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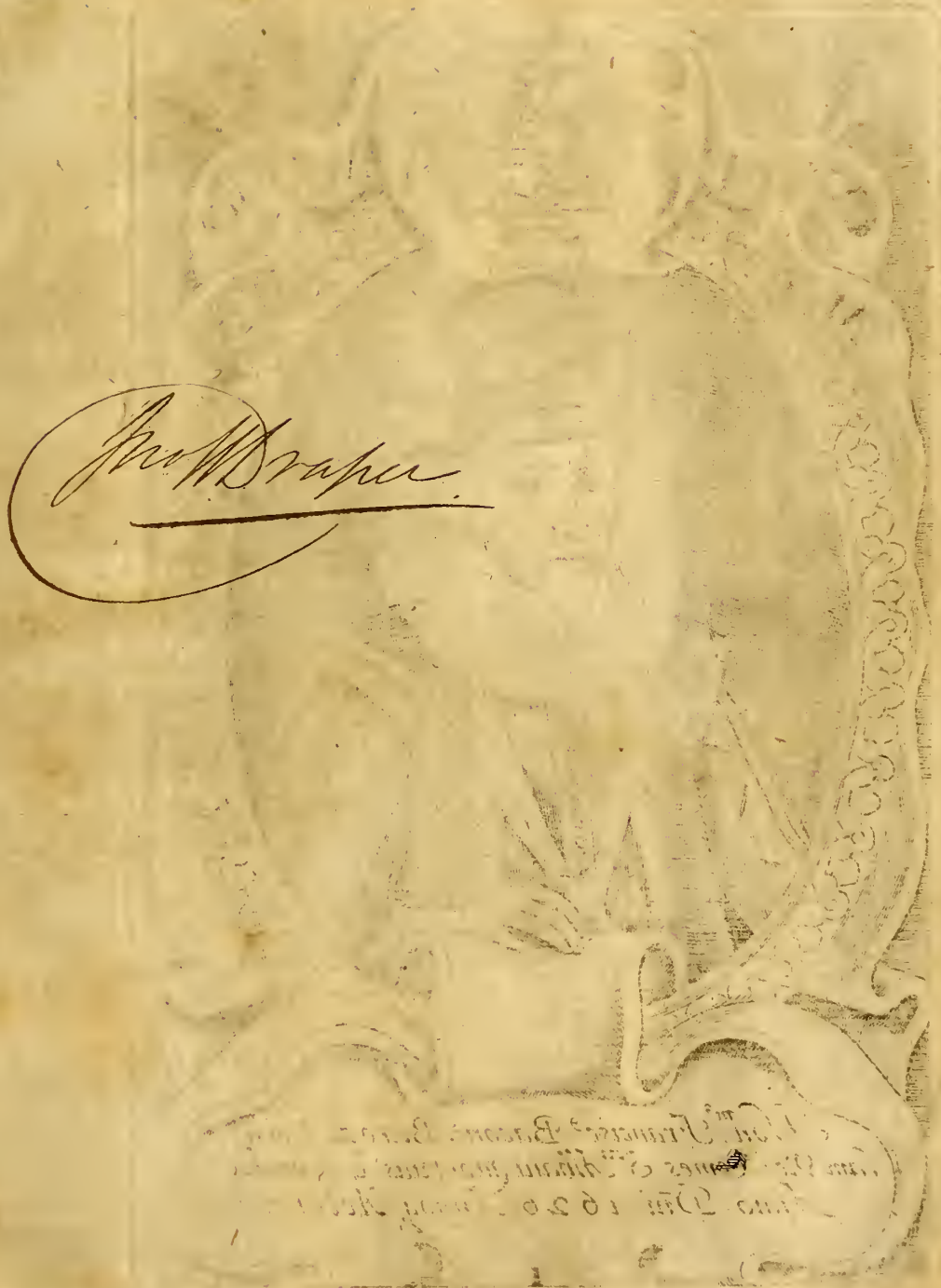

MOVITI MELIORA
Hon.mus Francisc.us Bacon.us Baro de Verulam Vice-Comes S.cti Albani. mortuus 9o Aprilis.
Anno Dñi. 1626. Annoq; Aetat 66.

SYLVA SYLVARVM
or
A NATVRALL HISTORY
In ten Centuries.

Written by the right Honble Francis Lo: Verulam Viscount S^ct Alban.

Published after y^e Autho^rs Death

by W: RAWLEY D^r of Divinity. &c

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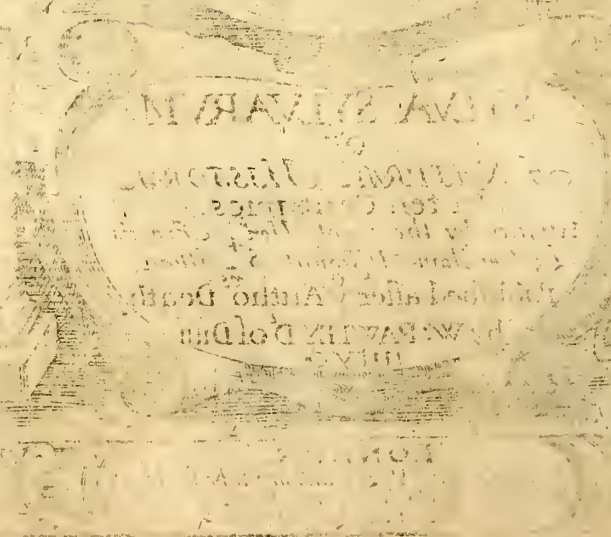
LONDON
Printed for W: Lee and are to be sould at the Great Turks head next to the Mytre Taverne in Fleetstreet

Anno 1669



SYLVA SYLVARUM,

OR,

A Natural History,

IN

TEN CENTURIES.

