr. *Innovator*, answer directly or yield. And since Expulsion, it seems, sticks so fast in your Gizzard, that after all hath been said against the Non-sense of it, you cleave and keep still to it, say in
you

you have any more to shew for it; and answer, from whence comes the Heart to have an expulsive Faculty, otherwise than what you said, and what hath been refuted.

I. Either from the Soul her self, acting immediately upon the Parts without the Mediation of the Spirits; or from the Vital Spirits, which you say the Heart boils with. *The Soul*, saith Dr. de Back, *being given to the Parts, as an impulsive Spirit, to perform all their Actions; and the Faculties being but the Powers of the Soul, it is she that performs them, as present every where; and doth, as an Artisan, when she finds fit Instruments, perform them of her own self* without the Mediation and the help of the Spirits. And to have recourse to them, is, saith he pag. 11. *to multiply Entities without a Necessity.* See this pag. 6 and 12 of his Treatise of the Heart Printed with Dr. Harvey.

A. This is as great a Wisdom as the *Dutch* Repartition of the *Spanish* Monarchy; and as good every whit as that of the same Author in the 13th paragr. of the 5th chapter of this: for by it, and what he saith further in the same pages, *That the Parts are enlivened by the Powers of the Soul, and warmed and made moveable by the Blood circulating*, it appears,

1. In the first place, That whilst he denys Spirits, and frames Reasons against them, he establisheth the same, making the Soul a Spirit.

2. Secondly, By making it a Spirit, and affirming that by it all the Actions are performed in the Parts, he makes out that very thing, which he hath been at the Trouble of a whole Book, to refute, viz. that the Parts and the Blood are moved by the Spirits. A *Griboüille* Philosopher that runs into the Water to save himself from the Rain!

3. Thirdly, He makes of the Soul an Artisan, who is independent of the Matter, and can't work it without Tools; yet binds her to the Matter, and doth allow her no Tools, or no Spirits to work with; and thinks to save by putting his Soul upon the Office and the Work of the Spirits, whilst, for want of her own Work, which is, to use and exert the Understanding and Will, her own proper Faculties, he writes this piece of Non-sense.

4. Fourthly,

4. *Fourthly*, Whilst he makes of her a Mechanical Engine, and a Tool of the Matter, he denys her Wheels and Weights, and Springs, and Roaps to pull with.

5. *Lastly*, In assigning her the expulsive Faculties, he gives her an Employment fit for a *Dutch Doctor's* Soul, *viz.* to turn out Excrements, and to wait at the back Door.

And tho' these his Assertions might be denyed him, as well as he denys without Proof the Existence of Spirits, and the working of the Soul upon the Parts by their means; and especially because they are contrary to Sense, Reason and Divinity, (this last teaching that the Soul was given to rule over the Body and all its Parts, and to use it as her Tool, and exert her Faculties freely, independently from *the Body of this* Death, *Rom.* 7. 24. and the Clog of those vile Lusts, which raising a Mist or Smoak in her from her Nether-lands, darken and put out her Eyes; but was by no means given to fulfil the Lusts thereof, *ch.* 13. 14. tho' the Parts be disposed) yet not to go so far back from the main Point, (*viz.* by what the Soul acts upon the Parts, and makes the Heart expel Blood) as the Office of the Soul in point of Divinity, I will that he may be made sensible of the Wisdom of his *Dutch Philosophy*, answer him accordingly, *Prov.* 26. 5. by reminding him of things were not unpleasing to him, since he is so great a Friend of the Materiality, or so carnally minded, I mean of the stirring, and the ebbing and flowing of that *enlivened* sometimes his Grasshopper in his Youth; and how his Soul was sometimes busy and sometimes remiss in exercising that part; and sometimes quite gone from it, whilst *present* and very brisk in every other place; and how, when being absent, she never appear'd again, to perform her Actions there, but when there were new Spirits provided to bring her back: for it is known, that she brought nothing else along with her; And that nothing but Spirits waited upon her thither? and by what, I pray him, doth an Ass prick up her Ears, when being faint and weary, ready to give up the Ghost or the rest of her Spirits, for want of what brings her back, *Lament.* 1. 11. they are both flapping about?

Surely,

Surely, if the Soul could work of her self upon the Parts, the Body would never die, but be, like her, Immortal. For she never departing from it but unwillingly, she would abide and harbour in it, and actuate its Parts so long as she lives her self, if she were not obliged and forced to forsake it, with the Spirits her Vehicle, that join her to the Body. The reason of her Absence, or of her ceasing to act, being but because she is an immaterial Substance, and the Body material; and therefore, that the distance and difference between them is such, that she cannot join with it, nor work upon it of her self, without the help of a *Medium* or Mean, to wit, the Vital Spirits, which partake of both Extreams. So that when the Body is deprived of its Spirits, it falls and remains Senseless, and is but a Cadaver, tho' the Soul be within it, *Jam. 2. 26.* as appears by the Palsy, the Numbness and Gangren'd Limbs, which are Dead and Mortified, tho' the Body be living. The Soul remaining in it or by it in her Vehicle, *viz.* the Spirit of the World, which was breathed in with her, *Gen. 2. 7.* without acting and working by its means upon the Parts; because this moves not the Parts but when it becomes Vital. And this is meant of the Soul of natural Men only; for the Souls of the Faithful, which are regenerated, when they die, remain in God, in those *everlasting Arms* which embrace every thing, and lye underneath open and ready to receive her, *Deut. 33. 37.*

I wonder this Man durst pretend to profess Physick, being so ignorant of Nature, and of its Principles, *viz.* Spirits, Heat and Motion! and how the Materialists, who know nothing of Spirits, have the Face to practice it! for its Practice being but *additio & subtractio* of what gives Health and makes Sick; which is the same thing as that which gives Life, to wit, Spirits: how can they do it without knowing the things that encrease and diminish Life and Health; and how to add and subtract? Indeed, to Purge, and Vomit, and Bleed to Death, and Blister, is of great Efficacy towards the taking from Life that which gives and foment it; whence to be a quick ready *Receptarium Magister*, quick at prescribing Physick, makes now

a good Physician; but to help and preserve Life, and add to it when impair'd and suffocated, and spent, is what is not to be done without knowing what Life is, and how and by what it burns, and by what the Flash of Life is produc'd and maintain'd: which things shall be, God willing, shew'd them in the second Part.

A Venerable Sheeps-head, that hath taken a Degree, (refused to no Body that will give Money for it) calls himself a Physician, and receives Pensions for it from a Town or a Colledge, which are as wise as he is. And the silly Vulgar thinks, that because they gave it him, he must understand his Trade, and be wise: so goeth the World. How much Trouble Non-sense Creates! How much Pains wise Men must take to redress the Grievances Mankind doth labour under by pretended Modern Wit! and which would have been spared, if the Priest's Lips kept Knowledge, and the Universities taught to know *a Priori*. I dare say the Ancients had Laught at me for my Pains, if I had, in their time, written such a Book as this, for they would, like *Lycurgus* when he refused to make a Law against *Parricides*, have thought it was impossible, *ut caderet inquemquam tantum nefarius* Non-sense as hath been refuted here.

As for an Expulsion by the Vital Spirits alone, it is not to be thought of more than by the Animal, being subject to the same Defect and Inconvenience, *viz.* that no distinct Motion can be deduced from them; three things being requisite for the distinct Pulsation besides the Motion of them, *viz.* their Coacervation into a narrow Compass, breaking out into a Light; and a proceeding of Beams, which are Spirits, from this Light: and a Reiteration of these things from time to time. Besides, the Heart expels not, and hath no such Expulsion and expulsive Faculty.

Now, from the things have been shew'd, the Reader may easily perceive the Absurdity and Impossibility of the Blood circulating; and that of the four things promised in ch. 3. three are already made out, *viz.* *First*, That the Heart moves not by its expulsi^{ng} of Blood, or by its being a Muscle. *Secondly*, That there being no Blood in the left Ventricle, but Vital Spirits only; it is Spirits, and not Blood, which pass away from the Heart at every Pulsation: and *thirdly*, That there is no efficient nor final Cause of the Blood circulating: and that the home Arguments urged in the 7th chapter are more than capable alone to destroy this Invention, and stop and turn the Current of the Modern Opinion. Which things will yet more fully and evidently appear by that time the fourth thing, to wit, the adequate Cause of the Motion which is seen in the Heart and in the Blood, and the distinct Pulsation of the Heart, shall be made out; which shall be done, God willing, in the second Part of this.

F I N I S.

The Second Part of the BOOK
Against the
Circulation of the Blood.
And the First Part having shew'd
The Absurdity, Nonsense, and Impossibility
O F
That Blind Hypothesis.

This shews
The True CAUSE
O F T H E

Motion is seen in the Blood ; and of the Pulsation of the Heart and Arteries, by set Times or Intervals : by a way more agreeable to Reason and to Nature than any grounded and built upon that Supposition.

T O W I T,

By the Heat of Life kindling in the left Ventricle, and breaking out into Flames or Flashes, like the Lightning, (which shines but from time to time) and making a Puff and Blast : the first whereof swells the Heart ; and the other moves the Blood.

**And by the by demonstrates Trinity
in Unity.**

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The Second Part of the BOOK

Against the

Circulation of the Blood.

And the First Part of the Second

The Absurdity, Non-sense, and Impossibility

of

These Blind Hypotheses.

This Book

THE TRUE CAUSE

OF THE

Motion is seen in the Blood, and of the Principles

of the Heart and Arteries, by the Times of their

beats: by a way more agreeable to Reason and to

Nature than any proposed and built upon that

Supposition.

TO WHICH

Are the First of the Arteries in the whole Body

and the First of the Veins in the same Body

Added, (as was shown in the First Part)

and a new and full and true Account

of the Heart, and of the Arteries and Veins

And by these by demonstration I prove

in Liberty

AND BY THESE BY DEMONSTRATION I PROVE

IN LIBERTY

AND BY THESE BY DEMONSTRATION I PROVE

i

To the Learned Gentlemen of the House in *Warwick-* *Lane.*

Gentlemen,

THE Design of these Essays, and of this especially, was rather to oppose you, or at least to vindicate Truth and my self against you, than in hopes to bring you off of the Errors they refute, and get your Approbation. For Experience hath taught me, that where Error hath obtain'd, they shut their Ears against Truth, except that single Eye, which Christ saith is the way to Knowledge, Matth. 6. 22. be given to prevent it: which Eye whole Societies were never yet seen to have. Witness all the present Sects, which stick to their Opinions, tho' none but one being true, all the rest must needs be false; and are shew'd them to be such. The way to convince some Men, that they are in an Error, being not only to shew and discover Truth to them, (for what signifies shewing the Sun-shine to a Blind Man?) but to give them Sight to see, and Light to see Objects by: which no Book and no Author of Books is able to do.

And being not ignorant that this Book, having no Sect or Party to side with it, as all other disputable and controverted Matters, either in Philosophy or in Divinity have, would have all the whole Possess of the Learned against it, and your House amongst the rest, I was so far from hoping you would applaud
* it;

it, that I thought you would burn, or condemn it to the Flames. A Man that strives with the Scribes, and takes upon him to shew that they understand nothing of the things they pretend to, and are not what they pretend, comes off well if he receives no other Damage from them but the burning of his Books, having nothing to expect from them but Fire and Sword. Thanks be to God, Gentlemen, we live not in that Country where the Scribes had Friends enough to damn for Heretical the News of the Antipodes; and where Men must take nothing for Truth but upon their word. If all the Ingenious Men in the World were in your hands, Scribbling were Labour in vain. But Wisdom hath yet Children enough to justify her without your Approbation: for whose sake I write.

It was not then for your sakes that I writ this Book: but in the Defence of Truth; and to disengage my self of the Obligation some of you lay upon me, to make good what I had offer'd in Conversation against the Circulation. And as I was full sure that what I said was Truth, and relied on the Merit and the Goodness of the Cause, I thought it was needless to use insinuating words, and necessary and fit to call things by their own Names. Truth stands upon its own Legs, and is stronger than all things, 3 Esdr. 4. 41. And when a Man is certain that he hath it on his side, he speaks with Authority, Prov. 21. 28. Mat. 7. 29. and takes no care to court Men into a good Opinion of what he saith and writes. Did ever Christ, in teaching, address himself to the Scribes, or court them to a Belief? No. He knew what was in them: and that, being always such as keep the Key of Knowledge; and neither enter themselves; (note, he that looks for Physick amongst
the

the Doctors of it, is not of my Opinion,) nor suffer any of those that would enter, to do it, Luk. 11. 52. there was no hopes to win them: and so he did usually, after telling them their own, or some smart short Repartee, depart from them and leave them, Mat. 16. 4.-21. 17. for an Example to those who should be concerned in bringing a Truth to Light. Therefore, have at you, likewise;

Arma ciere juvat Medicantis raro Cohortis.

I'll make out to the World that you are but Pretenders: and that, if I be that Mad-man which you say I am, when you cannot answer me, a Mad-man knows more than you; and can teach you your own Trade. If I have done it here already, let others judge. For made out, or not made out, there is but one Law with you, to call me a Mad-man still. That's your Judgement and Answer. Come Piping, Mourning, Eating or not Eating, Son of Man, it is all one with the Scribes: thou art a Beelzebub still, Mat. 11. 18. A Man that contends with them hath good Luck if he go for a Mad-man but amongst them: seeing that Christ went for one even amongst his own Friends, Mar. 3. 21. for doing more than they did, or could do, Signs and Wonders: and healing the Diseased.

A Proof of the Singleness of Eye you are endow'd with, is, that some of you will not so much as look in my Book. Will this Man make us believe when we see the Sun shining, do they say, that it is Night? beat us out of our Sense and Reason, and persuade us, against what we see and feel, that the Blood circulates not? None but a Mad-man indeed, unskill'd in Anatomy, would make these groundless Attempts, and build these Castles in the Air. We thank thee, Lord, do they say in their Heart, bless-
* 2
sing

sing themselves, that we are not like this Man, that is, so blind as he is; and that we know better things. And so go on at this rate, answering and condemning a Matter without hearing. Which is witness Solomon, Prov. 18. 13. a piece of Wisdom worthy of the Colledge in Moor-fields. If thine Eyes be so evil as to judge without hearing, thou shalt bee full of Darknes. But if besides, that Light which thou shouldst become seeing by serves but to make thee more blind, or keep thee off from the Light; by what wilt thou recover thy Sight, or become seeing? Mat. 6. 23. Thy Blindness is incurable. Nothing befools one so much as Conceit and Prejudice.

But you will neither read it nor look in't, you are resolv'd: (for no doubt but you buy it to keep from the Author's sake) and so Truth, which stands and falls and riseth by your Verdict, must needs have the worst of it, and he that brings it to light be thereby slurr'd and non-plust. O Fates! conclamatum est. Truth is now dead and bury'd, since you have withdrawn the Light of your Countenance from it. This is your wise Opinion; but all are not of that mind. For many Ingenious Men, who see into your blind Side, say, that you are not willing to read your Condemnation: and that had you ought to say against it, you would shew it, and own reading of the Book. But read and hear, or forbear to read, what is it to me, so long as you buy the Book? Whether you hear or forbear, a Truth which you would conceal, is by it made manifest, and new drawn out of its Well. Wisdom in Solomon's days was heard in the midst of Fools, Prov. . . but now it is not so much as allow'd to speak of Truth to our Modern Sages, except it saith as they say, or becomes False and Non-sense.

Well,

Well, but to suppose for once that you are the People, Job. 12. 3. and know all that which is to be known, and see all is to be seen in the World, and beyond it, per foramina Portæ; what do ye see in the Blood that the Blind-man hath not seen? A Motion? Great News indeed. What Motion? In Circulum? Or only from Vein to Vein as far as the Vessels go? In Circulum, you suppose, from the Heart into the Heart again, at the other side, through the whole Concavity and Compass of the Body. But how far have you traced this same circular Motion? as far as Vena Cava, which you say it returns through? No sure. For you lose the Sight and Scent of it from that place where the Vessels cease to beat: and could never follow it beyond the second Turning or Meander of the Veins. And the Blind-man tells you that he seeth in't further than that; for pag. 13. he allows of a progressive Motion of the Spirits through the Blood, as far as the Veins extend: and when he openeth any of the ascending Branches which are near Vena Cava, the Blood comes out at that hole, and at any other hole in any part of the Flesh, and then seeth a progressive Motion from all Parts thither: because those Veins emptying, there would be a Vacancy, if all the whole Mass of Blood did not follow from all Parts, as Water in the Syphon. But when the Veins remain full, the Blood hath no where to run, and so remains in its place: like Water in the Syphon when you stop its lower end. This the Blind-man seeth; and shews from pag. 25. to 38. that it is not by the Blood (which is but a cold dead thing) that the Vena Cava beats, but by the Spirits coming from the Chyle and the Liver; and that its beating therefore is no Proof nor Argument for the progressive Motion of the Blood so far as that.