Whereunto is newly added,

The *History Natural* and *Experimental* of LIFE and DEATH, or of the Prolongation of LIFE.

Published after the Authors Death.

By WILLIAM RAWLEY, *Doctor in Divinity*, One of His Majesties Chaplains.

Whereunto is added *Articles of Enquiry*, touching *Metals* and *Minerals*. And the *New Atlantis*. As also the LIFE of the Right Honorable *Francis Bacon*, never added to this Book before.

Written by the Right Honorable

FRANCIS

Lord *Verulam*, Viscount St. *Alban*.

The *Ninth* and *Last Edition*,

With an *Alphabetical Table* of the *Principal Things* contained in the *Ten Centuries*.

LONDON,

Printed by *J. R.* for *William Lee*, and are to be sold by *George Sawbridg*, *Francis Tyton*, *Thomas Williams*, *John Martin*, *Thomas Vere*, *Randolph Taylor*, *Henry Broom*, *Edward Thomas*, *Thomas Passenger*, *Nevil Symmons*, *Robert Clavel*, *William Crook*, and *James Magnes*; and other Booksellers in *London* and *Westminster*. 1670.

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TO THE

MOST HIGH AND MIGHTY

PRINCE CHARLES,

By the Grace of GOD,

KING of *Great Britain*, *France*, and *Ireland*,

Defender of the Faith, *&c.*

May it please Your Most Excellent Majesty,

THE vvhole Body of the Natural Hiſtory, either deſigned or vvritten, by the late Lord Viſcount S. Alban, vvas dedicated to Your Majeſty, in his Book De Ventis, about Four years paſt, vvhen Your Majeſty vvas Prince: So as there needed no nevv Dedication of this Work, but onely in all humbleneſs, to let Your Majeſty knovv, it is Yours. It is true, if that Lord had lived, Your Majeſty, ere long had been invoked to the Protection of another Hiſtory, vvhereof, not Natures Kingdom, as in this; but theſe of

Your Majesties, (during the time and Reign of King *Henry* the Eighth) had been the subject; which since, it died under the Designation meerly: There is nothing left, but Your Majesties Princely goodness, graciously to accept of the undertakers Heart and Intentions; who was willing to have parted for a while with his darling Philosophy, that he might have attended Your Royal Commandment in that other Work. Thus much I have been bold, in all lowliness to represent unto Your Majesty, as one that was trusted with his Lordships Writings, even to the last. And as this Work affecteth the Stamp of Your Majesties Royal Protection, to make it more currant to the World; so under the protection of this Work, I presume in all humbleness to approach Your Majesties presence, and to offer it up into Your Sacred Hands.

Your Majesties most Loyal

and Devoted Servant

W. RAWLEY.

TO THE

READER.

Having had the Honor to be continually with my Lord, in compiling of this Work; and to be employed therein, I have thought it not amiss, (with his Lordships good leave and liking) for the better satisfaction of those that shall read it, to make known somewhat of his Lordships intentions, touching the ordering and publishing of the same. I have heard his Lordship often say; That if he should have served the glory of his own Name, he had been better not to have published this Natural History *; for it may seem an indigested heap of Particulars, and cannot have that lustre which Books cast into Methods, have: But that he resolved to prefer the good of Men, and that which might best secure it, before any thing that might have relation to himself. And, he knew well, that there was no other way open to unloose Mens mindes, being bound; and (as it were) Maleficiate, by the charms of deceiving Notions and Theories; and thereby made impotent for Generation of Works: But onely no where to depart from the Sense and clear experience, but to keep close to it, especially in the beginning. Besides, this* Natural History *was a Debt of his, being designed and set down for a third Part of the* Instauration. *I have also heard his Lordship discourse, That Men (no doubt) will think many of the* Experiments *contained in this Collection, to be Vul-*

gar

gar and Trivial, mean and ſordid, curious and fruitleſs; and therefore he wiſheth, that they would have perpetually before their eyes, what is now in doing; and the difference between this Natural Hiſtory, *and others. For thoſe* Natural Hiſtories *which are extant, being gathered for delight and uſe, are full of pleaſant Deſcriptions and Pictures; and affect and ſeek after Admiration, Rarities, and Secrets. But contrariwiſe, the ſcope, which his Lordſhip intendeth, is to write ſuch a* Natural Hiſtory, *as may be fundamental to the erecting and building of a true Philoſophy: For the illumination of the Underſtanding; the extracting of Axioms, and the producing of many noble Works and Effects. For he hopeth by this means, to acquit himſelf of that, for which he taketh himſelf in a ſort bound; and that is, the advancement of Learning and Sciences. For having, in this preſent Work, collected the materials for the Building; and in his* Novum Organum *(of which his Lordſhip is yet to publiſh a Second Part) ſet down the Inſtruments and Directions for the Work; Men ſhall now be wanting to themſelves, if they raiſe not knowledge to that perfection, whereof the Nature of Mortal Men is capable. And in this behalf, I have heard his Lordſhip ſpeak complainingly, That his Lordſhip (who thinketh, that he deſerveth to be an Architect in this Building) ſhould be forced to be a Workman, and a Laborer; and to dig the Clay, and burn the Brick; and more then that, (according to the hard condition of the* Iſraelites, *at the latter end) to gather the Straw and Stubble, over all the Fields, to burn the Bricks withal. For he knoweth, that except he do it, nothing will be done; Men are ſo ſet to deſpiſe the means of their own good. And as for the baſeneſs of many of the Experiments, as long as they be Gods Works, they are honorable enough: And for the vulgarneſs of them, true Axioms muſt be drawn from plain experience, and not from doubtful; and his Lordſhips courſe is to make Wonders plain,*

and

and not plain things Wonders; and that experience likewise must be broken and grinded, and not whole, or as it groweth; and for Use, his Lordship hath often in his Mouth, the two kindes of Experiments, Experimenta Fructifera, *and* Experimenta Lucifera. Experiments of Use, *and* Experiments of Light: *And he reporteth himself, whether he were not a strange Man, that should think, that Light hath no Use, because it hath no Matter. Further his Lordship thought good also, to add unto many of the* Experiments *themselves, some gloss of the* Causes, *that in the succeeding work of* Interpreting Nature, *and* Framing Axioms, *all things may be in more readiness. And for the Causes herein by him assigned; his Lordship perswadeth himself, they are far more certain, than those that are rendred by others; not for any excellency of his own wit, (as his Lordship is wont to say) but in respect of his continual conversation with* Nature *and* Experience. *He did consider likewise, That by this Addition of* Causes, *Mens mindes (which make so much haste to finde out the causes of things;) would not think themselves utterly lost in a vast* Wood of Experience, *but stay upon these* Causes *(such as they are) a little, till true* Axioms *may be more fully discovered. I have heard his Lordship say also, That one great reason, why he would not put these Particulars into any exact Method, (though he, that looketh attentively into them, shall finde, that they have a secret order) was, Because he conceived that other men would now think that they could do the like; and so go on with a further Collection, which, if the Method had been exact, many would have despaired to attain by Imitation. As for his Lordships love of Order, I can refer any Man to his Lordships Latin Book,* De Augmentis Scientiarum; *which, if my judgment be any thing, is written in*

The Epistle is the same, that should have been prefixed to this Book, if his Lordship had lived.

the exactest order, that I know any writing to be. I will conclude, with a usual Speech of his Lordships. That this Work of his Natural History, *is the* World, *as* God *made it, and not as Men have made it; for that it hath nothing, if Imagination.*

W. RAWLEY.

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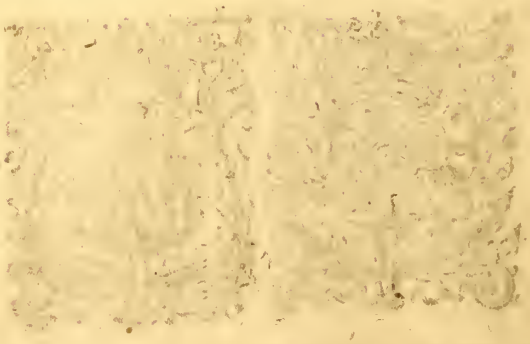
THE
LIFE
OF THE
RIGHT HONOURABLE
FRANCIS BACON
Baron of VERULAM, Viſcount St. ALBAN.

BY

WILLIAM RAWLEY. D. D.
His Lordſhips firſt and laſt Chaplain, and of late his *Majeſties* Chaplain in Ordinary.

LONDON,
Printed by *S. G.* & *B. G.* for *William Lee*, and are to be ſold at the ſign of the Turks-Head in *Fleet ſtreet*, over againſt *Fetter-Lane*, 1670.



THE

LIFE

OF THE

RIGHT HONOURABLE

FRANCIS BACON

Baron of *Verulam*, Viſcount St. *Alban*.

FRANCIS BACON *the Glory, of his* Age *and* Nation; *The* Adorner, *and* Ornament *of* Learning; *Was born in* York-houſe *or* York-Place, *in the* Strand, *On the 22th,* Day *of* January; *in the* Year *of our Lord,* 1560. *His* Father *was that famous* Councellor *to* Queen Elizabeth; *The ſecond* Prop *of the* Kingdom *in his Time, Sir* Nicholas Bacon, Knight, Lord Keeper *of the Great Seal of* England; a Lord *of known Prudence, Sufficiency, Moderation, and Integrity. His* Mother *was* Ann, *one of the* Daughters *of Sir* Anthony Cook; *unto whom the* Erudition, *of* King Edward *the* Sixth; *had been committed: A choyce* Lady, *and Eminent for Piety, Vertue, and Learning; Being exquiſitely skilled, for a Woman, in the* Greek, *and* Latine, *Tongues. Theſe being the* Parents, *you may eaſily imagine,*

what the Iſſue, *was like to be*; *Having had whatſoever* Nature *or* Breeding *could put into him.*

His firſt and childiſh years were not without ſome Mark of Eminency; At which time he was indued with that Pregnancy, and Towardlineſs, of wit; *As they were* Preſages, *of that* Deep, *and* Univerſal Apprehenſion, *which was manifeſt in him, afterward*: *And cauſed him to be taken notice of, by ſeveral* Perſons, *of* Worth *and* Place; *And eſpecially, by the* Queen; *who (as I have been informed) delighted much, then, to confer with him*; *And to prove him with* Queſtions; *unto whom, he delivered Himſelf, with that* Gravity, *and* Maturity, *above his years*; *That Her* Majeſty *would often term him,* The young Lord Keeper. *Being asked by the* Queen, how old he was? *He anſwered with much diſcretion, being then but a Boy*; That he was two years younger than her Majeſties happy Reign; *with which anſwer the* Queen *was much taken.*

At the ordinary years, of Ripeneſs, for the Univerſity; *or rather, ſomething earlier*; *he was ſent by his* Father, *to* Trinity Colledge, *in* Cambridge; *To be educated, and bred under the* Tuition *of* Doctor John White-Gift, *then* Maſter *of the* Colledge; *Afterwards the renowned* Arch-Biſhop *of* Canterbury; *a Prelate of the* firſt Magnitude *of Sanctity, Learning, Patience, and Humility*; *Under whom, He was obſerved, to have been more, than an Ordinary Proficient, in the ſeveral Arts and Sciences. Whilſt he was commorant, in the* Vniverſity, *about* 16 *years of age, (as his* Lordſhip *hath been pleaſed to impart unto my ſelf;) he firſt fell into the Diſlike, of the* Philoſophy *of* Ariſtotle; *Not for the* Worthleſſeneſs *of the* Author, *to whom he would ever aſcribe all* High Attributes; *But for the* Vnfruitfulneſs, *of the* way; *Being a* Philoſophy, (*as his* Lordſhip *uſed to ſay*) *only ſtrong, for Diſputations, and Contentions; But Barren, of the* production *of* Works, *for the Benefit of the Life of* Man. *In which Mind he continued to his Dying Day.*