But you say you see it move forwards, and from place to place, by means of your Microscope. *A Mistake*, saith the Blind-man: and such deceptions as that whereby the Oar looks crooked under the Water: and that of the Miller's Boy, who thought that his Water was going away from the Mill, because the Wind impell'd it towards the opposite side. It blew hard; and the Wind set from the Mill, and raised Waves on the Surface of the Pond which gave Water to the Mill: and the Waves seem'd to run very fast before the Wind, and to follow each other very close in their running. Whereupon the Miller's Boy thinking that they really went over to the other side, and that the Pond would be dry and empty towards the Mill, cry'd out, *All our Water is running away from us: and ran after it himself, to see what became of it.* And the Miller coming out, and not finding the Boy there, ran himself another way, to find out the Gap or Leak, at which he thought it ran out. Then the Miller's Wife, and those who were in the Mill Grinding, and heard the Boy make a Noise, running out with her likewise, to see what the Matter was, left the Mill Door ^{was} open, and the Ass came out and Bray'd, and there was Crying, Braying and Running after Water, which never stirr'd all the while from the side next to the Mill. For looking on the Mill Bank and on the Sluce of the Pond, the Water was there as high as it was before it blew, and had not sunk in the least. So after Crying, Braying a good while, they knew not why, they found it was a Mistake; which having chid the Boy for, they went about their Business.

Gentlemen, this is the Case of the Blood, and your own Case: with this difference only, that you will not

not acknowledge the Mistake, like the Miller, but run on, and make a Noise of the Bloods running away, or forwards from place to place, and those that see and hear you, believe the Report, and Bray, and help to encrease the Noise: which sets others a Braying, and Trying and Writing. And there is Scribbling, Trying, and heaping Absurdities and Mistakes upon Mistakes: for from one Absurdity granted spring many others. And tho' the Blind-man shews you by three good Experiment, pag. 147. that the Blood doth not shift place, but fluctuates in its Pipes or Vessels, whilst they are full: as the Water in the Pipe of Glass which he blew into: or as that in the Vessel which received in it self the Fumes of the Quick-silver: or that in the Boiling-pot, which is raised into Bubbles, or Bouillons, by the fiery Particles which pervade the Pot, and penetrate through its sides, whilst it stands at the Fire; you go on at a mad rate, crying out that he is Mad, and crying up your Notion. Whereas it appears plainly from those three Experiments that, if you are not quite blind, you are the Mad-men your selves.

As for the Observations you make from the Ligatures, whereby the Vena Cava and Arter. Venosa are empty towards the Heart, and full on the other side towards the Lungs and Liver, they prove not that the Blood runs into them from other Parts, since they swell by the Spirits from the Chyle, and by the Air; and since the Chyle runs through that, and the Air through this into both the Ventricles of the Heart.

Some others of your Cabal, who own they have read the Book, say they understand it not. Which is the same as to say, that either they cannot read, or have nothing to reply, or to suggest against it. Per

to any that can read, that is to say, spell the words, and set the same together, and gather the Sense of them, it is plain and obvious, that this your Circulation is refuted many ways in all the particular Members and Branches of it.

1. For, first, the 7th Chapter contains 15 Arguments, Reasons and Experiments against it in general, Each of which is sufficient of it self to refute it, or to put a stop to it, till you make them null and void.

2. Your Opinion supposeth that the whole Mass of the Blood goeth through the Heart, that is, through both its right and left Ventricles; and that both are full of Blood. But from pag. 53. to 56. it appears by some Experiments which every Body may try for a Groat in his Kitchen, that there is none in the left; and that it is impossible any should stabulate there whilst the Body is in Health: because it would suffocate the Heart and the Light of Life. And since there is none in it, it is not Blood, but Spirits therefore pass away from it into the great Artery, at every Pulsation.

3. The whole Hypothesis of the Circulation stands meerly upon Expulsion, either by an expulsive Faculty of the Ventricles; or by the Dilatation and Constriction of the Nerves which you suppose in the Heart. All your Authors, first and last, being for this Expulsion, but differing in the means and in the manner of it. The first being for the first, and the last for the last way, to wit, for a Constriction and Contraction of the Heart by the means of its Fibres, which they would have to be Nerves; and to extend and to shrink by the Animal Spirits. Expulsion being taken away, down falls your Notion; with all your Skill and your Pains about it these 50 Years. Now both those Opinions are refuted adnaufeam,

team, and proved groundless and false, throughout the three last Chapters, from pag. 65. to pag. 88. Where that of Doctor Lower, that the pretended Nerves move by the Animal Spirits, is yet more than the former, exploded and ridicul'd.

4. For Instance, it is shew'd there by an Experiment known to all the Circulators, that the Heart moves of it self by means of its own Spirits; and so moves not by the help of the Animal Spirits; its own being but Vital: nor by expulsi^{ng} the Blood. For when its pretended Nerves (whereby it is said to draw it self close, and to contract) are all cut to small pieces, and thereby made incapable to draw and extend, or act, the pieces of the Heart move after that nevertheless, by their own Vital Spirits, which lye lurking in the Pores of the Substance of the Heart. This is said and repeated pag. 28, 73, and 74.

5. The 8th Chapter shews that there being no End nor Use, and Necessity therefore for your Motion of the Blood, it cannot be in Nature: she doing nothing in vain, but for some Use or other: acting necessarily, per Sapientiam Divinam, which set all Wheels in the great Machine to work to bring certainly to pass the Effects he made them for.

6. The 10th Chapter shews besides that amongst all the Causes assigned of this Effect, there is none capable of it. So that no Cause efficient being as yet shew'd for it; and nothing being capable to make or produce it self, cessante causa cessat effectus, this its Effect, and our Faith of it must be suspended till some other Cause be found, or one of those is given be shew'd to be adequate, that is, sufficient for it.

7. Lastly, From the 6th Chapter it appears that the Authors of this noble Hypothesis conclude often
Quid

Quid pro Quo, or the contrary of that their Experiments shew them. So that their Ability in drawing Consequences and framing Hypothesis, is much to be suspected, and may very lawfully therefore be call'd in question. Besides their Disagreement and Contradiction of one another and of themselves, proved in the same Chapter, are, according to Plato, who saith that Sapientes sunt omnes unanimes, evident Proofs against them, that they are in an Error.

These things every Body that can read may spell and conn, and gather from the first part. And they are intelligible to all the Ingenious Men whom I am acquainted with: who tell me that tho' my Style is not so much A-la-mode as that of the City Bard, yet it hath Sense and Method enough to be understood. If you understand it not whilst others understand it, it is your fault, and not mine. And if it be silly Stuff, and not a Refutation; pray shew me where the Non-sense, and the Defect of it lyes. And if all these Objections and Reasons, whereof one part would more than do in your hands, will not serve, pray, what will do? for was ever any thing so perfectly refuted? And since less Proof serves your turn to build your Hypothesis and rare Invention upon, why shall not these be judged sufficient to impugn it, or at least to shake it so as to bring into question the Reputation of it.

Because I answer not Argument by Argument, take you not Experiment by Experiment to task, in the same method as you pickt up your Notion from them, you cannot think I have made a full Refutation, but cry, like Merry-Andrews, who, because the Gentleman whom he laid out a Groat for, did not return him a Groat, but gave him Six-pence for it, cry'd out, Here is a Six-pence, but where's my Groat
all

all this while? You cry, like him, I say, Where is the Refutation of this or that Argument? How is such Experiment and what it shews answered? For Instance, what you observe from the swelling and filling of the Venous Artery and of the Vena Cava as far as the Ligature, and their becoming empty beyond it towards the Heart, to wit, that the Blood returns through them into the Ventricles; you think is not refuted, because that which refutes it, to wit, that it is Spirits and the new Blood from the Chyle, and Air sent in from the Lungs which run through them and fill them, is not brought in directly by way of answer to it. So all that which hath been said of the Blood being one Mass, which hath neither high nor low, the Body being a Sphere; and of its running all out at any place soever when a way is made for it, because it must all follow, as Water in the Syphon, propter fugam vacui, is of no force, as you think, against its running forward whilst its Vessels remain full; and you can see and conceive, no more than Merry-Andrews how Six-pence repaid his Groat, how the Blood can run all out of the ascending Branches without a Circulation. And so this Reason you think remains still unrefuted, because my Refutation is not particularly bent and levell'd against it. These are some of the Reasons why the Learned amongst you (who therefore have read the Book) cannot allow it to be a Refutation in full. If they had any better, they had done well to shew them: but they said all in one word.

And least you should be as short Sighted, and as far to seek in reading the Second Part, as in reading the other, I will also help you to read it, and to observe that because Life is the thing which the Motion of the Heart and of the Blood derives from, it
gives

gives you in the first place a Definition of Life; then goes on, according to that Definition, proving that Life being a Fire, and a Light, and a Spirit proceeding out of that Light; and that the Light breaking out of the dark Heat by flashing, or like a Flash of Lightning; and this in the left Ventricle, this Flash makes the Heart to swell and to puff up for that time; then the Spirits which proceed from the Flash in that Ventricle coming out but by degrees and dribblets through the Portals of Arteria Magna, make a small and constant Blast which always pervades the Blood, and moves it in its Passage. It shews that Life is a Flame, and that Life and Light amongst the Wise Men reciprocate, Job 3. 20. and that Light is produced by a Coacervation, concentrating and breaking out of the Spirits in the Smoak or Vapour, or dark Fire, 2 Cor. 4. 6. and that all Light sends forth Beams or Spirits, made Vital by their proceeding from the Light. And that by their gathering again in the left Ventricle, as fast as they pass from it they reproduce a new Flame, or flash out from time to time; and so on continually, till the Silver Coard breaking, the Spirits cease to flash out, and out goeth the Lamp of Life.

In treating of the Efflux and Process of the Spirits, or of the Beams from the Light, there is a Digression made to shew, that a Trinity may be known and understood in the Unity, that is, in the Godhead, from Nature, Rom. 1. 20. Because the Light and its Beams, or Spirits flowing from it, being two of the Numbers, or the second, and the third Numbers of the Trinity, it was fit to speak of it. And I could not excuse in explaining what Life is, and how it is produced in the Flash and its Efflux, going to its very Root and Originality, which is, God

in Trinity; who is the true Light and Life; and shewing in God himself (the Prototype of all things) how the Light and the Spirit shine out of the dark Fire of the Father of the Light; and how all the three come from the dark and imperceptible Abyss of the Unity. For to write of things but according to la Methode, by heaping Consequences drawn a Posteriori, and not deduced from their very first Ground and Principles, is but to groape, and to cause others to groape in the Dark; and to be a Seeker still; not yet fit per consequent to teach and be an Author. In it, if some things occur concerning that Act of God whereby he hath produced a Something in the Nothing, to make himself manifest, they call that Act Creating, too high for your Learned Heads, you may skip them if you please: they begin at pag. 116. and end 126. But as these things are abstruse, how plain soever made out, it was not in my Power to accommodate them more to the great Capacity and the reach of Learned Heads, which exert their Faculties upon a Corpuscular material Philosophy; and never raise them higher than Terrestria, Joh. 13. 12. that is, the Objects of their Senses. Excelsa nimis stulto mundo sapientia, Prov. 24. 7. If they prove too high for you, they do not so to all those who have their Eyes in their Heads. And if you did but bestow some of that time which you spend in Dissecting the Bodies, and in Microscopizing; upon the Contemplation of their Spirits, of Nature, and of that Tool whereby God works invisibly therein; you would find them plain enough, Prov. 8. 9. and might find out better things than those you have hitherto put upon the silly World; and be more beneficial to the Publick than you are. In fine, you would not be put to the miserable Shift of calling an
Author

Author Fool for taking the occasion you gave to shew you are such; for then you would give him none, or so few that he would then be unwilling to take them.

O ye, Gentlemen-Cobwebs of the Palace of Wisdom, who adorn it as they do the Walls which they hang upon: and serve like them to catch Flyes, and expose them in your Books and your Monthly Transactions; do you think to hold the Truth so that it shall not break loose, or to run it down at once by calling me a Mad-man? you have taken wrong Measures; and shall see ere it be long that more People will find you out by these disingenious Means, than if you had confessed and forsaken your Error.

Dr. Brown, an Eminent Physician of this City, bath Nicodemically, for fear of the Jews, it seems, who are his Fellow-Doctors, (for Truth, when contradicted, meets with no open Vouchers, and Friends amongst the Doctors: it fails; and they that own it, must do it Clandestinely, lest they make themselves a Prey, Isa. 59. 13.) deliver'd his Opinion of the First Part of this Book, in a late Paper called, The Weekly Miscellany, Printed and Sold by John Nutt, in these words, viz. This Author, whoever he be, writes with an unusual Assurance. But that he hath overthrowed the whole Doctrine of Circulation, as it hath been yet deliver'd by Harvey, Lower and other Anatomists and Physicians, seems to me a plain Truth.

I know that he is not the only Nicodemist; and that great many others, who are not of your Members, appear openly for me. And I know that my Book will out-last you and your Name; and prevail in spite of you. I, not you nor Harvey, shall be thought the Inventor; and your Notion shall lye down and stink with you in the Grave; because it

*is false, and so is but for a little while. Prov.
12. 19.*

Ecce opus exegi quod nec ira vestra, nec ignes,
Nec poterit ferrum, nec edax abolere vetustas.
Cum volet illa dies, quæ nil nisi corporis hujus
Jus habet, incerti spatium mihi finiat ævi;
Ore legar populi; perque omnia sæcula, famâ,
Si quid habent veri Divina oracula, vivam.

*Because it is true, and Truth abideth eternally, Ps.
146. 6. Whereas Chimæra vestra in aere bombinans
tanquam ens rationis vestræ bombinabitur. And
thus, with one single Kick I have thrown down that
huge Tower and heap of Non-sense which you have
been erecting these 50 or 60 Years.*

*I wonder what you'll do, now you have no more the
Theam of the Circulation of the Blood to cant upon,
to give an Account of the Distempers you go to
Cure? But notwithstanding this Loss which you
have to charge me with, and to place to my Debet;
you remain Debtors to me for many of my Secrets
concerning Life and Motion, and for teaching you
your Trade. Who shall pay me, Gentlemen, for the
World will not do it? Pray, in that Mercy whereby
you will let neither the Quacks nor the Apothecaries
live: but would fain engross their Trade, by vent-
ing Panaceas, and pretending to dispense Me-
dicines at the first cost, when some that sell them
cheaper than you get Estates by them; pay me either
in Money, or Rents and Annuities, or make me your
Dispenser, or Treasurer, or Censor: for, if I ne-
ver saw Man nor Woman Dissected; as some of you
said of me, who never saw one themselves; it is not
for your Credit to be taught your Trade by me, ex-
cept*

cept I be made one of your Venerable Heads. In hopes to be one of your Censors, I must remain,

Gentlemen of *Warwick-house*;

Your most Affectionate Friend and Servant,

Oliver Hill.

Postscript.

I Hear a new Syfteam of your old Circulation (long promised and lookt for) is Tranflating out of *French*. Which, if the Circulation be false, can never be true. But tho' it were in the right, which I hold impoffible, it would do you no Kindness. For it being a new Whym, different from yours therefore, it would, in case it were right, fhew that you are in the wrong, and have been for all this while. And fo I need not wait till it comes out of the Prefs for the Publifhing of this; it needs no other Answer.

Against the
Circulation of the Blood.

The Second Part.

The true Cause of the Motion of the Heart and of the Blood, not only in general, but distinct, by Pulsation.

I Have in the first Part made the *Circulation* void and null three several ways, mention'd in the Title-page. By shewing, *first*, the Discord and Disagreement of its Inventors amongst themselves; which is a Mark of Falseness; for all they that understand and know Truth, agree in it: *Consentiunt*, saith Plato, *sive sunt unanimes*; and their Deficiency in drawing Consequences, and passing a right Judgment on their own Experiments: then, by offering Reasons and Arguments against it, which ought to be refuted before any Man of Sense can freely assent to it: and lastly, by exploding all the Causes assigned to this pretended Effect; and shewing that there being no Cause of it in Nature, it cannot be and exist.

And thus, having made an end of pulling down this Product of Modern Wit and Wisdom, and taken time to do it; *Et despectare procul palantes homines illos*, who suffer themselves to be cully'd out of their Reason; I will (that I may do some good in this blind Age, and in my Generation) build up again the old Truth, and set it up in the room of that which hath stood so long in its stead, without being attempted and set upon.

juvat ire per alta
*Astra ; juvat, terris & inani sede relicta,
 Nube vehi : cœloque sedens immotus, ab alto
 Palantes homines passim ac rationis egentes
 In veterem rectamque viam deducere veri.*

And the best way to do it, and to refute all Errors, and to clear ail Doubts at once, is to shew how the thing is, *contraria juxta seposita elucescunt* : when the Sun doth shew it self, all the Mists vanish away. Truth, like the Sun, hath no need but to appear in its force, to be known and justified by them that have Eyes to see.

And the best Method for this, is, to shew, besides the *Quid*, the *Perquid* and *quomodo*, the Cause and Reasons of things, by what means they become such ; and how, or in what manner. And the *Quid* of this being the Motion and Pulsation of the Heart by Intervals, and the Motion in the Blood : the *Perquid* or the Agent of it must needs be the same as that of all the Motion in Nature, to witte Spirits. Of which, having already said enough in the first Part, and proved their Existence, and that they move of themselves, and give Motion to all things : we have no more to do now, than to shew the *Quomodo*, or the way and manner how this Motion is produced by the means of the Spirits.

And, as we have said before in the 11th Chapter of the Spirits, whether Vital, Animal or Natural, being not able of themselves to make the Heart beat and pulse constantly and distinctly, we must find out how they cause this orderly Pulsation ; and to this end, consider all that which accompanies this Motion and Pulsation ; where it is, what promotes it, makes it stronger and weaker, and when it begins and ends.

Which, if we do, we shall find Life and Heat all ways with it ; it beginning, decaying, and ceasing with

with Heat and Life, mending and slackening its pace, or being subject to change with our Heat, Life and Breath. In cold things, Motion is not sensible; and it ceaseth quite with Life in all dead Bodies. So, this Motion beginning and ending with Heat and Life, Life and Heat in the first place are to be considered of in the Search and Enquiry we make after the Reason and the Cause of this Motion. And, as we see by all the Reasons in the 5th Chapter, that it is Spirit gives Life and Motion to living things, the Spirits in the Body are to be taken with them into Consideration: and so Life, Heat and Spirits are to be searched into for the Motion in question. And especially because this Motion is in the Heart, which is the Centre of Life, and the *Focus* of the Heat, and the Store-house of Spirits. And as Motion it self is but the Act of the Spirits, Heat the Effect of Motion, and Life the Result of both; nay, a Motion and a Heat; we cannot consider one, but we must see and observe the others that stick to it, and that go along with it.

Motus ipse omnibus rebus naturalibus est quidem vita quaedam, saith *Aristotle*: who stopt not, as the Modern, at the Blood or the things he felt and toucht, or at the Objects of Sense, in searching out of the Cause of the Motion of the Heart; but stept a degree higher, as appears from what he said, that it moves by its own Heat. And that Life is a Motion, and begins at the Motion it receives from the Spirits, Father *Harvey* shews himself by the *Punctum Saliens*, or heaving Spark in an Egg; and by saying in his Book *de Generatione*, pag. 142. *That the Spirit in the Seed is that makes it prolifick*; to wit, by moving therein, and in the Bag or Bladder, which results from both the Seeds

and becomes the *Embryo*. For by moving in that Bag or Bladder, as in a Sphere, they concurr and center at last in its middle Point, which is the Heart afterwards; and by Motion produce Heat; and by their Concentration and Concourse both Light and Life: Life being but the Product of the Motion and the Heat of the Spirits infused with the Seed into the Womb: as by its Stop and Failure in the Limbs by too much Cold, the Palsy, Sleep, Weariness, Swoning and Convulsion Fits; and the like Cases appears: these Accidents and Defects being but the Cessation of the Heat and the Motion, or a Vice in the Motion and the Heat of the Spirits. And as by Heat and Motion they give beginning to Life, so by the very same means they preserve and maintain it; as I am about to shew.

So that Motion beginning with Life in living Creatures, and Life being that always accompanies their Motion; we must begin our Search by enquiring into Life, what it is, from whence it comes, where it takes its beginning, and how and from what it springs. And before we make an end of resolving these Queries, the Reader will be capable to see and to find by them the true Cause of this Motion. Therefore, to the first Question; what is that thing called Life? tell me, Mr. *Innovator*, can you resolve this Question?

I. That my Books say nothing of, tho' they teach to preserve it; and so if you will know it, you must find it out your self.

A. If they teach to preserve Life, they must tell you what it is; for if *eisdem rebus nutrimur vel vivimus quibus constamus*, you must, to practice Physick, know what things constitute Life, to add and take them from it; the Preservation of Life, and the Practice

Etice of Phyfick confifting, as I faid before from *Hippocrates, in fubtractione rerum quæ exsuperant, & in additione eorum spirituum qui deficiunt illi*. None but he that knows this well being able to preferve Life; *Qui hæc optime facit is optimus medicus*, continues *Hippocrates, existimandus erit; qui verò multum abest ab hoc medendi modo, is plurimum in arte deficere cenfetur. Caveat iſtus ager!* What truſt to a Phyſician that cannot tell what Life is! But, have you nothing to ſay of your ſelf to this Queſtion?

I. What, to a thing we all do conclude to be ſo abſtruſe, that we think it is enough for us to ſay, God knows it! leaving it to God alone, as we do the Knowledge of all the occult Qualities! Truly no, except it be things you will like no better than thoſe you have refuted.

A. A ready way of ſhewing the World your Ability in finding out unknown Truths! The Wiſe Men of *Pharaoh* made a great Noiſe in their time, but when an arduous Caſe did occur in their own way, poor *Joſeph* muſt be ſent for: for they are not the wiſeſt that make a Noiſe in the World, *Job 32*. But this thing, *Circulators*, which you do reſerve to God, as being too high for you, which *no Cultures Eye hath ſeen; and which is hid from the Eyes of all Living*, as you think, *Job 28. 7, 21*. the thing which you give over as inſcrutable to you, is that which I take here upon me to demonſtrate, as being well known to me; by God's Mercy, it is true: for *acceptum refero* to God, the Father of Lights, whoſe Gift all Knowledge is, that glimpe of light I have. So that you are in the right, to ſay the Knowledge of it belongeth to God alone, in this ſenſe, and not in that which excludes Mankind from it. And ſeeing you have nothing to ſay fur-

ther for your selves, or in answer to this thing, you will do well to change place, and to come down into mine, and become *Oraculum Sciscitans*, that is to say, fitter to consult others than resolve Questions your self: and I will, taking yours of *Respondent* and Teacher, resolve as many Questions concerning Life and Motion, as shall be consistent with Reason and Philosophy, and as Reason shall direct.

I. With all my Heart: I will never stand in my own light, but live and learn: and therefore taking my turn readily, I ask you, what is Life?

A. I am glad to see this Change; because *he that confesseth and forsaketh his Errors*, saith the Wise *shall have Mercy*, Prov. 28. 13. therefore you shall have from me that thing you count a Secret, tho' it is not such indeed, but to those *wise and prudent Inventors*, who say *they see*, Mat. 11. 25. Joh. 9. 41. Life is a Fire and Light burning in this or that space which circumscribes the Body: from which two proceeds a third, to wit, the Vital Spirits, that feed Life and maintain it; being not Vital but when they proceed out of the Light. So that the *Biolychnium*, the Match of the Lamp of Life, consists of a threefold Thread, (like that God whose Gift it is Rom. 6. 23. and is called so himself) viz. Fire, Light and Spirit, Joh. 4. 24. Heb. 12. 29. 1 Joh. 1. 5. Which three things are but one thing, being the same Substance as the first Spirit that came from the Seed of the Parents; producing by its Motion a Heat or Fire; then Light; and thirdly Beams or Spirits emanating out of that Light.

I. Why a Fire and a Light? seeing Life is Motion, which Motion Fire alone without the Light supposeth?

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A. Because Fire without Light doth not make the Life perfect; giving but a beginning and original to Life, by its Heat and its Motion or setting Life in Motion: but Life is more than Motion, and implies the Light of Life; for Light, which Motion ends in, as being the thing to which all things tend, as to their end, as I shall shew by and by, is that brings Life to its Rest, and gives it its Perfection. In Light is the Good of Life, *Col. 1. 12.* and seeing Life is God's Gift, and every Gift of God is perfect in its own kind, it implies the Light of Life, or the Perfection of it. In the State of the Fire it is burning, anxious, in an unquiet, fretful, miserable Condition, it cannot acquiesce in; but in the State of the Light, which allays and mitigates the Fierceness of the Fire, as Oil doth a sharp Acid, it becomes calm, still and meek, and pleasant and delightful; so that the living Creatures may not only abide in't. *Isa. 33. 14, 15.* but therein enjoy themselves, and find the Rest of their Souls, *Mat. 11. 29.* In the Fire properly is Hell, or a restless State; but in the Light is the Joy and the Rest, and Bliss of Life. In a word, the Light, saith *John 1. 4.* is properly Life it self. So Fire and Light concur, and are both necessary to the making up of Life; and so are, with the Spirits that proceed out of the Light, and convey Life and feed it, the constitutive Principles, and integrant Parts of Life.

I. What is a Fire burning?

A. It is the Spirits moving together towards the Light, not yet attained unto; and therefore yet invisible: the Motion of the Spirits, or the Spirits in Motion, making that dark corrosive, burning, fretting Quality (rather Essence or Nature) the Spirits have of themselves, before they attain the Light,

which the Wise Men call Fire ; Fire being of it self destructive and invifible, of an efurine Nature ; as may be feen from fharp Froft, and all thofe other Fires the Chymifts call Potential, (fuch as is *Aqua Fortis* and *Lapis Infernalis*) which burn like actual Fire, or rather as being fuch ; for they are actually fuch : being called Potential, by reafon they do not fhine, but abufively by thofe who confound Light with Fire. That the Efurine Nature and Fiercenefs of the Fire come from the Spirits moving before they attain the Light, may be feen from green Acids, green Grapes, and all unripe Fruits and vitriolick Juices, whole Spirits are corrofive, becaufe they are yet unripe, that is to fay, yet moving towards their Maturity ; having not yet acquired the Qualities of the Light wherewith ripe things are indued : for it is the Light makes Grapes, which were fower and auftere, to become fweet and pleafant ; and a Metal and Mineral, which was brittle and imperfect, to become tough and oily, (the Oil is *aula Lucis*) fopliable and malleable, that they extend like Butter and foft Lead, when they grow ripe. And the Spirits of ripe Fruits, that have attained their Light, fuch as is Spirit of Wine, are fo far from corrofive, that they deftroy or fweeten the Nature of Corrofives : whereas thofe of Vitriol, Verjuice, and all thofe Wildings which have not attained theirs, are fo fharp and corrofive, that when coacervated in any of thofe Subjects they call Potential Fires, as *Lapis Infernalis*, they burn and become cauftick as much as actual Fire, which is the greateft and moft prevalent of all Acids. As the fweet Influences of *Orion* and *Pleiades* fhew their vivifick Nature, becaufe they come enlightned by the Sun in his return towards our Hemisphere ; fo
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those of some *Northern* Stars or Signs, or Constellations, shew their deadly, corrosive, sharp and astringent Nature, at the absence of the Sun, by hard Frost, and nipping Winds, because they are not allay'd, and temper'd, and corrected by his Beams or by his Light. The Fire of Hell, which is a meer Fire without Light, is dark and cold of it self, (being in outer Darkness, and causing, as Christ teacheth, quaking and gnashing of Teeth) and kindled by the Motion of the Spirits that form it; the Spirit or Breath of God, which blows and sets its Particles into as fierce a Motion as they are in any Flame a Streaming, kindling the same, *Isa.* 30. 33. Nothing doth overcome Sense so much as Fire and Flame; Sense *superantis motus existit cognitio*; then Fire, or the Spirits, are in Motion when they burn, because one hath a feeling or a sensation of it, and in a violent one, because they overcome Sense: their violent desire and haste to attain the Light; occasioning their Fierceness.

I. And why moving together?

A. Because the Motion of few produce no Fire or Heat, at least such as is sensible; and it is many Spirits or Sparks flying together that cause a Heat and a Flame. The Concourse of many Sparks flowing together out of the Body of the Fewel, forming a Stream, which we call a Flame; that flows contrary to the Water, *viz.* upwards.

I. How do you prove that Fire is but Spirits in Motion?

A. Fire is made up of Sparks; the Sparks are but the Particles exhaling from the Fewel; and they are Spirits, and move. That they move is obvious, for any Man that hath Eyes may see that they fly upwards. And that they are the Spirits *cujus ope totum*

totum cum toto compactum est, by the Means and Act of which the Matter of the Fewel which they are some Particles of, is compacted together, doth appear from that it was (as all concretes in the World) made of Spirit and Water; and that they come out of it, when it is by the Fire resolv'd into its Principles: nothing coming out of things but that they were made up of; and all that comes out being in the form of Sparks and Smoak. Now, as the Smoak is the most watry part of the Matter, so the Sparks are its Spirits: and these Spirits are therefore that which a Fire and Flame is made up and consists of; and whereof all the Fires are produced in the World; with the Addition of some other Spirits in Motion to the Fewel or Matter in which Fire is kindled, or Heat and Motion stirr'd up: as in the Fermentation of Mault and Sugar Liquors, kindling of Fire in Wood, and leavening of Bread, appears: the Fire or the Leaven, or the Yest added to them, to set the same a working, being things that stirr them up; because the Spirits in them are already excited. And that it is their Motion which causeth a Heat and Flame, the rubbing of two hard Sticks or *Indian Canes* together, and the filing of Iron, and the mixing of Acids, as of Spirit of Brimstone with any essential Oils, as the Oil of Turpentine, demonstrates *ad oculum*; the haste the hungry Spirits in the Liquor of Brimstone make to glut themselves with Oil, which is fit to saturate and fulfil their Desire, causing that Motion therein, called Effervescency, which breaks out into a Flame. By the same Reason it is that mixed with Alcalis, (which are a kind of fixt Oil) or any oily Bodies, such as Coral, Pearls and Metals; they cause a Fermentation, moving therein

therein furiously, because having been loosed from the Bonds of their Matter, by being distilled from it, they run greedily towards any other ripe Matter, to re-assume a Body, and fill their Hunger with it.

That all things, and so Sea-coals, Wood, Bitumen, Tallow, Gums, and all combustible things are but a Composition made of Spirit and Water, it hath been shew'd already in the 8th paragr. of the 6th chap. of this, being made by the Spirit or Influence of Heaven coming down into the Air, and the Water of the Sea it joins, and turns to Salt in which going into the Earth with it through the Crevasses at the bottom of the Sea; and there, by the central Heat (which is such, in those places where the outward Air comes not, that the Miners in deep Mines are forced to work naked) turning it into Vapour, it thickneth it into Oil, which joineth to that was left in the *caput mortuum* of the first Distillation of the Waters of the World, that is to say, in the Earth, and supplies and augments it; and with it produceth Coales, Bitumen, Gums, and the Oils of all gummy Trees that burn; and in a word, of all that is fit to make Fewel of for any Fire and Flame.

I. Why moving towards the Light not yet attained unto?

A. Because Fire is a State as yet deprived of Light, where it is not yet obtain'd. And the Light and Liberty being the end of Nature, which Nature, and the Spirits in Nature therefore tend to, as to the State of their Rest, wherein they can acquiesce; and for which they were all made, they must move to obtain it, and till they attain to it. Light is the end of Nature; or which Nature was made for: that

that is, the end for which God moved himself to Nature, or to Manifestation; *Natura, quasi dicas nascitura, la naissance*, Manifestation of God, or God bringing forth himself *respectu creaturæ*. And he manifests himself to communicate himself, or his Good, that all his Works might partake of his Goodness, enjoy and share Good with him, for he made all very good, *Gen. 1. 31.* Now, Light is the only thing fit to answer those two Ends, *viz.* a Manifestation and a Communication of God, or *Summum Bonum*: being, *first*, the only thing which is manifest or seen, as St. Paul himself asserts, *Eph. 5. 13.* his words being *all that which is made manifest or seen, πᾶν τὸ φανερόμενον ὥς ἐστὶ, is Light it self; not that which makes manifest*, as the Translators mistake. And Willis shews, that it is to be taken in this sense, saying pag. 72. *de Fermentatione, Cum lucis radii corpori alicui occurrunt, haud recta pertranseunt, sed denuo reflektuntur; & hi radii ab aliis corporibus reflexi, inque oculum illapsi, rerum visibilibus imagines, & colorum varietates representant. Itaque lux haud tantum illustrat medium, ut visio peragatur, verum & ipsa creat rerum objecta; eademque ad oculi penetralia, imo ad intimos cerebri recessus, introducit. Idem hæc præstat oculo officium quod intellectus animæ. Scilicet corporum ideas sive imagines cudit, atque easdem ab intuitiva facultate perceptibiles reddit.* Which words shew, that the Light doth configure the Particles its Beams are composed of, according to the Textures and the Shapes of the Objects it presents to our View, and is what we see it self. In the *second* place, being the only thing fit to spread and communicate the Good; because it is not only the most diffusive and swift, but the most beneficial and pleasant thing in Nature.

Nature. God himself, which is the Good, being such, that is to say, Good and Love but in the Light, 1 *Joh.* 1. 5, 14, 16. but in the Fire he is devouring and consuming, *Heb.* 12. 29. an angry and jealous God. So that the Light being that answers those two things fully; it is the end of Nature, of God communicating and manifesting himself; and the end therefore to which all things tend, as to their Rest; and so that which the Spirits tend to till they attain it; and for which they move always, to attain it in this World: and which, if they could obtain therein, they would move no more, but enter into their Rest: as it will be at the end, when all Beings shall be fixt, yet like a spiritual Oil.

I. How do you prove that they move, and that they move of themselves?

A. This was already proved: And if I must always begin at the A. B. C. at every Assertion we shall never make an end. I thought to have to do with a Doctor of Physick, one that could cunn his Lesson; but it seems he can't yet read, so set together the things which he spells, to form whole words, or draw Conclusions from them: being always asking me, How do you prove this or that, tho' fully made out before? *Oportet auditorem acutorem esse voce docentis eum*; or wo be to the Disciple, *Joh.* 20. 29. say Christ and *Trismegistus*. And seeing you want Spectacles for every thing you read, come take mine, and put them on. Even from what was now said, you might gather that they move, since they tend towards the Light, as to the end of their course; and that they must always move; because, tho' they often form in this World a Light or Flame, they never attain therein their entire Liberty. But as all things in
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the World are a mixture of Water and Spirit, that makes Matter; they remain always groaning, even in the Light it self, under the Clogg and Burthen, and Bondage of that Matter, in hope of Deliverance, and of the same liberty which God's Children shall obtain, *Rom. 8. 20, 21, 22.* all things *being subjected in hope* of it, saith *St. Paul*; who was a greater Doctor, and understood of Nature more than *Harvey* and *Des Cartes*. I said the Light it self, because it is neither pure nor quite perfect in this World, *Job 25. 5.* being still but a mixture, tho' an Harmonious one, of Spirit and of Water, like the rest, as shall be said; which mixture is not so pure, as it shall be at the time of the restitution of all things from Corruption; or at the end of the World. And therefore the Light of it being not the thing wherein the Spirits attaine their end; they are forced to move on from one Light to another; still longing after the Light, because therein they break loose from the Bonds of their Matter, or Water, *secundum quid*; becoming more clear of it, enjoying their freedom more, and expanding more freely, where they break out into Flames, and great flashes of Lightning, than when they are contained in the thick Vapor and Smoak. And as God is a Spirit; and they come from God himself, who breathed them in the Deep, they move and work of themselves, as God doth, *Job. 5. 17.* from whom they come: following the Impression which they received at first, *viz.* to move, to manifest God, and his works of Wonders; and need no other mover than the Will and Act of God (which is the same as his Word) to move by, till all those Works shall be quite manifested to his Glory in the World.