After he had paſſed, the Circle *of the* Liberal Arts; *His* Father *thought fit, to frame, and mould him for the* Arts *of* State; *and, for that end, ſent him over into* France, *with*

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Sir Amyas *Paulet, then Employed* Ambaſſadour Lieger, *into* France; *By whom, he was, after awhile, held fit to be entruſted, with ſome* Meſſage, *or* Advertiſement, *to the* Queen; *which having performed with great Approbation, he returned back into* France *again; with intention to continue, for ſome years, there. In his abſence, in* France, *his* Father, *the* Lord Keeper, *died; Having collected, (as I have heard, of Knowing* Perſons) *a conſiderable ſum of* Money, *which he had ſeparated, with Intention, to have made a competent* Purchaſe *of* Land, *for the Lively-hood of this his youngeſt* Son; (*who was onely unprovided for; and though he was the youngeſt in years, yet he was not the loweſt, in his* Fathers *affection;*) *But the ſaid* Purchaſe, *being unaccompliſhed, at his* Fathers *Death, there came no greater ſhare to him, than his ſingle Part, and Portion, of the* Money, *dividable amongſt five* Brethren; *By which means, he lived, in ſome* ſtreits, *and* Neceſſities, *in his younger years. For as for that pleaſant* Scite, *and* Mannor *of* Gorhambury, *he came not to it, till many years after, by the Death, of his* Deareſt Brother, *Mr.* Anthony Bacon; *a* Gentleman, *equal to him, in* Height *of* Wit; *Though inferiour to him, in the* Endowments *of* Learning *and* Knowledge; *Unto whom he was, moſt nearly conjoyned in affection; They two being the ſole* Male-iſſue *of a ſecond* Venter.

Being returned from Travail, *he applied himſelf, to the ſtudy of the* Common-Law; *which he took upon him to be his Profeſſion. In which, he obtained to great Excellency. Though he made that, (as himſelf ſaid) but as an acceſſary, and not as his Principal ſtudy. He wrote ſeveral* Tractates, *upon that Subject. Wherein, though ſome* great Maſters, *of the* Law *did out-go him in* Bulk, *and* Particularities *of* Caſes; *yet, in the Science, of the* Grounds, *and* Myſteries, *of the* Law, *he was exceeded by none. In this way, he was after a while, ſworn, of the* Queens Counſel Learned, Extraordinary; *a grace, (if I erre not) ſcarce known before. He ſeated himſelf for the commodity of his ſtudies, and Practiſe; amongſt the* Honourable Society, *of* Greyes-Inn; *Of which* Houſe; *he was a* Member; *where he Erected, that*

that Elegant Pile, *or* Structure, *commonly known by the Name of the* Lord Bacons Lodgings; *which he Inhabited by Turns, the moſt part of his Life, (ſome few years onely excepted,) unto his Dying Day. In which* Houſe *he carried* himſelf, *with ſuch Sweetneſs, Comity, and Generoſity; That he was much revered, and beloved, by the* Readers *and* Gentlemen *of the* Houſe.

Notwithſtanding, that he profeſſed the Law for his Livelyhood, and Subſiſtence; yet his Heart and Affection was more carried after the Affairs *and* Places *of* Eſtate; *for which, if the* Majeſty Royal *then, had been pleaſed, he was moſt fit. In his younger years, he ſtudied the Service, and Fortunes, (as they call them,) of that* Noble, *but* unfortunate Earl, *the* Earl *of* Eſſex; *unto whom he was, in a ſort, a Private and free* Counſeller, *and gave him Safe and Honourable Advice, till, in the end, the* Earl *inclined too much, to the violent and precitate Counſell of others, his Adherents, and Followers; which was his* Fate *and* Ruine.

His Birth *and other* Capacities *qualified him, above others of his* Profeſſion, *to have ordinary acceſſes at* Court; *and to come freqnently into the* Queens *Eye; who would often grace him with private and free* Communication; *Not onely about* Matters *of his* Profeſſion, *or* Buſineſs *in* Law; *But alſo, about the* arduous Affairs *of* Eſtate; *From whom ſhe received, from time to time, great Satisfaction. Nevertheleſs though ſhe cheered him much, with the* Bounty *of her* Countenance; *yet ſhe never cheered him with the* Bounty *of her* Hand: *Having never conferred upon him, any* Ordinary *Place or* Means *of Honour or Profit, Save onely one dry* Reverſion *of the Regiſters* Office, *in the* Star-Chamber; *worth about* 1600 l. per Annum; *For which he waited in Expectation, either fully or near twenty years; Of which his* Lordſhip *would ſay, in* Queen Elizabeths *Time;* That it was like another mans Ground, buttalling upon his Houſe; which might mend his Proſpect, but it did not fill his Barn. (*Nevertheleſs in the time of* King James, *it fell unto him, Which might be imputed; not ſo much to her* Majeſties averſeneſs *and* Diſaffection, *towards him;*

as

as the Arts *and* Policy *of a* Great Stateſman, *then; who laboured by all induſtrious, and ſecret Means, to ſuppreſs, and keep him down; leſt, if he had riſen, he might have obſcured his Glory.*