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It is certain that Spirits swell the Tides at the Full Moon ; and fill up Bottles of Liquors sealed Hermetically, which are but three quarters full ; (*Schomberg*, the Overseer of the Mines of *Misnia*, hath a Glass of that Liquor, drawn from Mineral *Bismuth*, which they dig up at *Schneberg*, and make that Blue color with, which comes here from *Hamborough*) and cause all green things to spring, to grow, fill up, and encrease. Now those things keep in their place, and do not depart from it to meet and fetch that Spirit ; so that it must come it self, of it self, to fill them up ; or by some other Mover unknown to the Inventors ; who knowing of nothing else than the Particles of Matter, were not like to find it out, in case it were in Nature. As they proceeds from the Stars, they move always like the Stars, which were called *Θεοὶ ἀπὸ τῆς Θεότητος*, to run, because they move of themselves. And as they come to supply that part of our Substance which wasteth continually, they must come continually : and come as they do return, that is to say, of themselves : for what else sends them upwards ? *Fieri nunquam potest ut Spiritus consistat, sed sursum ac deorsum eum ferri oportet* ; saith the Oracle of Physick. And we see it moves upwards in all Effervescencies, seeing the Matter it self, which moves but by its Spirits, runs upwards out of the Glass. But one should never have done, if he must always shew you *ab ovo*, all that he saith, and make all Intelligible to Non-intelligent Heads, *Excelsa nimis stulto mundo sapientia*, Prov. 24. 7. Shew the World what Truth you will, and prove it never so much, yet after he hears it out, he will be always asking of you, How is that proved ? The wise World will be as wise, and Error as much in vogue as if it had not heard you,

you, and you had said nor a word. Understanding comes from Christ, 1 *Joh.* 5. 20. and from the Spirit he sends, *Joh.* 14. 26.---16. 7, 13. and without Understanding, the World in Hearing hears not; that is, understands no more than the bare sound of the words, *Matth.* 13. 14.

I. So much for Fire. Pray now, What is Light, and by what Means, and how is the Light formed?

A. *Amicitia contrariorum, & dissimilium commixtio Lumen constituunt, illustratum ab actu Dei,* saith *Trismagistus* of it. But six things are requisite, and must concur together in the production of Light. First, the Motion of Spirits, of which enough hath been said: Secondly, a reflection, or something to stop and check, and to obstruct their Motion: Next, a Coacervation, or gathering and crowding together into some space: And fourthly, a meeting and concentrating in one point: And fifthly, an Eruption, or breaking or flashing out of their dark and thick Vehicle, into a Flash, or a Flame: And lastly, an Harmony of the two great contraries, to wit, Spirit and Water. And enough having been said already of their Motion, we will begin by the next: to wit,

By their Reflection or Refraction. This appears by a stock or heap of Hay, which being not stow'd in dry, doth Ferment, and send upwards its Vapor and its Spirit, which is by Fermentation set in Motion within it: For this Spirit being kept within the moist stock or heap, by the upper lays of Hay, as it were under Hatches, from rising and expanding in the Air, beyond the heap; doth coacervate therein; and so the Vapour growing thereby thicker and thicker, flasheth out into a Flame. The
same

same thing is more visible in Fires made of Sea Coal ; for if, when their Cake is made, one break it up with a Fork, and lay its pieces hollow, and then hold the Fire-pan over the Crack or Fracture, the Smoak kept under thereby is reflected and gathers together under that Vault ; and grows thicker and thicker, till it break out into Flames. The Lightning it self is made the same way, by Reflection ; for the ascending Vapour being hot and unctuous ; (they call it Sulphureous) oily and full of Spirits, (for none but oily Vapours can cause Thunder and Lightning) when it meets with moist Vapours, it cannot unite with them ; and so, running against them, it is stopt and reflected, and thereby gathers more Strength, to divide and run through them, or to thrust them quite away ; by which means being crouded and hedged in on both sides, it breaks out into a Flash ; which taking up a great space, thrusteth the watry Vapour closer than it was before, and condenseth it to Rain on that side where it gave way : whence we very seldom hear any Thunder without Rain. But when the watry Vapour cannot be wholly dispers'd or broke through, or thrust away at first or second on-set ; the other which riseth still, doth coacervate again under it, and keeps flashing or lightning by Intervals, till one of the two be spent or thrust away, or scatter'd ; and then no Thunder is heard.

Their Coacervation appears from what hath been
 said, and from what follows, to wit, when a Candle
 is lighted, the Flame spreadeth no further than the
 space which the Spirits or Sparks rising from the
 Wax or Tallow do gather in ; and as soon as they
 dilate and proceed beyond that space, they cease to
 shine, and appear no more in the form of Light, but

of invifible Beams, known to the Senfe of Feeling by their Heat, which one may feel if he will but hold his Hand clofe by or over the Flame. The fame Candle, when blown out, is by driving back its Smoak or Spirits towards the Match, about which they do gather together, blown in again. Small Eyes have a better Sight than full and prominent ones; and their Light is much stronger; fhining fometimes in the dark, which the other feldom do. And Spectacles help our Sight but by co-acervating, or gathering and ftopping the difperfed vifual Beams: which encrease, witnefs *Willis, à pleniore potu vini fpirituofi*. And by compreffing, fqueezing and rubbing a Cat or Horfe againft the Hair in the dark, Sparks and *Flammulae* fly out. And fome rotten Wood doth fhine when by its Vifcofity the Spirits that fly from it as it rots or putrifies, are retained and gather about its Superficy: and in a word, no Light fhines but where the Spirits gather. *Note*, the thicker the Smoak is, or the greater the Darknefs, the nearer the Light is to a breaking or fhining out. *Gaudeat hoc faeculum cecum*, the Light is at hand.

Their Concentration appears plainly from the Burning-Glaf, which affords a Flame by it, and without it affords none; but only fome fainting Heat, according as it doth ill or well concenter the Beams. For if all the Lines or Beams which it receives and gathers do not meet juft together into one Point or Centre, but cut each other either on this or that fide of it, it yields no Fire or Flame, and very often no Heat; in which cafe it deferves not the name of a Burning-glaf. The Sun is a flaming Globe or Sphere of Flame and Fire, which, as fuch, draws and attracts, and, as round, draws on all fides. Now, the Spirits it attracts getting in it on all fides, run as far as they are able in it towards its

Centre, and meet together in it, except some should go further, which there is no reason for, all having but the same way to go, because it is round; and no reason to suppose they move swifter on one side than they do on the other. By meeting in the Center, they concenter in that Point; and by that Concentration, and Chock, break out into Flames; which are manifestly seen by the help of Telescopes, starting out and prominent from the Center of the Sun, which is but a Point belching and breaking out into Flames; its Surface being not smooth, but rough, scabrous, uneven, like that of the Fire-ball which is on the Monument; and having no Spots on it therefore, as some do suppose: those Spots being but the Beams which issue out of its Flame; and appear to our Sight, by reason they cease to shine, in the form of a dark Smoak. By the like Concentration of God's Spirit in the Souls of Heroes and Believers, at every Act of Faith, there breaks out a Flash likewise, which inflames and gives them Strength, so that *they run through a Troop, and put whole Armies to Flight*, become *fulmina belli*, so light, that they seem to fly, *Psf. 18. 29, 32, 33.* do all Wonders, raise the Dead, and even remove Mountains, *Heb. 11. 34.* whilst the Flash is upon them, *Judg. 14. 6.* Each Act of their Heroism being a new Flash or Flame, kindling and enabling them, whether Heathen or Christians, to do that which is as much above the Activity of our Modern Heroes, (who act like all other sorts of Trades, after *la Methode*) as the Activity of a pound of Gun-powder is above that of few Coals, or of a Faggot lighted.

For the Crack or Eruption of the concentrated Spirits out of their thick and dark Cloud, *St. Paul*

takes it for granted, 2Cor.4.6. And any Man may see it that will but open his Eyes and look up, when it Lightneth, toward that part of Heaven where the Lightning doth appear. For there, in that very place where, before the Flash, he saw nothing but black and dark Clouds, a Light shines on a sudden: and he seeth those Clouds open, and the Light break out of them, as palpably as ever he can see any thing else. The Flames seen in *Strombolo*, *Gibel*, and other Vulcans, are but a Vapour or Smoak when they rise out of the Earth; and become a Flame or Flash, or do break out of their Smoak, but when they are above Ground. The Earth is but an *'Ass*, where nothing but Smoak is seen, when one looks down upon it from the top of high Mountains, or from above in the Air, as Witches may do sometimes, when they are carryed through it from one place to another: Darknes being still in part on the face of our Deep, by reason of the Vapours always arising from it: now, all the Flames upon Earth break out of those dark Vapours, in the same manner as that which proceeds from Gun-powder upon the firing of it, by tearing open the Pores of the Coals, or the Coal-dust which the green acid Spirits of Brimstone and Salt-petre are crouded and absorbt in, and so do those which break out of two contrary Liquors, *viz.* *Acid* and *Alkali*, and an Acid and an Oil, when they mix them together: their Spirits being stirred up by an Effervescency; and moving on a sudden, and breaking out to get loose.

And these five Requisites to the Production of Light, may be seen in the manner of the Creation it self, as deliver'd by *Moses*. *First*, There was a dark Abyss, wherein the Spirit of God was moving from the Center towards the Surface of it. Not
flut-

fluttering over it, as those that know little of God and of Nature imagine. For God is in the Center, and the Center of all things, working therein to this day, *Joh. 5. 17.* producing out of himself all his Works, by the Virtue or Breath that flows forth from him. *Luk. 8. 46.* and manifesting himself out of one Point, like the Sun, by sending forth Light and Beams. His Spirit then ascending from the Center of the Deep towards its Circumference, raised, as it doth still since, *Gen. 2. 6.* the Water it mixed with, into a Vapour or Smoak: being then, as it is now, the central Heat of all things, and the old Demogorgon, and the Pluto in the Earth, ruling in the lower World, *Job 28. 5.* And when it had thus moved for the space of the first Night; for by *Moses* his Reckoning, the Days begun at Evening, as they do still in the East, and all Italy over; then God said, *Let there be Light, and the Light*, as *St. Paul* saith, *2 Cor. 4. 6.* *shined out of the Darknes.* That is, when the said Spirit was, by its moving upwards in the form of a dark Smoak, come to the outermost bounds of the Sphere appointed it, there was, by the Will of God, (which is the same as his Act, Power and Word, God having, as was said before, no Mouth nor Hands to speak and work with, and being the Almighty, he doth things at the same time that he willeth and speaketh; nay, reduceth into Act, and exerteth his Power instead of speaking the Word: Good, or God, being meer Act.) I say, that there was then, by the Will or Act of God, a stop put to the further Progress of the said Spirit: so far, said God, stopping it, shalt thou rise, and no higher. So that by this Act of God, it being thus reflected, it did gather together under its Goal or Limit, and grew thicker and thicker, (for it ceased not to rise,

since it riseth to this day) and by concentrating, broke out into a Lightning or Flame; which condensing together into a closer Texture the next ascending Vapour, got room enough to dilate and to ex-patiate in, above it in the void space next to the Circumference, called, *Primum Mobile*, because being the first checkt, it was the first that moved about, or circulated. And as this was reflected and stopt, it did likewise stop the next ascending Vapour, which gathered and broke out by degrees at divers times, and in different spaces; always lower and lower, till the Sun was created: the Vapours that ascended and gathered by degrees, hiding the Light from the Earth, and making Night or Darknes: and thence came the Day and Night the first, second and third Day. On the fourth, after all the Waters were condensed and had run into one place, and the Air was clear of them; the Light being then but such that one might see it was Light, because it was disperfed; the Spirits which had broke out into Light the three first Days; and were spread through the whole Sphere, moving themselves from the space which is now above the Sun downwards to the middle Point between the Circumference and the Center of the Sphere, met in it with the other which continued to ascend, or to move from all that space which is now under the Sun, and there concentrating with it, broke out again into that great Sea of Flashes or Flames, which is now called the Sun, and is the Heart of this World. So that by the Reflection, Concourse and Concentration of the Spirits in Motion, and by their Crack, Eruption or *Fragor*, the fourth time, there was a great Flash of Light; which continues
ever

ever since flashing out of its Center, the Sun being as it were a Spring of renaſcent Flames. And by the ſame way and means Life is ſtruck the fourth Day; and the Heart, the Spring of Life, having the ſhape of a Flame, begins in the Microcoſm. And thus, from the Word of God, we might learn to know his Works, if we did not reject it: but our Innovators *reject the Word of the Lord, and what Wiſdom is in them therefore?* ſaith Jeremiah 8. 9.

I. Well; is there no other thing requiſite to produce Light?

A. Yes; an harmonious Mixture of the two great Contraries, to wit, Fire and Water; that is, Spirit and Water, (for once for all you muſt note, that the Spirit in Motion being the ſame as Fire, both words, as Synonymous, are uſed promiſcuouſly by the ancient Writers; *Hippocrates* calls Spirits πνευματικόν, as was ſaid.) The anatical Mixture of the four Qualities, chiefly of Heat and Moiſture, is that which, with the other five things, produceth Light, and cauſeth it to burn clear. For no Light doth ever ſhine where there is either too much or too little of one of them. Too much Air (which is the ſame as Spirit) ſuffocates it, as well as too much Moiſture: for too much Air blows it out: and the Lamps ſhut up in Vaults, found burning ſome hundred Years after they have been lighted, go out immediately upon letting in the Air. And, as much Air and Moiſture put it out immediately, ſo it dies for want of them; when the Air is kept from it, or it is kept from the Air. Whilſt the Vapour is too moiſt, no Light can break out of it, and when too much rareſied, as in ſome Grottas and Mines, no Candle can burn in it. The

Spirit above the Sun must descend and come lower, and that below it ascend, and both mix their Qualities, and come to that proportion of Dryness and of Moisture requisite to produce Light, before they can form the Sun, and are fit to feed its Flames. The Vapours must grow thicker or thinner, get or loose some of their Dryness or Moisture; and the two great Enemies must make a just Agreement before any Light appears. As from fermented Spirits, which burn not before they are well freed of their watry parts; from the Blackness in the Match of any Candle burning, caused by too much Tallow, which the Flame can't dissipate; and from the Vapour rising from *Gibel* and *Strombolo*, which is dark, not luminous, when it comes out of the Earth, but riseth ten or twelve Foot above Ground, to grow thinner in the Air, before it shines, we may infer and conclude. The Fire and the Water must be wrought to a Temper between wet and dry, cold and hot, thin and thick, fluid and hard, where neither of the four Qualities predominate in an excessive degree, such as Oil, to form a Light. The Oil is *aula Lucis*: being a Middle or Medium between the two great Extreams. Fermented Spirits burning and yielding a Light or Flame but on the account of their Oleaginosity: being but the unripe part of the Oils of the Concretes, which the Spirits have not yet inspissated to the full by their working upon it. And Oil, upon the account of being apt to catch Flames, and yield a Light or a Flame, was used under the Law, to typify the Effect of God's Spirit in the Soul, *viz.* the enlightning of it; and the anointing of it with the true Oil of Gladness, 1 *Joh.* 2. 27. whereby Christ makes the Saints Kings and Priests, *Rev.* 1. 6. or anointed Ones, or Christians;
for

for a Christian signifies one anointed ; bringing them to their even, just, right or perfect Temper, or the State of Righteousness, (where they find Rest to their Souls, *Matth.* 11. 29.) *Rom.* 14. 17. *Colos.* 1. 12. by the Light of his Spirit.

O that Oil, Innovator, a little of that blessed Oil, which makes the Soul fit to dwell with everlasting Burnings, without being hurt by them ; and a little of that also which is fixt and flows like Wax, without evaporating ; both as great Secrets to you as the Cause of the Motion of the Heart by Pulsation was, till I told it you, would make you, what do you think ? other guise Tools, I hope, than what your Sparks from your Schools will ever do, Kings and Priests, or anointed Heads indeed ! *O ye that kindle a Fire, that compass your selves with Sparks, and walk in the Light thereof ; walk on still, and take your Course : this shall you have at God's Hand, you shall see none of those Oils, Isa.* 50. 11. *Joh.* 9. 41.

It appears from that the Beams or Rays of the Sun shine not in the Burning-glass it self, but in that Matter only, (in case it be combustible) which it reflects them upon, that they want Moisture to shine, which they find in that Matter, and not in the Burning-glass ; and that a due proportion of Spirits and of Water is requisite in the Light ; no Light being producible without such anatical, oily, harmonious Temper, as is above expressed. *Amicitia contrariorum, & dissimilium commixtio aequalis*, is that which constitutes Light, by the Word and Act of God, saith one, whom our Christians call Heathen : but who shews more in that short Sentence of his than their heathenish Scholarship, with all their Experiments, have yet made out to the World.

World. And thus it hath been made plain, that these six things together, viz. a Motion of Spirits; then a Check of that Motion; and a Coacervation; and Concentration of them; with a *Fragor* of the dark, black and thick Vapour or Smoak, and their flashing out of it; and a convenient Mixture of Spirits and of Water; must concur to produce Light, and to feed it in the Sun, and wheresoever it shines. And therefore, that the three things offer'd by Doctor *Willis* in his Accension of Blood, are not sufficient to form a *Flammula* in the Blood.

I. All this is plausible enough. And so far having proved that Life is Fire and Light; pray shew the next thing, which is, that a third proceeds from them, to wit, the Spirit of Life?

A. That, if you had not your Eyes at 'tother end of the Earth, but on the thing we treat of, to wit, Fire, Light and Heat; and the Sun, and the Sun's Beams; you might see and find your self. Those Beams and that Heat being but the Spirits emaning; and moving out of its Light; and but Sparks flying from it, and following each other constantly in a straight Line: nay, the very same Spirits as the Light they issue from was made and consisted of: which having not attained their Liberty in that Light, go from it, and continue their Motion and Pilgrimage; seeking, as all the Children and Works of God in this World, *Heb. 11. 14.* a better State and Country, Redemption from their Bondage, *Rom. 8. 22.* *Willis* hath proved for me in the words before cited out of pag. 72. *de Fermentatione*, that the said Beams are Particles of the Luminous Bodies; and part of their Light themselves; which must needs proceed from them, seeing it was part of them; and, as we see, doth come out of their Body

Body or their Orbe. And holding your Hand hollow over a Candle lighted, you may feel that those Spirits or Sparks, which are invisible when they come out of that space the Flame is circumscrib'd in, are parts of that Light or Flame; for they turn to Light again, being apt to catch a Flame, and the Flame doth then encrease; which shews they were such before, and that they come from that Light which they join to and encrease. And since the Light doth consist, like other things in the World, of Spirit and of Water, it is Spirit and Water which we see proceed from it in the form of Sparks and Smoak.

As Fire ceaseth to burn when it ceaseth to attract Air and Spirits to it self, so the Light ceaseth to shine, and goeth out, witness *Willis*, when it cannot send forth Beams, and hath no convenient space to send Beams or Spirits in; want of space to send them in, suffocating it as much as Water poured upon a Flame which stops up the Pores the Sparks fly out at, can do. And as he that saith Fire, saith the Spirits attracted and moving towards the Light, so the word Light implies Beams or Spirits moving from it, or proceeding out of it. These three things, *viz.* Fire, Light and Spirit, always going and subsisting together, in any actual Fire; not one without the other, nor each of them of it self; but dependently from each other; and from that Spirit which is their *Hypostasis*, Stock or Subject, and to which they owe their Original; and which they make manifest: being no more in Effect than the Manifestation of that very same Spirit; nay, that same Spirit it self manifested divers ways, under three several forms of Fire, Light and Spirit.

For

For the Eternal Spirit in the still Eternity, before it moved it self to a Manifestation, is known but under one Form, which we call the Unity; nay, is but a dark Abyſs, which we have no Knowledge of till it manifest it self, or move it self to Nature, or to a Generation. This Generation, Nature, Manifestation of God is performed by three Steps; the Abyſs or Unity in coming out of its Rest in the still Eternity, to make it self perceptible, moving it self by three steps, and appearing in three Forms, of Fire first, secondly of Light, thirdly of Spirit, which we call the Trinity, and which, as by three Degrees, manifest the Unity. So that, first, The Unity is known but in Trinity. Secondly, The Trinity is but the Generation, or the Manifestation, or Nature of the God-head. Thirdly, Tho' the Trinity be co-eternal to the Unity or the God-head; yet it is not known to us in the still Eternity; the Unity becoming perceptible to the Creatures but in its Generation, or its Motion to Nature; and it is called Nature, because the God-head brings forth and unfolds it self thereby; and thus brings it self to Kenn and Perceptibility.

And the Eternal Spirit moves himself out of his Rest eternally (to this time and to all Eternity; his Generation being eternal, everlasting, and a reproduction of it self continually) the same way and manner as when he created the World: for the World is the Image and Similitude of God, as well as the Microcosm; nay, *corpus ipsum Dei*, God become Corporeal; and its Creation therefore is after the same manner as the eternal Nature or Generation of God; for *Deus & Natura sunt ubique Similes*. Now, in creating the World, it moved under the Form of a dark Fire and Smoak, Gen. 1.

2. as he did in Mount *Sinai*, *Exod.* 19. 18. and he dwelleth, as to us, in the thick Clouds and Dark-ness, 1 *King.* 8. 12. *Psa.* 18. 11. in the *umbra horrenda*, as *Trismegistus* calls it, moving furiously upwards. And because Fire gives Life and Motion to all Beings, is the Begerter of Life, and gives Life its Beginning; it is in that Appearance, and under that Form and State that God is called Father; and an angry jealous God, and a consuming Fire; and the Almighty likewise, all Might and Power coming from the Force and *Impetus* of the Spirits in Motion, which is the State of Fire. And as Heat is the first in every Generation, whence *Lully* and some others, who understood Nature well, have called it *Pater Noster*; it is called the Father, and the Father is the first in the Trinity, or in the Generation of God: tho' but part of it himself, or generated himself from the Stock or Unity, (the first eternal Spirit) tho' the Son nevertheless be generated, that is, manifested out of him; in the manner as the Light is out of the thick Darkness. The Light being properly the Son in the Trinity; called Son of the *Hebrews* for the same Reason doubtless, as they call in their Language the Sparks that fly out of Coals, *the Sons of the burning Coal*, because it is, as it were, brought forth and generated from the Fire or Father. So that the Name of Father and Fire reciprocate. And as this Motion of God is a Motion of himself, in himself, and to Nature, it hath been called therefore by those that understood it; the Generation, or the Multiplication, Encrease, Expansion of the God-head; or God unfolding himself, or flowing out of himself, *Quasi per fluxum atque extensionem centri.*

The Heat or Fire therefore being the first in order, out of it the second Form or Essence, which is the Light, is manifested, or shines, by Eruption, as was shew'd from 2 Cor. 4. 6. And out of this the third Form, which is a Breath or Spirit, and the last under which God hath manifested himself, and will be known of Mankind, (allowing of no other Conceit and Knowledge of him than that which is Spiritual; and forbidding all Worthip under a material Form, *Exod. 20. 4. Deut. 4. 15. Job. 4. 24.*) flows forth, issues, and proceeds into all the Creation.

So that the Hypostasis, Stock or Substance of the three, or the eternal Spirit *qui substat* to all the three, and therefore is their Substance, or in *Greek*, *Hypostasis*, hath made in its Unity a Trinity, of what, pray? of Persons, or of God-heads? No sure; for it is still but the same eternal Substance, which hath unfolded it self; but of Forms or Essences, which subsist not like Persons; for a Person subsisteth independently from that which it hath Relation to, that living tho' this be dead; whereas each of these three are dependent from the other: but like distinct Essences: having divers Properties, or Natures, or Essences: in *Greek* called *ουσιαι*. The Nature or Property of the Light being divers from that of the other two. The Light, as I have said, being of a gentle, meek, comforting, and refreshing and vivifying Nature; but that of Fire, dark, fierce, and burning and destructive: and that of the Spirit fit to convey the Light of Life, Food and Health to all Creatures, to reproduce Life in them, and make them enjoy the Good of Life as long as they live. And these three, tho' different from each other in Essence or in Form, agree in one, saith *John*

1 Ep. 5. 7. to wit, in Substance ; the first eternal Spirit, which *substat* to all the three.

The Reason of this Error, that is, why they give the Name of Persons to the Father, and the Light and the Spirit ; is, that Christ is a Person : and that both he and the Light are called the Sons of God : that Christ calls himself the Light, *Joh. 8. 12.* and is called God himself *manifested in the Flesh*, 1 Tim. 3. 16. and is said to have in him the Fulness of the God-head, *Col. 2. 9.* to be one with the Father, *Joh. 10. 30.* ---- 17. 11, 21. and to sit at his Right Hand in the Majesty on high : and many other such things, which make Men to confound him with the second of the three ; and to make the first and third, *viz.* the Father and Spirit, two Persons as well as he. But Christ, as Christ, is an *Ens* not only distinct from God, but from the second Number, or Form in the Trinity : being God and Man, that is, a Concrete of both Natures ; who existeth in Nature but since the Fall of *Adam*, and the Promise made to him of his rising from his Fall by means of the Anointed, who should anoint him again with the Oil or Light of which he saw himself deprived : being the second *Adam*, substituted in his place ; and like him *the Son of God*, *Luk. 3. 38.* because begotten, like him and the World, *Gen. 1. 2.* -- 2. 7. of God's Spirit ; by which he was conceived. So that, as neither *Adam* nor the World are God himself ; so Christ, as Christ, is not God himself, but distinct from him. And note, I say, as Christ ; that is, as that Person which consisteth of both Natures ; for, as God, that same Person is the same with the Father, and the Light, and the Spirit, in Substance, not in Essence ; having all these three in him, dwelling in him together, and, faith

faith *Paul*, in their *Fulness*. God's Efflux or his Spirit bringing with him when he came in the Seed of the Virgin, or when Christ was conceived, all the Might of the Father, and the Virtue of the Light, and its own; for Christ did not receive, like *Adam* and those who are God's anointed Ones, the Holy Ghost by measure, *Joh. 3. 34.* and in this respect it is, that all that belongs to God may be ascribed to him, *ch. 17. 10.*

And why should it seem more strange, that God, by joining himself again to Humanity, or to the Human Nature, in the Seed of the Virgin, by his Spirit, which perform'd in it the part of the Male, made of both Natures, that is, of the Human and Divine, thus joined in one Body, a new thing more excellent than all he had made before; to subsist a part from him, than that he did it before, when by breathing his Spirit into the Water that was the first Matter of the World, *Gen. 1. 2.* and the Body of *Adam*, *ch. 2. 7.* he made of them two Creatures, which, tho' both out of himself, yet were things distinct from him; neither of them being God, or the Deity it self. God made all out of himself, by the very same Spirit whereby Christ was conceived in the Womb of the Virgin, *Pf. 33. 6.* all being but God himself become a Corporeal Substance; and *corpus Dei*. And when the first Angel fell, he made another, to wit, *Adam*, to supply his place, that his first Purpose might stand, and not be disappointed; and when this was fall'n also, he had another in store; which he told the Serpent of, *Gen. 3. 15.* And in the Fulness of time, moving himself a third time in Nature, not to Nature, (which was already brought forth; and so needed no more than to be regenerated, as having been

been

been corrupted by the Fall of *Lucifer*) he joined himself to Man, who was the Head of Nature; or however of this World: *Gen. 1. 26, 28.* and made by this Conjunction this third Angel manifest; and manifested himself in him, to such degree, that he made him fit and able to regenerate all things, and Redeem the Creation from the Curse of Corruption; no Angel being capable of such great Performance, since they were not able to stand, *Job. 4. 18.* And this third Angel being to reform the Creation from the Depravation introduced in Nature by the Fall of the Angels; for he came, as *St. John* saith, *1 Ep. 3. 8. to destroy* that Work of theirs; and to *make up* that also which *Adam* had done amiss; is a Regenerator, (the true Office of Christ is to regenerate Mankind; therefore he saves us by it, the new Birth of the Spirit being the true way to Life, *Joh. 3. 5.*) and must be more excellent than all God had made before. And as such deserve a Name above that of all Creatures, and that every Creature should bow the Knee at his Name, and confess that he is Lord, *Phil. 2. 10, 11.* As such, tho' distinct from God, and also from the second Essence in the Trinity; I declare I hope for Salvation (the new Birth of the Spirit) by his means. I am sure, were he not God, or had he not been a God at first, as well as a Man, he could not have fulfilled all Righteousness in the Flesh, reconciled Humanity or Human Nature to God; and could not regenerate or beget those Men anew, who believe, and die with him in the Water of Baptism, *Rom. 6. 4.* and be their second *Adam*; that is, their true Begetter, Father, Regenerator; and in short, the Author of their eternal Salvation. As God, he is the Word, Light, Wisdom and Brightness of God; and the

Holy Ghost proceeds from him, and is sent by him, *Joh. 16. 7.* to regenerate Mankind, chap. 3. 5. And all that is said of God, is due, and belongs to him. chap. 16. 15. And as Christ, or God and Man, he is the anointed One *κατ' ἐξοχὴν*, above all the other anointed Ones, *Heb. 1. 9.* as having not received the Holy Ghost by measure, *Joh. 3. 34.* the only begotten Son of God, begotten of him by his own Spirit or Seed, on the Body of *Mary*: God's Holy Spirit coming in and upon the Virgin, *Luk. 1. 35.* and bringing along with him the Power and the Virtue of all the three Essences, wherein we are Baptized: the Fulness of the God-head dwelling in him bodily, or as in its own Body, which it formed to it self. As Christ, he is the First-born, that is, the Heir and the Chief of all the Creatures of God, *Col. 1. 15.* the Head of Angels and Men, that is to say, of the Church, *Eph. 1. 21.* which shall consist of those two: *Emmanuel*, or, God in Man; the Mercy Seat, where God dwells; reconciles Man to himself, *2 Cor. 5. 19.* and hears him: being no more to be prayed to as dwelling in Churches, but as in Christ, and through Christ, since his coming, *Joh. 4. 21.* But if any Man takes Christ, as Christ, that is, as Man God, or as he is a Person composed of God and Man, for the same as the God-head, or for the second Essence or Form in the Trinity, which hath been generated of God from Eternity; it is not the Scriptures fault; for it makes a Distinction, chap. 17. 3. and teacheth us otherwise, chap. 14. 28.

Thus, by the visible things of the Creation, saith *Paul*, *Rom. 1. 20.* the invisible God-head it self may be known and seen: and the Cant of those that make the Mysteries in Scripture, and that of the Trinity,

Trinity, to be above our reach, appears to be *no Excuse* for not searching into them. Thus the Book, *Christianity and Scripture no Mystery*, instead of making them so, appears to be one it self: and erroneous besides. For the way to make them so, is the same as I take, to wit, to make them out plain: but instead of doing that, leaving them such as they are, he goeth about to make out that Reason can fathom them: whereby leaving the Reader, who receives no Benefit of his Arguments towards understanding the Parables and Mysteries in Scripture, as much to seek as before in the fathoming of them, it is but like a Parable or a Mystery to him; and, as being opposite to Christ and his Apostles, who teach, that Reason (which is the Light of Nature only) understands nothing of them, without that which comes of Grace by the Birth of the Spirit, *Mat. 11. 25, 27. Mar. 4. 11. Joh. 3. 3, 5. 1 Cor. 2. 14.* it is a damnable Error. And thus, if this Mystery had been made out by the Priests, it had saved the Labour of making so many Books, concluding like St. *Austin*, *Nos autem, fratres, fide precedente, quæ sanat oculum cordis nostri, quæ non intelligimus sine dubitatione credamus*, faith that Great Man; that is, just nothing at all: for, as *Trismegistus* faith to it, *intelligere* being *ipsum credere*, to believe, is to assent, and we cannot assent to those things we don't understand. Faith, faith *Paul*, *Heb. 11. 1.* makes evident, plain to the Understanding, things not obvious to Sense: and so supposeth that Men must understand, to believe; whereas this Saint would have them to believe without doubting, that which they understand not. And if the Eye of the Soul, which is the Understanding, be healed by Faith, Faith is to make that Faculty sound,

that is, fit to understand? and procure it that Spirit of Truth, and of Discernment, *Joh. 16. 13.* which Christ is come to give us? 1 *Joh. 5. 20.* and whereby he doth heal us. *Plusieurs saints a mon avis ont sainti a bon marché.* And thus is the Trinity made out in the Unity against the half-witted Crew of *Socinians* and *Deists*. And this, without dividing the Substance, *Hypostasiz*; and confounding the Essence, *οὐσίαν*, or Properties; according to the Doctrine of the true Church of *England*.

How the Eternal Spirit, which in God is pure and simple; and, saith *Paul*, dwells in the Light no Man can approach unto, and hath no Darkness in him, 1 *Joh. 1. 5.* came to obumbrate himself, or raise a Mist in himself, which the Light might break out of; and to bring himself in time out of his eternal Rest into Motion and Nature; or the State of the Father; when there was yet no Nature; nor Water or moist Vehicle for that Spirit to move in, and to raise a Vapour with: *St. Peter* hath declared in his Sermon to *Clemens Romanus*; and *Jacob Behm* hath said much concerning it. *Erat, & est, & erit prima voluntas*, saith he, to the Manifestation: *in qua rursus voluntas*, to wit, to the Means of it: which Means are a dark Motion, or a Motion and Darkness; as it hath been shewed above, in the Discourse of the Light. To which end the Will becomes desirous, first, of the thing which it conceives in the Mind, to wit, the eternal Word; and secondly, of the Means, *viz.* the Expression of it. This Desire or Hunger of some thing, (which is *Peter's* second Will) is attractive, and astringent or binding; the Desire or Acid which is the first Quality in Nature, being binding and congealing, as appears from Saturn, which is the first, and is coagulative. But finding nothing to

draw together in the Abyſs, but it ſelf, it draws it ſelf, condenſeth and fills it ſelf; and by filling of it ſelf, becomes dark and ſhadowed, as a Sun-ſhiny place is by the Shadow of a Tree, or of any other thing ſtands between it and the Sun, or takes it up and fills it; till the conceived Wiſdom, Word or Light is expreſſed, ſpoken forth, maniſeſted; by the Spirit breaking out into a Flaſh or a Light. This is called Creating, that is to ſay, producing of ſomething in the nothing.