But though, he ſtood long at a ſtay, in the Dayes of his Miſtreſs Queen Elizabeth; *Yet, after the change, and Coming in of his New* Maſter, King James, *he made a great progreſs; by whom he was much comforted, in* Places *of* Truſt, Honour, *and* Revenue, *I have ſeen, a* Letter *of his* Lordſhips, *to* King James, *wherein he makes Acknowledgement*; That he was that Maſter to him, that had raiſed and advanced him nine times; Thrice in Dignity, and *Six* times in Office, *His* Offices (*as I conceive*) *were* Counſel learned extraordinary, *to his* Majeſty, *as he had been*, to Queen Elizabeth; Kings Solliciter General; *His* Majeſties Atturney General; Counſellor of Eſtate, *being yet but* Atturney; Lord Keeper *of the* Great Seal of England; *Laſtly*, Lord Chancellor: *which two laſt Places, though they be the ſame, in Authority and Power; yet they differ in* Patent, Height, *and* Favour *of the* Prince. *Since whoſe time, none of his* Succeſſors, until this preſent Honourable Lord; *did ever bear the* Title *of* Lord Chancellor. *His* Dignities *were firſt* Knight, *then* Baron *of* Verulam; *Laſtly*, Viſcount Saint Alban: *Beſides other good* Gifts *and* Bounties *of the* Hand, *which his Majeſty gave him, Both out of the* Broad-Seal, *and out of the* Aleniation-Office, *To the value, in both of eighteen hundred pounds* per annum: *which with his Mannour of* Gorhambury; *and other* Lands *and* Poſſeſſions, *near thereunto adjoyning, amounting to a third part more, he retained to his Dying Day.*

Towards his Riſing years, not before, he entered into a married Eſtate, and took to Wife, Alice, *one of the* Daughters, *and* Co-heirs *of* Benedict Barnham, Eſquire, *and* Alderman *of* London, *with whom he received, a ſufficiently ample, and liberal* Portion, *in* Marriage. Children *he had none: which, though they be the means to perpetuate our* Names, *after our Deaths; yet he had other* Iſſues *to perpetuate his* Name; *The* Iſſues *of his Brain; in which he was e-*

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ver happy, and admired; as Jupiter was, in the production of Pallas. Neither did the want of Children, detract from his good usage of his Consort, during the Intermarriage; whom he prosecuted, with much Conjugal Love, and Respect; with many Rich Gifts, and Endowments; Besides a Robe of Honour, which he invested her withal; which she wore untill her Dying Day; being twenty years and more, after his Death.

The last five years of his Life, being with drawn from Civil affaires, and from an Active Life, he employed wholly in Contemplation and Studies. A thing, whereof his Lordship would often speak, during his Active Life; as if he affected to dy in the Shadow, and not in the Light; which also may be found in several Passages of his Works. In which time he composed, the greatest part of his Books, and Writings; Both in English and Latine; Which I will enumerate, (as near as I can) in the just order, wherein they were written. The History of the Reign of King Henry the Seventh; Abcedarium Naturæ; or a Metaphysical piece; which is lost; Historia Ventorum; Historia Vitæ & Mortis; Historia Densi & Rari, not yet printed; Historia Gravis & Levis, which is also lost; A Discourse of a War with Spain; A Dialogue, touching an Holy War. The Fable of the New Atlantis. A Preface to a Digest of the Lawes of England. The Beginning, of the History of the Reign of King Henry the Eighth. De Augmentis Scientiarum, Or the Advancement of Learning, put into Latin, with several Enrichments and Enlargements. Counsels Civil, and Moral. Or his Book of Essayes, likewise Enriched and Enlarged. The Conversion of certain Psalms, into English Verse. The Translation into Latin; of the History of King Henry the Seventh. Of the Counsels Civil and Moral. Of the Dialogue of the Holy War. Of the Fable of the New Atlantis, For the Benefit of other Nations. His Revising of his Book, De Sapientia Veterum. Inquisitio de Magnete, Topica Inquisitionis, de Luce & Lumine; Both these not yet Printed, Lastly, Sylva sylvarum, or the Natural History. These were the

Fruits,

Fruits *and* Productions, *of his laſt five years. His* Lordſhip *alſo deſigned upon the Motion and Invitation of his* late Majeſty; *To have written the* Reign *of* King Henry *the* Eighth; *But that* Work *Periſhed in the* Deſignation *meerly*; God *not lending him Life, to proceed further upon it, then only in one Mornings Work: whereof there is Extant, An*, Ex Ungue Leonem, *already Printed, in his* Lordſhips Miſcellany Works.

There is a Commemoration due; As well, to his Abilities, and Vertues, as to the Courſe *of his* Life. *Thoſe* Abilities, *which commonly go ſingle in other Men, though of prime, and Obſervable,* Parts, *were all conjoyned, and met in Him. Thoſe are,* Sharpneſs of Wit, Memory, Judgment, *and* Elocution. *For the Former Three, his* Books *do abundantly ſpeak them; which, with what* Sufficiency *he wrote, let the* World *judge; But with what* Celerity *he wrote them, I can beſt teſtifie. But for the Fourth, his* Elocution; *I will only ſet down, what I heard,* Sir Walter Rawleigh, *once ſpeak of him, by way of Compariſon; (whoſe Judgment may well be truſted;)* That the Earl of *Saliſbury*, was an excellent Speaker, but no good Pen-man; That the Earl of *Northampton*, (the Lord *Henry Howard*,) was an excellent Pen-man, but no good ſpeaker; But that Sir *Francis Bacon*, was Eminent in both.

I have been enduced to think; That if there were, a Beam *of* Knowledge *derived from* God *upon any* Man, *in theſe* Modern Times, *it was upon Him. For though he was a great* Reader *of* Books; *yet he had not his Knowledge from* Books; *But from ſome* Grounds, *and* Notions *from within Himſelf. Which notwithſtanding, he vented with great* Caution *and* Circumſpection. *His* Book, *of* Inſtauration Magna, (*which, in his own Account, was the chiefeſt of his* Works,) *was no Slight* Imagination, *or* Fancy, *of his brain; but a* Setled, *and* Concocted Notion; *The* Production *of many years,* Labour, *and* Travel. *I my Self, have ſeen, at the leſt, Twelve* Coppies, *of the* Inſtauration; *Reviſed, year by year, one after another; And every year altered, and amended,*

in the Frame thereof; Till, at last, it came to that Model, *in which it was committed to the* Press; *As many* Living Creatures, *do lick their* young ones, *till they bring them, to their* strength *of* Limbs.

In the Composing of his Books, *he did rather drive at a Masculine and clear* Expression, *than at any* Fineness, *or* Affectation *of* Phrases, *and would often ask, if the* Meaning *were expressed* plainly enough: *as being one that accounted* words *to be but* subservent, *or* Ministerial, *to* Matter; *and not the* principal. *And if his* Stile *were* Polite, *it was because he could do no otherwise. Neither was he given, to any* Light Conceits; *Or* Descanting *upon* Words; *But did ever, purposely, and industriously, avoid them; For he held such* Things, *to be but* Digressions, *or* Diversions, *from the* Scope *intended; and to derogate, from the* Weight *and* Dignity *of the* Stile.

He was no Plodder *upon* Books; *Though he read much, and that with great Judgement and Rejection of Impertinences, incident to many* Authors; *For he would ever interlace a* Moderate Relaxation *of His* Minde *with his* Studies; As Walking, *Or* Taking *the* Air abroad *in his* Coach; *or some other befitting* Recreation; *and yet, he would* loose *no* Time, *In as much, as upon his* First, *and* Immediate Return, *he would fall to* Reading *again, and so suffer no* Moment *of* Time *to Slip from him without some present* Improvement.

His Meales *were* Refections *of the* Eare *as well as of the* Stomack: *Like the* Noctes Atticæ; *or* Convivia Deipno-Sophistarum; *Wherein a Man might be refreshed in his* Mind *and* understanding, *no less then in his* Body. *And I have known some, of no mean Parts, that have professed to make use of their* Note-Books, *when they have risen from his* Table. *In which* Conversations, *and otherwise, he was no Dashing Man, as some men are; But ever a* Countenancer, *and* Fosterer, *of another Mans* Parts. *Neither was he one, that would* appropriate *the* Speech, *wholy to Himself; or delight to out-vie others; But leave a Liberty, to the* Co-Assessours, *to take their* Turns. *Wherein he would draw*

a Man

a Man *on, and allure him, to ſpeak upon ſuch a ſubject, as wherein he was peculiarly* Skilful, *and would delight to ſpeak. And, for Himſelf, he contemned no Mans* Obſervations, *but would light his* Torch *at every mans* Candle.

His Opinions *and* Aſſertions *were, for the moſt part,* Binding, *and not contradicted by any; Rather like* Oracles, *than* Diſcourſes. *Which may be imputed, either to the well weighing of his* Sentence, *by the Skales of* Truth, *and* Reaſon; *Or elſe to the* Reverence *and* Eſtimation, *wherein he was commonly had, that no* Man *would* conteſt *with him: So that there was no* Argumentation, *or* Pro *and* Con *(as they term it) at his* Table: *Or if there chanced to be any it was carried with much* Submiſſion *and* Moderation.

I have often obſerved, and ſo have other Men of great account, That if he had occaſion to repeat another Mans Words *after him, he had an uſe and faculty to dreſs them in better* Veſtments, *and* Apparel *than they had before: So that the* Authour *ſhould find his own* ſpeech *much amended; and yet the* ſubſtance *of it ſtill* retained: *As if it had been* Natural *to him to uſe good* Forms; *As* Ovid *ſpake of his* Faculty *of* Verſifying.

Et quod tentabam ſcribere, Verſus erat.

When his Office *called him, as he was of the* Kings Counſel Learned, *to charge any* Offenders, *either in* Criminals, *or* Capitals; *He was never of an* Inſulting, *or* Domineering Nature *over them; But alwayes tender Hearted, and carrying himſelf decently towards the* Parties; *(Though it was his Duty, to charge them home:) But yet, as one, that looked upon the* Example, *with the Eye of* Severity, *But upon the* Perſon, *with the Eye of* Pitty, *and* Compaſſion. *And in* Civil Buſineſs, *as he was* Counſellor *of* Eſtate, *he had the beſt way of* adviſing; *Not engaging his* Maſter, *in any* Precipitate *or* grievous *Courſes, but in* Moderate *and* Fair *Proceedings: The* King, *whom he ſerved, giving him this* Teſtimony; *That he ever dealt, in Buſineſſe, Suavibus*

Modis; Which was the way that was moſt according to his own heart.

Neither was He in his time leſſe gracious with the Subject *than with his* Soveraign. *He was ever acceptable to the* Houſe of Commons, *when he was a* Member *thereof. Being the* Kings Atturney, *and choſen to a place in* Parliament; *he was allowed and diſpenſed with to ſit in the* Houſe; *which was not permitted to other* Atturneys.

And as he was a good Servant *to his* Maſter; *Being never, in nineteen years ſervice (as he himſelf averred,) rebuked by the* King *for any Thing relating to his* Majeſty; *So he was a good* Maſter *to his* Servants, *And rewarded their long* attendance *with good* Places, *freely when they fell into his Power. Which was the Cauſe that ſo many young* Gentlemen *of* Blood *and* Quality, *ſought to liſt themſelves in his* Retinue. *And if he were abuſed by any of them in their* Places, *It was onely the* Errour, *of the* Goodneſs, *of his* Nature; *but the Badges of their* Indiſcretions, *and* Intemperances.