But if one would conſider, *quid homini accidat generare volenti*, he might the better thereby conceive, and form Ideas of the manner of that thing. Thus, when a Man falls in Love, (exerts his firſt, general, inbred Will to generate, or to multiply himſelf) he becomes penſive and dark; becauſe by his ſecond Will, which is Deſire or Luſt after the thing beloved, (called Love wrongfully, becauſe oppoſite to Love; for it draws all to it ſelf, whereas Love gives all away) he attracts, and amaſſates, and condenſeth in his Mind the Idea which he forms of that he is in Love with; and makes of it to himſelf a real *Ens* or Subſtance, which taking up his whole Mind, ſo that he cannot think of any other thing beſides, or receive it within it; it fills it and darkens it; whereby he looks cloudy, dull, and becomes dark and reſtleſs.

A Woman, by her luſting, or her longing Deſire after ſome thing conceived in her Imagination, forms a real *Ens* of it, and ſtamps it *per contactum*, by the touch of a *Medium* (which is ſome part of her ſelf) upon the Fruit in her Womb; producing, by her Fancy, and her Deſire only, in a thing diſtinct from her, and reducing to Subſtance and Corporeal Matter, the thing ſhe luſteth after: of which In-

stances enough ; and of the Strength of the Will and the Imagination, in producing Entities ; and reducing Ideas well impressed in the Mind into real Substances ; not only in Men, but Beasts : In *Jacob's* Sleep, for Instance, *Gen. 30. 39.* *Helmont* speaks of a Woman big with Child, which, seeing one Beheaded, was brought to Bed of a Child without a Head. The Fruitfulness of the Seed, and Generation it self, is by *Harvey* ascribed to the Imagination.

When Man is thus over-cast, and comes to reduce his Will and his Power into act, his Spirits, that move in him, and form in him the dark State of the Father or Fire, being still by the first Will to a Multiplication, determined and guided towards the Parts and Organs proper to Generation ; gather and coacervate, and cause a Heat in those Parts ; and then, when the Parts are full, and can hold out no longer, break out by Concentration into a Flash or a Flame ; *fit Lux*, the Son, or the Seed, comes forth with Delight and Joy ; a sign that the Light is Born ; the *Pulchrum* and the *Bonum*, to be good and delightful, being the essential Form and Property of the Light. The Pleasure in Begetting, is a Remnant of the Joys and Pleasures of Paradise ; where the Soul trembleth for Joy ; as *Clement* the XI did for being chosen Pope.

Then this Light, Sun, Flame or Seed, turning to Spirit again, becomes a thin Breath or Steam ; and Streams from that part or place, which the Flash did break out in, into that Cell of the Womb where the Conception is made ; leaving behind it the Sperme or the Vehicle of the Seed, which doth not go in with it. A proof it goes not so far into the Womb as the Seed, (which is but a meer Spirit)

is,

is, that after Conception it is known to come away : but the Womb shuts close upon the Conception as soon as it hath conceived the Seed ; and doth not open again before the Delivery, in case of no Miscarriage : therefore, if the Sperm went in, it would no more let it out than the very Seed it self ; which is a spiritual Steam. In the Womb, that same Steam is condensed into Water, which the Spirit moves upon, and works in ; and then it is, by the binding astringent Quality of the Male Seed, coagulated like Cheese, *Job* 10. 20. and afterwards by the same formed into the Body and the Members of the Son : which, whether Male or Female, is the Son, that is, the Fruit, from the very first moment of the Ejaculation, and the mixing of the Seeds ; and not by reason of its being receiv'd in the Womb : for the Womb retains it not, except it be prolifick ; and it becomes prolifick from the time of the Flashing and the Ejaculation, and the mixing of both Seeds ; to wit, when both the Sexes ejaculate together, and both Seeds unite and join, and become one in the Flash. The Generation of all living things *fit* in the Flash. Nay, that of Trees and of Metals ; and the Stone of the Wisemen, (which is but Gold exalted by a Regeneration) *fit micante lumine, cum coruscatione*, by the Spirits within them breaking out into a Flash.

A Seed being putrefied in the Ground, its Spirits move in its dark *Chaos* or Deep, and by their Motion break out into a Flame, or a Germ ; which sprouts out by the *Exit* and *Egress* of its Spirits, and by the Access of those which it attracts from the Earth, into the Trunk and Branches. And by this moving, flashing and process of the Spirits, both Life and the Light of Life is produced, nou-

rished and preserved in Nature ; and in God himself, therefore, (after whose Similitude all things are done in Nature) tho' *Eminenter*, that is, in a more sublime manner than in Man, and other things which *dwell in Houses of Clay*, Job 4. 19. But of this thing more at large in the 5th of these Essays, concerning the Trinity.

Note here, that the last Spirit which becomes the Son or Fruit by steaming out of the Flash into the Cell of the Womb, is the same as was moving in the Deep of the Parents when they went to generate, and as broke out of their Deep into a Light or a Flash, and as streamed out of it. The same whilst in the Parents moving to Generation ; whilst flashing, whilst steaming out, or proceeding from the Flash ; that which animates the Son being the same as before animated the Parents,

Res formis eadem atque sub omnibus una.

one thing being Father, Son and Spirit in Man and Beasts. According to the three States and Steps which it passeth through. And so in the Deity it self, whose Image Man is.

Thus was Life kindled at first by the Spirits (that give Life 2 Cor. 3. 6.) moving to obtain the Light, and breaking out of Darkness into a Light or a Flame ; and proceeding from the Light to find their Deliverance and Liberty some where else ; and to convey, and preserve and feed Life in the mean while. And thus it is, and will be to all Eternity, in those *have Life in themselves*, Joh. 6. 53. preserved and maintained by the same Reproduction ; or by the very same means as it was first produced.

I. You have shew'd us what Life is ; and how it was produced, and is now reproduced, preserved
and

and nourished, in Nature and in the World, by the Motion and Process of the Spirits, to and from the Light, to attain therein their entire Liberty; and revealed many things concerning the Light it self; which seem to me such Secrets as have been kept from the World since the Foundation of it: now, pray, shew that it is done the same way in Man also; and thence deduce afterward the thing in Agitation, to wit, the distinct Motion and Pulsation of the Heart, the Arteries, and the Blood?

A. If it be so in Nature, it is so likewise in Man, for Nature *est ubique Similis*, in all alike. And by what was said just now of the *fiat Lux*, or Flash, in the Act of Begetting, it appears, that Life in Man is produced, preserved and maintained the same way as in Nature and the World. In both, the Spirits kindling a Fire by their Motion; and breaking out of that Heat or Fire into a Flame; which Light sending forth its Beams or Spirits, nourisheth Life: and reproduceth it still by the same renascent Flame.

That Life is a Light or Flame kindled and burning in us, the Scriptures, Experience and Reason, *Hippocrates*, *Bartholin*, *Willis* himself, and others teach and maintain. *Willis* pag. 52. of his *Accension of Blood*, in these words, *Vitam flammæ speciem quandam esse*. *Bartholin* in his Treatise *de Luce Animalium*, and *Wirdig* affirm the same; to wit, that Life is a Flame irradiating us through the whole Sphere of the Body to the Skin or the Surface; shining through the very Skin, whilst the Body is in Health, transpirable or pervious to the Spirits or the Beams proceeding out of that Light; and whilst that Light doth not grow smoaky or fuliginous. And *Willis* shews in the Blood, three of the things
requisite

requisite to the Production of Light ; which three are not sufficient ; and he shews not the manner how the Light is produced : that thing , as you have observ'd , being as great a Secret as the distinct Pulsation of the Heart and Arteries. *Quan diu lumen radiat*, that is, burns clear, saith *Wirdig*, *vivit animal ; verum quam primum cessat vita, cessat radiatio. Vita autem & radiatio illa statim incipit cum motu : mediante micante hac radiatione distribuuntur & se multiplicant spiritus : quæ radiatio durat per totam vitam. Quando desinit motus desinit ipsa vita. Posito sufficiente lumine ponitur vita : extincto, in propinquo mors est.* And this Extinction he proves by the Vitrification, and the darkning of the Eyes in decay'd and dying People, when their Life begins to fail.

For what is Man, thou blind Soul ? It is not that stinking, rough and elementary Beast *cui sarcina ventris appensa hæret*, with all its Guts and Garbage : but an Orbe or Sphere of Light and Fire, sending forth Beams from its Center, like the Sun. For he was created such, since he shall be such again after his Resurrection ; for his Resurrection is but a Rising from his Fall, a Return to his first State ; and a Reformation to the same Image of God, that is, to the same Glory, *1 Cor. 11. 7.* as he was created in : and he shall shine like the Sun, *Dan. 12. 3. Mat. 13. 43.* raise a spiritual Body, *1 Cor. 15. 43.* be equal to the Angels, *Luk. 20. 36.* and sit with Christ in his Throne, *Rev. 3. 21.* that is, in the same Glory ; of which that he shined with at his Transfiguration, was but a Diminutive ; and come to the perfect Man, and the full Stature of Christ, *Eph. 4. 12.* which he was created in : for God made him very good, *Gen. 1. 31.* that is, perfect, and shining ;
for

for Good implies Perfection; which comes by the Light only. And coming immediately from the Hands of the All-wise, Almighty and Perfect God; the Works of whom are perfect, *Deut.* 32. 4. and whose Will is, that the Light and Good should stand and subsist, he could not chuse but be such. He was made *Isch*, in *Hebrew* Luminous, from *Esch*, Fire. And seeing he was made such, he is still such inwardly; tho' fallen, and by his Fall cover'd over with the dark Crust of his Body of Flesh.

If thou couldst but see thy self within, as thou seest thy Blood, by means of a Microscope, thou wouldst see all thy Spirits moving to and from the Light flashing in thy left Ventricle; and streaming forth from thy Heart (which hath the shape of a Flame from the Flame that shines in it) through the Arteries and Veins, as through so many Channels, into thy Blood and thy Brain, thy Tongue, Eyes, Arms, and all Parts: and that, as the Blood it self is but one Mass, in the middle of which the Heart came to be; so thy Light makes but one Sphere, whose Center is in the Heart, whence it diffuseth it self. Thou wouldst see that thou art still all glorious inwardly; a Breath, Spirit, and a Flame giving thee a fresh Colour, Health, Strength and Agility; streaming as far as thy Pores: but incrustated over by the Materiality; which the Devil, by his Fall, introduced in Nature; bringing all from its first clear, thin, bright and spiritual State, wherein Liberty reigned, into this dark, thick, hard, bound and compacted outward Shell, which keeps things from our sight: and by *Adam's* Fall likewise, who at the touch of the Fruit, which was Elementary, and a Product of this World, mixt of both Evil and Good, as other worldly Fruits are, was

was seized and caught hold of by the four Elements; the World is composed of; and thereby was transmuted, cloathed upon with this rough, hard, opaque, vile, Body endued with their Qualities, which Christ is come to destroy, 1 Cor. 6. 13. 1 Joh. 3. 8. and to deliver us from, Rom. 7. 24.---8. 21. that we may put on again, *be cloathed upon again with our House* from above, 2 Cor. 5. 2, 4. and in fine, was made thereby such as they and the World are.

What a fine Creature was Man before he fell from that State which God created him in? And how fine will he be yet, when his Materiality, which Paul calls *Mortality*, ver. 4. *shall be swallowed up of Life*? Instead of a Beard and Hairs, he was crowned with Glory, his glorious spiritual Beams shining at every Pore: as the Saints are by Painters represented in Pictures. Which is the Reason, Doctors, that the Man, who is the Head of the Woman, hath a Beard; because being the Image, that is, the Glory of God, 1 Cor. 11. 7. he retains *modo suo*, in his fallen Condition, after a beastly manner, the Tokens of that Glory, in Elementary Beams. For which thing no Reason is to be learned out of you; nor for the Blood being Red, the Milk White, and the Grass Green: tho' you are Doctors, and read Learned Books; and amongst them Boyle's Book *de Coloribus*. Instead of Bones, he had Strength and Virtue to sustain him: and instead of a Belly to lodge the Dregs he stuffs in from Elementary Fruits, he had but such Center as the Heart, fit to attract, specificate and diffuse through the Body of his Sphere, the Heavenly Quintessence of the Fruits of Paradise. The Paradise he was in being not within the reach of the four Elements; but in the fifth Element, (which
elements

elements the other) and is the true Quintessence. But what a sad Pickle is he now in, to be not only brought to that State he is in ; but into the hands of those that handle him like a brute Beast, both in his Body and Soul ; applying no other thing to him than material Stuff ; a coarse bodily Worship, and unrefined Physick. *Tues anima massam corporis circumferens*, said *Erasmus* in his time : but his Learned Successor *de Back* saith contrariwise, *Tues corpus animam movens & determinans* ; as each part requireth it : so much is since *Erasmus* Knowledge improv'd in *Holland* ! The Physick proper for him must be like him, spiritual, fit to augment his Spirits, and to feed the Light in him. And because Doctors and Priests deny it, and have none such ; wo to his Body and Soul !

To make an end of the Proof of the *Exit*, and Process of the Spirits from the Light, which I digressed from to speak of the Trinity ; we see that there is a Puff for every Flash and Blaze. Every Grain of Powder fired, blows away the Air in the Flash and the Egress of its Spirits out of it. And this Process of Spirits or Sparks, is as observable in those melting Furnaces, where they melt without Bellows by the means of a long Flew : the longer the Flew is made, the more Spirits proceeding from the Fire and the Flame. For the Flame, when the Fire is kindled, drives out the Air, and keeps it from returning into the Flew at the top ; so that it would be empty, except the Flame sent up Sparks from below, to supply it : and the longer the Flew is, the greater the empty Space, or Vacuity, would be ; and so the greater its want of Sparks or Spirits, or Air : therefore the longer the Flew, the more Sparks the Flame must send for fear of a *vacuum* ; and attract

tract so much the more Air or Spirits from without ; and so the more it attracts, the fiercer the Fire burns, and the more Sparks it sends forth ; provided no Air can get into the Flew or void Space but through the Fire it self, and the Grate of the Furnace. The visul Rays from the Eyes, *teneros quibus fascinant agnos* ; and all the Influences from the Sun and from the Stars ; which *Willis* proves in the Words cited before pag. 100. to be Particles of their Light flowing out of their Body) all Odours, sweet and stinking, proceeding from refinous oily Flowers and Bodies, and all Sparks flying upwards from any Fire or Flame, or Lamp, or Candle burning, demonstrate this proceeding of the Spirits from the Light. Which, I hope, by all this is now made as plain to you, as that the Sun sends forth Beams.

But, as by the Proceeding of the Spirits from the Light and their Access unto it ; Life is both kindled and fed ; so by their Recess from it, and the Body it burns in, Destruction and Corruption, or Death is introduced. By their Access and Recess, and their Motion to and from the Light which they had kindled, they kill or take away Life, and give it and preserve it ; occasioning Life and Death, Health, Sicknes, Youth and old Age ; and becoming the Cordial or the very Bane of Life : according as they are more or less homogeneous, natural, pure and serene : and according to the State or the Form, which they move in. *Ortus & interitus* , the Encrease and the Decrease, Generation Corruption, of all things is made by them. Multiplication being but the Flux of the central Spirit in every thing ; and Generation but a Traduction, or Conveyance a *Traduce*, of its Beams. Lord, thou sendst forth thy Spirit, and all things are

are created; and when thou tak'st it away, they return into their Dust, Psal. 104. 29, 30. vanishing by the Recess of each Spark of their Spirit, from each Particle of Water, which it incorporated and grew into one Mass with, into nothing but a Dust which flies away with the Wind. As it is in the great World (which is but a Plenitude of *Effluvi-ums* or Beams) when the Sun is overcast, in his Retrogradation or Recess from a Climate, all things languish and dry up, for want of their wonted Food which the Sun brings them daily; so, in the little World, Man, when the *Silver Coard* begins to wear out at the *Cistern*, Eccl. 12. 6. or the Spirits to recede and to slack their flashing out; all Faces gather Blackness, Joel 2. 6. become pale, wan and cloudy; shrivelled, wrinkled, and wither: the Heart faints, the Voice grows weak, Strength fails, the Senses decay, and at last the Light goes out; and down drops the Microcosm: Death being the Cessation of the Light and Flash of Life.

Now, to give a full Answer to your Question, if Life is kindled in the little World as it is in the great one; I say, that having shew'd Life in Man to be a Flame and a Fire in the Heart from Reason, Authority and Experience, &c. it will be necessary to shew, that the *Quomodo*, or the Manner how this Flame is produced in the Heart, is the same as hath been shew'd of other Flames in the World.

I. Before you do it, pray, shew that it is done in the Heart, and in which of its Ventricles.

A. That it is done in the Heart, is confessed on all hands, except by Doctor *Willis*; and the Blood being hotter on the left side of the Heart in the Vessels next to it, which receive immediately their Heat and Spirits from it, but convey none into it; as *Willis* pretends they do; nor indeed any thing

else ; than in other more remote ; it shews, that
 the Heat begins, and hath its Seat in the Heart, and
 in that very Ventricle which it appears it comes
 from. Heat is caused by Motion in *puncto*
saliente ; this *punctum* becomes the Heart ; which
 Part is the first Mover ; and so the first where
 Motion, with its Heat, or its Fire, is stirred up
 and kindled : hi and the thing the Blood (which
 is a cold thing) borrows Heat from. The
 left Ventricle *possesseth the middle part*, saith Harvey
 pag. 95. *and seems to make up the Heart of it self ;*
or the Heart seems to have been made for its sake ;
and the Right seems, as it were, but a Servant to
the Left ; and an Appendix to it ; or at the most
 its Store-house to keep, prepare and transmit its
 due Aliments to it. *Cor nutritur intus ex defacato*
& spirituofo sanguine quem ex dextro haurit con-
ceptaculo, saith Hippocrates, shewing, that *per cor*
ex dextro nutritum ventriculo he understands, that
 the left Ventricle is the Heart it self, and therefore
 that, if the Heat or Fire, and Light of Life, Har-
 bour in the Heart, it is in the left Ventricle of it.
Connatus a natura ignis in sinistro est, saith he in
 another place. The right is the cause of no Pulsa-
 tion ; and it hath no Artery coming from it ; *Vena*
Arteriosa being, as Harvey argues pag. 30. but a
 Veine ; which shews it is not the Seat of the Heat
 and Flash of Life. And the left being thicker, and
 less capacious inside, that it may keep in the Heat,
 and concenter the Spirits which the Heat is kindled
 by, it is a sign that the Heat of Nature is kindled
 there. Then being round, like a Sphere, because
 the Light sends forth Beams equally from its Cen-
 ter, this shews that it shines in it ; and not in the
 right Ventricle : which being longer one way, and
 larger

larger every way than the left, is not so fit to center the Spirits : and being of a more laxe, or soft and loose Contexture, is not so fit to resist the Effort of the Spirits: but fitter to contain Blood, and the Steams that rise from it ; which having not room enough to flash out and expand in, because it is full of Blood, cannot yield a Flash in it ; and therefore passing from it into the left, yield it there.

Now, all the things requisite to the Production of Light and Fire in the great World, being in the little one, they may be kindled in it as well as in the great one, and by the same way and means. And first, as in the great World, without a stock of Fewel, or combustible Matter, capable to yield Spirits, and send them into the Air, there to burn and form a Flame, towards which the Air may run, and which may attract the Air, and the Spirits in that stock, there is no Flame produced ; so in the little World, Man, there is found a stock of Steams and of Air in that void space which is in the middle of him ; apt to catch and yield a Flame, which attracts more of the same. And as a Fire kindled in the Air draws on all sides, to feed it self, and to keep flashing out continually : so in Man, his Heat kindled in his Heart, draws Air and Steams from above and from below, the last from the right Ventricle, through the holes in the *Septum*, and the other from the Lungs through the Venous Artery : both which meeting in the middle, keep burning, and yield a Flame or a Flash from time to time. As it was in the great World at the Creation of it, the Spirits above the Sun descending met the other, which ascended from below, in the middle point or place, and broke out, by that Concourse and Meet-

ing, into a Flame, which is now called the Sun ; so in Man are Steams and Air, drawn from above and below ; which meet in his left Ventricle, and form in that middle space of his outward Circle of Life ; his inward Sun, Light and Flame : for note, that the outward Heart (which is formed from the Blood in the middle of the Vessels, *ex distensione sanguinis extra venas effusi*, saith my Master, by the *conflux* of the Blood from all parts to its Center ; the Blood, by the Tendency which the Spirits within it have to flashing, being made to puff up insensibly into that thick pasted Crust and Tumour called the Heart) is a Circle or Sphere of Life, but somewhat sharp near the top, because of its inward Flame which configures it so.

That the Heart attracts the Air, appears from that its Ears beat many times (*viz.* an hundred or more, as *Walæus* saith) before the Heart pulseth once : and from that both the Ventricles have each an Arterial Vein fit to draw and transmit Air. *Utraque*, saith Bartholin, *arteriosum corpus habens ad transmittendum & trahendum aerem, atque refrigerandum utrumque ventriculum.* Both these Veins being thicker and stronger than all others, to be fit to contain Air, and transmit it the better. *Præstantis Artificis hoc opus*, to wit, the Heart, saith Hippocrates, of it, *cum sit totum trahendi*, because of its innate Heat, *facultate præditum, folles habet duplices, scilicet auriculas, per quos instar fornacis fusorie spiritum ad se attraheret.* *Aures sunt instrumenta quibus natura*, adds he, *aerem ad se rapit.* The *Valvule* of the two Vessels that transmit the Air, *viz.* of the Arterious Vein and the Venous Artery, being set contrariwise, to the end they may open and shut alternatively, as each

each side of the Lungs falls and riseth, and blows in them; shews that the Heart receives Air from the Lungs through both its Ears; its two Ventricles answering to the two sides of the Lungs. And what becomes of the Air we breath in continually, and which stays not in the Lungs, if it goes not to the Heart? And if nothing but Blood were to pass through those two Vessels, two *Valvulae* would suffice; whereas one of them hath three, one of which is not in vain, but for some other guise Use, to wit, to let in the Air; and all three to let it in and some Blood out together, in so great a quantity, and as often as the Ears, which beat many times oftner than the Heart, require it.

Note, this beating of the Ears so often for the Heart once; and beating before the Heart; and continuing to beat (to wit, at the time of Death, as *Harvey* and all the rest of the Inventors confess) after its Motion ceaseth; shews that they beat not at all by the same cause as the Heart; nor by its Motion neither; seeing they move on a while after its Motion ceaseth. Nor do they move by throwing, and squirting, and expelling the Blood into the Ventricles, according to the Doctrine of the new Hypothesis; for the Blood stands and congeals, and ceaseth to run and to be fit to be squirted in, as soon as the Heart gives off, and ceaseth to send Spirits; as *Harvey* acknowledgeth it doth, pag. 59. saying, that not half the Blood runs out, tho' the Throat be cut with its Veins and Arteries, except it be done in time before the Heart giveth off: and pag. 54. that all Fluxes of Blood stop upon any sudden Fear, that is, when the Heart is damp't with Fear, and ceaseth to beat; because then the Blood doth stand, according to the Poet,

... *gelidus que stetit formidine sanguis.*

see pag. 54. and 63. of this Book ; and so is not then running nor fit to be expelled ; which is another good Proof against the Circulation, which saith that the Ears expel, tho' they are not musculous, and have no Nerves or Sinews, as the Heart is said to have ; to contract and distend them, and make them draw and expel.

And that the Heart attracts Steams also from the right Ventricle, which prepares them for the left, and transmits them into it through the holes in the *Septum*, several of the Modern affirm with all the Ancients. And *Harvey* himself owns it, saying, that the right is more capacious than the left, *for administering Matter and Nourishment unto it* : which Nourishment is thin Steams, saith *Hippocrates*, adding, that the right Supplies the left with the Beams he sends to it *Cor nutritur intus ex defecato atque spirituosio illo sanguine quem ex dextro haurit conceptaculo ; & dextrum alimentum distribuit sinistro ; & radios immittit ex secretione pura sanguinis ortos. Spiritus generantur ex subtili sanguinis parte*, saith *Doctor Wirdig* ; *natura curiose & sedulo spiritus a cibis & aere, pro restoratione sui, sibi separans. Et dexter ventriculus attenuat sanguinem ; & tenuiorem partem per septum in sinistrum transmittit*, saith *Bartholine*. *At sinister spiritum vitalem elaborat ex duplici materia, scilicet, ex sanguine in dextro preparato, & per septum transmissio ; & ex aere per os & nares inspirato, in pulmonibus preparato, & per arteriam venosam ab iisdem in sinistrum expulso. Et cum cibis ingeri spiritum necesse est*, saith *Hippocrates* again : *nam cum omnibus iis quæ eduntur & bibuntur spiritus aut paucior aut copiosior subit ; pars cujus ad pulmonem*

pulmonem & cordis ventriculos utrosque rectè pergit.
 If all these Men knew nothing, and the Inventors knowall, then there is no such thing as Steams passing from the right Cavity into the left: but then *Harvey* knew nothing neither, for if no Steams pass from the right into the left, the right administers not Nourishment to the other; that which is sent from the right Ventricle any other way, being not able to be the Nourishment of the left. However, not to rely upon any Body's word, if comparing both the great and little World together, we judge of this by that which we see is done in the first, and consider that the Steams which flow back from the great World, (they call them *Effluvia*) pass and repass through the Sun, we may gather and conclude from thence, that all the Spirits and the Steams the Chyle affords, and the Air which the Lungs send must run to and through the Heart, our Sun, to nourish it. And if Steams rise and issue from the Blood in all the Parts; nay, in the Extremities, (the Hands, the Feet, the Forehead, which are very apt to sweat) why not in the right Ventricle, where the Heat, being as strong and stronger than in the Parts, is as capable to turn the Blood into a Vapour, as in any of them all? There are Spirits without Blood in the young Mens Grasshopper; much more therefore in the Heart; and in that of its Ventricles, which is known and confessed on all hands to be the Spring, and the Storehouse of Spirits. The Palpitation felt by *Walaus* in the *Septum*, shews that there is a Passage of the Spirits through that Part; and the holes, which are too streight for Blood, indicate the same: as their being much wider on the right Side or Ventricle, to let in the Steams which are thicker there than in the

left; going acuminating Funnel-wise into the left, to let out the Steams again thinner at that streighter end, after their being strained, as it were through that Strainer, than they are at the other where they are let into it, shews that Spirits exist there; and that they pass and are sent through that middle Partition from the right into the left: for nothing but meer Spirits (from which proceeds all Motion) could cause that Palpitation. Which being felt nowhere else, because there is no passage or holes in other places, which they might strive to pass at, is a sign of their Passage, and of their striving to get through those narrow Holes or Chinks: for the Air doth the same thing at the Chinks and Crevasses of the Door of a close Room, which a brush, or any thing makes a Blaze, is lighted in; rushing in with a whistling; and a humming drumming Noise; and thrusting the Door open with great Force and Violence against him lifts up the Latch; to enter into that Room, and supply the place of that which the Flame and Fire draw and expel out of the Room. Note, the Heart, like the Fire, being *totum trahendi facultate præditum* attracts Spirits on all sides; and so must draw from the right Ventricle, as it hath been said.

That these Steams meet and gather with the Air comes from the Lungs, and coacervate with it, and concenter in the left, may be deduced from the Narrowness of that Ventricle, if compared with the right; and its spherical Figure: and from that a Wound in it with never so small a point, not only becomes Mortal, but killeth immediately; for down drops upon the spot he that is run through the Heart: because the Spirits finding a way open through that hole, fly out and evaporate; and so
ceasing;

ceasing to gather, cease to yield a Flash ; and so out goes *Flammula vitæ*. And if the Spirits gather and concenter in the Eyes, as by the Experiment offer'd by Doctor *Willis*, of him who saw the better for a large Dose of good Wine, whose Spirits rose in his Head, and did enlighten his Eyes, (as were those of *Jonathan* by the eating of Honey, *1 Sam. 14. 17.*) he grants tacitly they do ; why not in the left Ventricle, which supplies the Head it self, and all other Parts with them ?

And that they break out into a Flash or a Flame, appears from the Effects which we see accompany the Motion and Pulsation of the Heart. First, It moves by Intervals, and by rising and falling ; that which causeth it to swell being not always capable to blow and keep it pufft up : but dissipates and scatters as often as it gathers. This Symptom (which puzzleth you, and would puzzle you for ever, if I had not shewed you the way and reason of it) demonstrating of it self, without any further Proof, that it moves thus by the Flash and the Spirits gathering and dissipating again, or dispersing of themselves, as it happeneth in Lightning. This way being peculiar to Lightning, Flashing and Flames. No Flame burning constantly, with an equal even Blaze, but by hopping, Vulcan-wise ; *per saltus*, by Puffs and Gasps, and not with a constant Breath, as it may distinctly be perceived from its blowing with an articulated or uneven Sound or Noise. And we see that no Vulcans which keep constantly burning do it with a constant Flame, but break out from time to time, like Lightning ; Belching out Flames but when their Vapours which were dissipated in the Flash do meet and gather again. Then the rising of the Heart, which is the

Diastole, is as sudden as a Flash; *passing away like Lightning in the twinkling of an Eye*, as *Harvey* himself affirms; and all the Vessels as far as they reach swell very hard, *tendantur*, saith *Walæus*, all over on a sudden; which hard swelling, and sudden Motion to the remote Parts, cannot be, saith he again, (see the 9th Paragr. of the 4th Chap. of this) *à tenui liquida sanguinis materia; non enim tendi possent in talem durtiem nisi a spiritibus; nec ad remotas partes tam subito transire*, were it not done and caused in the Flash and by the Flash, and the Spirits it sends forth. Every Tumor rising is caused by the Spirits, which being set in Motion by a Blow, Hurt, Contusion, run in haste into the place which hath received the Hurt; after which the Blood follows, when they have made way for it. All *Impetus* proceeds from the Spirits, as hath been prov'd; but not from their bare Motion, without a Concentration and a flashing out of them; Gun-powder having no Force but when fired, and flashing in a hole or narrow space; and the Air having no Strength, Spring or Elasticity, but when being compressed, it gets loose by breaking out: and therefore the *Impetus*, whereby not only the Heart, but its Vessels throw up Blood, and swell up on a sudden, being by puffs and by fits, is a strong Indication of a flashing in the Heart; and that it is done by Puffs; by way of Fulguration: not by that of Expulsion: for what Expulsion is there in a Gun or Mortar-piece, when there is no Gun-powder fired and flashing in them? and likewise in the Vessels, when no Spirits are in them? Besides Expulsion hath been exploded in the First Part. *Willis* pag. 47. of his *Accension* saith, That our Heat *nullo præter accensionem modo*

modo in sanguine produci & conservari potest. Meaning by that *Accension* the same thing as I mean by the Fire shining out or flashing and appearing. And if, as *Walæus* saith, the *Diaſtole* begins *evidenter à baſi, & ſenſim ad mucronem tranſit*, we may gather thence, that the Heart (which is therefore ſhaped like the Flame in it) is diſtended by a Flame, (which is broad at its Baſis, and ſharp pointed at the top) and that its Motion is by the breaking out of that Flame; and that its *Impetus* is againſt the point of the Heart: which is thicker than the ſides to endure and to reſiſt the Force of it the better. All which Reaſons together point at the Way and the Means by which the Heart beats and ſwells, to wit, by a Flaſh or Flame breaking out from time to time out of the Fire of Life, in the Center of the Heart.

And this intermittent Pulſe and puffing up of the Heart ſhews, againſt Doctor *Willis*, that the *Flammula vitæ* is not conſtantly ſhining, but breaks out of the dark Smoak, like Lightning, by Intervals, as the Steams or the Spirits gather again in the Heart. For tho' the Undulation, or the Motion of the Blood, cauſed by that *Flammula*, and the Blaſt that comes from it; be continual, and not intermittent, in the Blood; it is ſo in its Veſſels, which ſwell and pulſe but by fits. And the reaſon that the Blood is in a conſtant Motion; and moves always from the Heart, or one way, towards the Parts, is that the Spirits, that flow from the Flaſh when it riſeth, paſs not away all at once ſo ſuddenly as the Heart ſwells and riſeth in the Puſh, but *ſenſim* or leiſurely, by reaſon of the ſtreightneſs of the Chinks or *Valvula* of *Arteria Magna*; which do not open and let thoſe Spirits through

through together ; but each interchangeably ; opening and shutting by turns : and so letting the Spirits by small Puffs continually, but one after the other, they make a continual blast or blowing into the Blood, as with a threefold Bellows ; and a continual Motion therefore : which seems progressive ; tho' the Blood doth not shift place, as shall be shew'd you by and by. And if that which moves the Blood were sent forth out of the Heart at once, as is pretended by the new Hypothesis grounded upon Expulsion ; the Blood would not move always, and its Motion would suffer a Stop or Interruption during the time that the Heart were filling it self again ; and so could not circulate or run about so swiftly as the Circulators say ; which Inconvenience, it seems, none of them all have foreseen.

The Exit and proceeding of the Spirits from the Flash, and their *Impetus* whereby they are able to move the Blood, having been proved before, we need not repeat it here. And granting a *Flammula* any where, Spirits must needs flow and proceed from it there. Their Existence in the Blood, into which they cannot come but from that of the Ventricles where the *Flammula* riseth, and their *Impetus* therein throwing it a good way off, when the Arteries are cut, have been both made out fully. And *Harvey* pag. 66. grants tacitly, by saying, that *one shall plainly perceive something breathed from the Heart, and entring by Pulsation through Arteria Magna suddenly into the Part, and heating and distending of the same immediately*, grants tacitly, I say, their proceeding from the Flash into the Blood and the Parts ; and at the time of the Flash, when the Heart doth pulse or beat. The Flash rising in the Heart makes a Puff which swells it up ; then the Spirits
which

which proceed and flow from every Flash pass away by little and little through the three streight *Valvulae* of *Arteria Magna*; which are three to the end that they may let out those Spirits by turns and continually, and in small dribblets; or else, if it were in larger Steams, they would not run through the Blood, but thrust it out of its place, and impel it before them. So frequent a Pulsation as that of 3000 times reckoned in half an hours time by some of the Inventors, can be by no other means but by the three *Valvulae* opening alternatively, very fast, and constantly: for if they opened at once, and but once every Puff there could not be so many Pulses felt in that short time, because the Heart doth not rise and pulse or beat so often. In fine, the Pulse, and Swelling and Tension of the Vessels by Fits or by Intervals, denote a Puff and a Blast; or something rising by Puffs; and blown into the Vessels as from a Puff, and a Gust of Air rising suddenly.