This Lord *was* Religious; *For though the* World *be apt to ſuſpect, and prejudice,* Great Wits, *and* Politicks *to have ſomewhat of the* Atheiſt; *Yet he was converſant with* God: *As appeareth, by ſeveral Paſſages, throughout the whole* Current *of his* Writings. *Otherwiſe he ſhould have croſſed his own* Principles; *which were*, That a little Philoſophy, maketh Men apt to forget God; As attributing too much to ſecond Cauſes; But Depth of Philoſophy, bringeth Men back to God again. *Now I am ſure there is no Man that will deny him, or account otherwiſe of him, but to have him been a deep* Philoſopher. *And not only ſo, But he* was able to render a Reaſon of the Hope which was in him; *Which that* Writing *of his, of the* Confeſſion *of the* Faith, *doth abundantly teſtifie. He repaired frequently, when his Health would permit him, to the* Service *of the* Church, *To hear* Sermons, *To the* Adminiſtration *of the* Sacrament *of the* Bleſſed Body *and* Bloud *of* Chriſt; *And died in the true* Faith *eſtabliſhed in the* Church *of* England.

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This is most true; *He was free from* Malice; *which*, (*as he said Himself*,) He never bred nor fed. *He was no* Revenger *of* Injuries; *which, if he had minded, he had both* Opportunity *and* Place High *enough, to have done it.* He *was no* Heaver *of Men out of their* Places, *As delighting in their* Ruine *and* undoing. *He was no defamer of any Man to his* Prince. *One Day, when a great* States-Man *was newly Dead, That had not been his* Friend; *The* King *asked him*, What he thought of that Lord, which was gone? *He answered*, That he would never have made his *Majesties* Estate better; But he was sure he would have kept it from being worse. *Which was the worst, he would say of him. Which I reckon, not among his* Moral, *but his* Christian Vertues.

His Fame *is greater, and sounds louder in* Forraign *Parts abroad, than at* home *in his own Ndtion. Thereby verifying that* Divine Sentence, A Prophet is not without honour, save in his own Country, and in his own house. *Concerning which I will give you a Taste onely, out of a Letter, written from* Italy (*The* Store-house *of Refined* Wits) *to the late Earl of* Devonshire, *Then, the Lord* Candish. I will expect the *New Essayes* of my Lord Chancellor *Bacon*, as also his *History*, with a great deal of Desire, and whatsoever else he shall compose. But in Particular of his *History*, I promise my self a thing perfect *and* Singular; especially *in* Henry *the Seventh; Where he may exercise the* Talent of his Divine Understanding. This Lord is more and more known, and his Books here, more and more delighted in; And those Men that have more than ordinary Knowledge in Humane affairs, esteem him one of the most capable Spirits of this Age; and he is truely such. *Now his Fame doth not decree with* Dayes *since, but rather increase. Divers of his* Works *have been* anciently, *and yet* lately, *translated into other* Tongues, *both* Learned *and* Modern, *by* Forraign Pens. *Several* Persons *of Quality, during his* Lordships *Life, crossed the* Seas *on purpose to gain an Opportunity of seeing him, and* Discoursing *with him: whereof one,*

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carried his Lordships Picture, *from Head to Foot, over with him into* France; *as a Thing which, he foresaw, would be much desired there; That so they might enjoy, the* Image *of his* Person; *as well as the* Images *of his* Brain, *his* Books. *Amongst the rest,* Marquis Fiat; a French-Nobleman; *who came* Ambassador *into* England; *in the beginning of* Queen Mary, Wife *to* King Charles, *was taken with an extraordinary Desire of Seeing him: For which, he made way by a* Friend: *And when he came to him, being then, through weakness, confined to his Bed; The* Marquis *saluted him with this* High-Expression; That his Lordship, had been ever to Him, like the Angels; of whom he had often heard, and read much of them in *Books*; But he never saw them. *After which they contracted an intimate Acquaintance; And the* Marquis *did so much* revere *him; that besides his Frequent visits; they wrote* Letters, *one to the other, under the* Titles *and* Appellations, *of* Father *and* Son; *As for his many* Salutations, *by* Letters *from* Forraign Worthies, *devoted to* Learning; *I forbear to mention them; Because that is a* Thing *common to other* Men *of* Learning, *or* Note *together with him.*

But yet, in this Matter of his Fame, *I speak, in the* Comparative, *onely, and not in the* Exclusive. *For his* Reputation *is great, in his own* Nation, *also; Especially amongst those, that are of a more Acute, and sharper Judgement: Which I will exemplifie, but with two* Testimonies, *and no more. The Former; When his* History *of* King Henry *the* Seventh *was to come forth; It was delivered to the old* Lord Brook, *to be perused by him; who, when he had dispatched it, returned it to the* Author, *with this* Eulogy: Commend me to my Lord; and bid him take care, to get good Paper and Inke, for the Work is incomparable. *The other shall be that, of Doctor* Samuel Collins, *late* Provost, *of* Kings Colledge, *in* Cambridge, *A Man of no vulgar Wit, who affirmed unto me,* That when he had read, the Book of the Advancement of Learning, He found himself in a case to begin his Studies a new, and that he had lost all the Time of his studying before.