That, that *something breathed out of the Heart into the Blood*, and proceeding from the Flash, blows through and pervades the Blood; and runs through it beyond it into the Members or Parts; and moves it in its Passage; leaving it all in its place, or however impelling or taking along with it so small a portion of it, that it is not worth speaking, is proved thus. Take a Tube of Glass about six Foot long, of one Inch *Diameter*, closed or stopt at one end, and having near that same end a short Spout starting from it of about three Inches long, and as big as a Goose Quill; whose Mouth must be stopt likewise with Wax, or some other thing. Fill up the Tube with Water; and lay it along upon the Ground, Horizontally; but so that the

the Spout may stand upwards, or Vertically. Then fix a Bellows to it, at the other open end; and blow hard, and you shall see that, if the Bellows have but one Orifice in their Pipe, and the Pipe be wide enough, they will force the Water out of the Spout into the Air, and so drive it all away: but if the Bellows have but two or three, or more small holes at the end of their Pipe, and be double to blow always; they will send forth through those holes but slender Fillets of Air, which will run through the Water, as far as the other end of the Tube, and pervade it; and make it to fluctuate, bubble and play in their passage; and leaving it behind them, go out at the open Spout; as by holding the Hand close by its Mouth it will be felt. By which means it doth appear, that the Water in the Tube, and the Blood in the Vessels *per consequent*, are not thrust forward and out of their place, by the Air and the Spirits blown and sent forth into them; since they remain always full; but that the Spirits and Air run through, and agitate them in making their way through them; so that they are mov'd forwards but seemingly to the Eye, like the Water of the Pond which the Wind blew hard upon. This *deceptio visus*, which is the first Cause of that of your Mind, and the true Ground of your Error and Mistake; keeping you from making that right Use of Experiments, which if you were not blinded by fore-Conceits, you might do. He that knows not *per causas*, and goeth about to find out hidden Truths by the Tryals and Experiments he makes, is like a Blind Man grooping in *Salisbury Plains* with his Stick to find a hole made in some corner of them, hardly to be found by one that hath a very good Sight.

Experimentum

Experimentum fallax, and the Judgment made of it so difficult, that it leaves those Men, which know not the Cause they seek, in Uncertainty.

If the Heart let out its Blast but through one wide *Valvula*; it would thrust the Blood forward; but then the Vapors or Steams could not concenter in it: but having three narrow chinks or holes to let it out at; it lets it out by dribblets, which can insinuate themselves and penetrate through the Blood before they condense in it: and being narrow and streight, the Vapour cannot get out so fast as it springs therein; and so it hath time to meet, and gather and concenter. This same playing and bubbling of the Water in its place by Fumes coming into it, and passing away through it, is known to all Refiners, and Chymists who ever did distil an *Amalgama*, or Quick-silver by it self; the Vapour rising from it, passing away through the Pipe into the Pot of Water they put to the Mouth of it, and penetrating into that Water, cause it to bubble and to boil in its own place; since none of it runs over, but all remains in the Pot. This, your great Dexterity and Skill in Anatomy could not help you to find out! And here is Anatomy for you out of a Glass Tube, without opening live Creatures, and becoming *Aruspex*, to look into their Entrails.

By finding out what Life is, and how it is produced, we have found out the Reason of the Motion of the Blood. For, insomuch as Life is a Heat flashing, and sending new Spirits into the Blood every time it flasheth, (which Spirits pervade the Blood, and cause it to fluctuate) the Blood must needs move by it; and from hence all the Effects you find by the Ligatures; and spy with the Microscope, must needs depend and proceed. And
upon

upon the whole Matter we may very well conclude, that whilst there is any Life in the Animal Bodies; there is a flashing, puffing, beating, pulsing of the Heart, and an Egress or Process of the Spirits from the Flash; and an Agitation of the Blood by those Spirits. And thus, having made out plain the *Perquid* and *Quomodo*, the Means and the Way of Life, and the Motion of the Blood by the Spirits sent forth from the Flash of Life into it, it is time to make an end, and draw to a Conclusion.

Inv. The Application you make of the *Quomodo* of Life to the Motion of the Blood, is right in my Opinion: or at least, more natural, or according to Nature than the opposite Notion. For every one may find, and even feel, in himself the best part of what you say concerning the Pulsation and the Motion of the Heart; being straitned in the Heart, and panting for want of Breath, when he runs or goes up Stairs; or when a fit of Sadness or of Fear seizeth on him; breathing then by Puffs and Gasps, and his Pulse beating faintly and frequently, by reason that the Spirits being spent much faster than they come in, cannot produce a full Flash; and must produce it often to send Spirits to the Parts; (for there is no Puff nor Blast, nor Emission of Spirits from the Heart, but in the Flash) the Flash or Flame in the Heart halitating like the Tongue of a Dog, and like a Flame which is ready to go out; but finding Ease presently, and having *Light and Gladness*, *Ezth.* 8. 16. as soon as he is at Rest, and his Heart can draw its Breath, and flash out again freely: whereas none of that Distress which the forcible Expulsion of so much Blood as they say circulates

culates every day, must needs cause, was ever felt: so that as that Expulsion hath not been known in the World before the last Century; and yet the World hath lived more than fifty six Ages before its Discovery, as well as it hath done since, so I hope it may still do well enough without it. And what signifies the Noise of a great Discovery, nay, and of Wisdom it self, if Man is not the wiser, and so the better for it? Besides this Cause efficient, which you shew, is adequate; answering every thing that belongs to the Motion of the Heart and its Vessels; especially their distinct and orderly Pulsation, which hath been, as inscrutable, left untouch't by the Modern. For the Spirits that gather and break out into a Flash, and make the Heart to puff up, causing its *Diaſtole*, pass away into the Blood, whereby the Heart doth subside and come to its *Systole*; and so the former Spirits evacuating the place, new come again in their room, and meet and flash out again, and make the Heart to puff up, and so on continually to the end of the Chapter, till Life and its Light go out, and *the Silver Cord and Wheel be broken at the Cistern*, Eccl. 12. 6. And in fine, you have made out that the Blood runs not forward; nay, and doth not move at all but by the Spirits in it: and that Spirits, and not Blood, is that which passeth away from the Heart into the Veins at every Pulsation: and many other such things very extraordinary; for which I give you Thanks; being wholly satisfied I was in an Error. But there remains yet one Scruple, which I desire you to clear before you conclude; to wit, how it comes to pass that, seeing the left Ventricle shuts not close when it subsides and brings its sides together (as you do confess
your

your self) the Blood which is in the Ear, doth not run in, and fill it? And how that Portion of it, which is made every day from the *Chylus* and the Viſtuals, and paſſeth, as you confeſs, through the Venous Artery, comes to be convey'd from it into the great Artery, (to go into all the Parts) without going through the Heart, that is, through the left Ventricle; there being no other way from one into the other?

A. To each of theſe two Queſtions I muſt answer apart. To the firſt, that tho' the Ear were full of Blood whilſt we live, yet whilſt we are in good Health, the Blaſt that comes from the Flaſh is ſtrong enough to repel that Blood, and to keep it in the Ear, and off of the Heart. That the Blaſt laſteth always from one Flaſh to the other, by reaſon of the Straitneſs of the Chinks or *Valvula* of *Arteria Magna*, which let not out the Spirits ſo faſt as the Flaſh riſeth and emits or ſends them forth; ſo that it continuing, it is able always to keep the Blood out of the Ventricle; and like an *Eaſterly* Gale which keeps the Tyde from ebbing or flowing back in the *Thames*; to repel and blow it off ſo long as it continueth. That if ſome Blood during Life doth by any Accident chance to run into the Heart, it is by the Heat of it turned into a Vapour (for it is all volatile, fit to be Vaporized by the Heat of any Part, when it is not congealed, nor in too great abundance or quantity in that Part) and by the Steams and Spirits which proceed out of the Flaſh, convey'd and carry'd away upon the Wings of the Wind into the great Artery. But in Death, when the Flaſh fails, and its Blaſt blows but faintly, it ceaſeth to keep it off, upon which the Blood runs in without check, and ſuffocates the Heat, and puts
out

out the Light : and is that Blood which is found congealed in that Ventricle in those that die of Sickness, by want of Spirits and Strength.

That the Blast repels the Blood, appears from that it impels and throws it off a good way, and makes it leap out by fits, when an Artery is cut, or a hole made in the Heart. For since it impels it then, and thrusts it out of its place, it is able to repel it and keep it out of the Heart. And something must repel it, to make it run, as it doth, from the Heart towards the Parts. For its natural Motion and Course is from all the Veins in all Parts towards the Heart. For all the Rivers and Brooks on Earth run towards the Sea, and the Spirits in Heaven towards the Sun, their Center : and so in the little World, the Blood, which is but one Mass diffused through all the Parts, and the Spirits it contains, run also towards the middle, there to form in their Center the inward Heart, Sun or Flame; and the outward, after the Figure of the inward one. *Hippocrates* in the place before-cited, shews he was of this Opinion, saying, *Ex distensione sanguinis extra venas effusi cor in centro corporis coalescit.* And hence, since the natural Motion of the Blood is from all the Parts towards the Heart, that from it towards the Parts is violent and forced; and must needs have a Forcer capable to impel it; which cannot be Expulsion, since it hath been exploded; but the Flashing and its Blast; no other thing being able to make it leap out by fits, or by distinct Intervals. And there is no Impulsion, and throwing out of a thing by Explosion or shooting with Impetuosity, but one way, which is the same as that things are blown up by, viz. by the Concentration

centration of the Spirits, and the Flash. Note, That what I have said of the Blood being thrust out of its place, is understood when a way is made for it to run out of the Body; and when some of its Vessels do thereby become empty: for when they remain all full to the very Fingers end, it refunds and makes a Stand, like the Tydes at dead Water: and then the divided Blast thrusts it no more out of place on that side of the Portals; but entering in by dribblets, pervades and passeth through it, and moves it in its own place.

To the other of your two Questions, I answer, That I never affirmed that the whole Portion of Blood which is made every day passeth into the Body through the Strainer of the Lungs and the Venous Artery; but declared in that place, which is pag. 15. of this, that it was not my Business to find out a way for it. And *Harvey* and *Folius*, and others, who endeavour to shew another Passage through their *Anastomosis* between the right and left Ear, and a certain Arterial Conduit-pipe perforated between the Arterial Vein and *Arteria Magna*, have eased me of that Care. Antiquity knew nothing of the Passage of that Blood through the Venous Artery and the left Ear and Ventricle into the great Artery; and *Bartholine* is so far from siding with the Modern in their Opinion of it, that he declares against it, that the Use of the Venous Artery is to transmit and send Blood into the Lungs, and to draw Air from the Lungs.

But supposing, not granting, that all the Blood which is made from the Chyle every day, should pass into the Body through the Venous Artery and the left Ear and Ventricle; and there were no other way patent or open for it into the great Artery:
yet,

yet, that quantity being very inconsiderable, and having a whole days time to pass away by pulses, it may very easily be turned into Vapours by the great Heat of the Heart, as fast as it is brought in by the Air sent from the Lungs, and so be convey'd away into the great Artery, by the Current of the Steams which issue out of the Flash, without sinking in the Heart or falling in that Passage. And especially, because it is already partly become and made a Vapour at its Entrance in the Heart, by the Air that comes with it from the Lungs, and blows through it, and makes it aerial: as Lower's Experiment of blowing into the Lungs through *Arteria Aspera*, and its Conclusion from it, to wit, that the Blood is made, by this Admission of Air, such as that is contained in *Arteria Magna*, that is thin and spiritual, or next kin to a Vapour, seems to demonstrate for me. And truly, except the Blood did first become a Vapour, it could never be Vital; for Life being Spiritual, as resulting from a Flash and the Spirits flow from it, wants Spiritual Aliments, *Si iisdem nutrimur rebus quibus constamus*. Those that expect to be fed, *preserved Body and Soul into everlasting Life*, by a Carnal Flesh and Blood, are far from understanding what their Life and their Soul is, and what is the Flesh of Christ. That Flesh which died it self cannot give what it had not, to wit, everlasting Life, 1 Cor. 15. 50. and if the Spirits give Life to the Soul and the Body, both the Soul and the Body feed upon Spirits only, if Christ be not mistaken. And the Flesh which Christ gives us to eat, is Spirit and Life, *Job. 6. 63.* and it comes down from Heaven, *v. 51.* whereas the Flesh that died neither came down from Heaven, nor was the true Flesh of Christ, but that

of Earthly *Adam*, which Christ came to take on Earth in the Womb of the Virgin. To conclude, Spirit and Life being as Cause and Effect, go together hand in hand, and never part but in Death.

Now, one may gather from hence, that the thing which preserves Life in Health, to wit, its Physick, ought to be made Spiritual, very different from that the Doctors administer. The biting of a Viper, which coagulates the Blood by suppressing the Vital Spirits which keep it fluid, shews that the true Medicine ought to consist of Spirits, to be fit to rectify and comfort our Spirits when impaired in their Strength and their Vital Faculty. *Tunc ignis naturalis cum igne naturali confortatur*, saith Lully. And the very Name of that which is called a *Cordial*, denotes a Spiritual thing, fit by quick Transpiration to penetrate to the Heart.

But, because the Spirits are of themselves (that is, before they attain the State of Light, and till they proceed from it, and by it are made oily, Partakers of its Nature) too raw, green, of a fretting, and a drying Quality, (as by drinking of Brandy, which parcheth up the Body at the long run, it appears) they will not do Feats alone, until they become oily; nor have a lasting Effect before they become fixed, because they are volatile; the true Physick of Life is to be oily and fixed, Permanent and Spiritual, to keep its Strength the longer, and to work powerfully. Life is a Fire and Light, to be fed and preserved by the things that produce it. And Oil is *Aula Lucis, atque pabulum ignis*, a thing fit to keep the Light and Fire of Life burning. And being the *Medium* between Fix and Volatile, wherein Spirit and Body meet and unite together; and which tyes to, and retains the Spirit in the Body,

Body, (whence it is called the Soul by the Chymical Authors) it is that alone can feed and preserve the Lamp of Life, and keep both Body and Soul with their Spirit together. But Spiritual and Fixed being no where to be had but in the Metallick Oils, that true Physick is to be looked for in Mettals alone, and in Metallick Sulphurs, which are made to flow like Wax without evaporating. *Amongst them I happened on a certain Mineral, of a wonderful Virtue in the Art,* saith Valentine; *from which I extracted its Salt, and Spirit, and Oil, whereby I restored my sick Brother to his Health.* *Est autem,* saith another, *in Regno metallico res Originæ miræ, in quo sol noster magis prope est quam in auro.* It is call'd, *Aurum vivum*: because it is Gold, and not so fixed as vulgar Gold. To this a Cordial made of the best refinous Balfams, (Gums being the most fixed of all the Vegetable Oils) is a *Succedaneum*. Of Which *Sal volatile Oleosum* (a Modern Whymsey on this Foundation) is a grand Diminutive, being a decomposed and volatilized Oil. *Unica potestate hujus Balsami vitæ,* saith Severinus of it, *omnes curationes omnium defectuum vitæ, curari possunt.* By it Life is made easy, and to last long, and burn clear. Happy is the Physician who is Master of such Oil! and happy is the Patient who hath such Physician!

A Saddle for all Horses, the Doctors say, must hurt some. But my Answer is, That tho' this will hurt none in their hands, because it can neither hurt nor do good but where it is, yet some of them, turning Quacks, pretend to do good to all with one old Womans Receipt, which they call a great Secret: and prescribing out of it, a Purge, a Sudorifick, a Cordial, and any thing; practice Physick at
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the rate that the Sea-men do at Sea : where when a Body is sick of an Ague, Calenture, Bloody-flux, or Vomiting, give him a Dose of Brandy : if he be sick of the Gout, Head-ach, or other Disease, give him Brandy, do they cry : if Brandy doth not help him, nothing else will do him good ; for it cures all Diseases, and is the Sea-mens Receipt, and doth either good or hurt, like some of the Doctors Drops. Who to ease themselves of the Trouble of reducing their Rules and Method into Practice, use one thing like the Sea-men in all sorts of Distempers ; and thereby reduce Physick to the Practice of Sea-men : with this difference only, that these, when a Man dies Drunk, do throw him whole over Board, but those cut him small, to know what Sicknes he died of.

This, Physick is now come to. And since it is come to this, let every Wise Man keep his Money in his Pocket : or, like some of the Doctors, learn the old Womans Receipt, which often proves best at last when that of the Doctors fails. But if any Body hath an itching to be cheated, (for *mundus vult decipi*, whatever may be told him) let him send me his Money ; or send for me to fetch it ; I will keep it for him : and I do promise him to cheat him as little, or less than any of his Doctors : for I'll take less of him ; and give him better Physick : and better Reasons to boot than any he hears from them. My House is in Fetter Lane.

F I N I S.