It hath been desired; That something should be signified, touching his Diet; *And the* Regiment *of his* Health: *Of which, in regard, of his* Universal Insight *into* Nature, *he may (perhaps,) be to some, an* Example. *For his* Diet; *It was rather a* plentiful, *and* liberal, Diet, *as his* Stomack *would bear it, then a* Restrained; *Which he also commended in his* Book *of the* History *of* Life *and* Death. *In his younger years, he was much given to the Finer and Lighter sort of* Meats, *As of* Fowles; *and such like: But afterward, when he grew more Judicious; He preferred the stronger* Meats; *such as the* Shambles *afforded; As those* Meats, *which bred the more* firm *and substantial* Juyces *of the* Body, *and less* Dissipable: *upon which, he would often make his* Meal; *Though he had other* Meats, *upon the* Table. *You may be sure; He would not neglect that Himself, which He so much extolled in his* Writings; *And that was the Use of* Niter: *Whereof he took in the Quantity of about three Grains, in thin warm Broath, every Morning, for thirty years together, next before his Death. And for Physick, he did, indeed, live Physically, but not miserably; For he took only a* Maceration *of* Rhubarb; *Infused into a* Draught *of* White Wine, *and* Beer, *mingled together, for the Space of half an Hour; Once in six or seven Dayes; Immediately before his* Meal, (*whether Dinner, or Supper,*) *that it might dry, the* Body, *lesse: which (as he said,) did carry away frequently, the* Grosser Humours *of the* Body, *and not diminish, or carry away, any of the* Spirits, *as* Sweating *doth. And this was no Grievous Thing to take. As for other Physick, in an ordinary way, (whatsoever hath been vulgarly spoken;) he took not. His Receit, for the* Gout; *which did, constantly, ease him of his Pain, within two Hours, Is already set down in the End, of the* Natural History.

It may seem, the Moon, *had some Principal* Place, *in the* Figure *of his* Nativity. *For the* Moon, *was never in her Pasion or Eclipsed, but he was surprized, with a sudden* Fit, *of* Fainting: *And that, though he observed not, nor took any previous Knowledge, of the* Eclipse *thereof; and assoon as the* Eclipse *ceased, he was restored, to his former strength again.*

He

He died, on the 9th. Day *of* April, *in the year* 1626; *In the early* Morning, *of the* Day *then celebrated for our* Saviours Resurrection, *In the* 66th. *year of his* Age; *at the* Earle *of* Arundells House *in* High-gate, *near* London; *To which Place, he casually repaired, about a week before*, God *so ordaining, that he should dye there, Of a Gentle* Feaver, *accidentally accompanied, with a great* Cold; *whereby the* Defluxion *of* Rheume, *fell so plentifully upon his* Breast, *that he died by* Suffocation: *And was buried, in* Saint Michaels Church, *at* Saint Albans; *Being the* Place, *designed for his* Burial, *by his* last Will, *and* Testament; *Both because the* Body *of his* Mother *was interred there; And because, it was the only* Church, *then remaining, within the Precincts of old* Verulam: *Where he hath a* Monument, *erected for him of* White Marble; (*By the* Care, *and* Gratitude, *of Sir* Thomas Meautys, Knight, *formerly his* Lordships Secretary; *Afterwards* Clark *of the* Kings Honourable Privy Counsel, *under two* Kings:) *Representing his full* Pourtraiture *in the* Posture *of studying; with an* Inscription *composed by that Accomplisht* Gentleman, *and* Rare Wit, Sir Henry Wotton.

But howsoever his Body *was* Mortal; *yet no doubt his* Memory *and* Works *will live; And will in all probability, last as long as the* World *lasteth. In order to which, I have endeavoured, (after my poor Ability,) to do this* Honour *to his* Lordship *by way, of enducing to the same.*

SPEECHES

NEW

ATLANTIS.

A VVork unfinished.

Written by the Right Honorable,

FRANCIS

Lord *Verulam*, Viſcount *St. Albans*.

TO THE READER.

THis *Fable* my Lord deviſed, to the end that he might exhibit therein a *Model* or *Deſcription* of a *College*, inſtituted for the Interpreting of *Nature*, and the producing of great and marvellous *Works* for the benefit of *Men*, under the name of *Solomons* Houſe, or, *The College of the Six days Works*. And even ſo far his Lordship hath proceeded as to finish that Part. Certainly, the Model is more vaſt and high, than can poſſibly be imitated in all things, notwithſtanding moſt things therein are within Mens power to effect. His Lordship thought alſo in this preſent Fable to have compoſed a Frame of Laws, or of the beſt State or Mould of a *Commonwealth*; but fore-ſeeing it would be a long Work, his deſire of Collecting the *Natural Hiſtory* diverted him, which he preferred many degrees before it.

This Work of the *New Atlantis* (as much as concerneth the *English Edition*) his Lordship deſigned for this place, in regard it hath ſo near affinity (in one part of it) with the preceding *Natural Hiſtory*.

W. Rawley.

NEW ATLANTIS.

WE ſailed from *Peru* (where we had continued by the ſpace of one whole year) for *China* and *Japan* by the South Sea, taking with us Victuals for Twelve Moneths, and had good Winds from the East, though ſoft and weak, for Five Moneths ſpace and more; but then the Wind came about, and ſetled in the Weſt for many days; ſo as we could make little or no way, and were ſometimes in purpoſe to turn back: But then again, there aroſe ſtrong and great Winds from the South, with a Point East, which carried us up (for all that we could do) towards the North; by which time our Victuals failed us, though we had made good ſpare of them: So that finding our ſelves in the midſt of the greateſt Wilderneſs of Waters in the World, without Victual, we gave our ſelves for loſt men, and prepared for death. Yet we did lift up our hearts and voices to God above, *Who ſheweth his Wonders in the deep*; beſeeching him of his mercy, That as in the *Beginning* he diſcovered the *Face of the deep*, and brought forth *dry land*; ſo he would now diſcover Land to us, that we might not periſh. And it came to paſs, that the next day about Evening, we ſaw within a Kenning before us, towards the North, as it were thicker Clouds, which did put us in ſome hope of Land; knowing how that part of the South-Sea was utterly unknown, and might have Iſlands or Continents that hitherto were not come to light. Wherefore we bent our courſe thither, where we ſaw the appearance of Land all that night; and in the dawning of the next day, we might plainly diſcern that it was a Land flat to our ſight, and full of Boſcage, which made it ſhew the more dark; and after an hour and a halfs ſailing, we entred into a good Haven, being the Port of a fair City, not great indeed, but well built, and that gave a pleaſant view from the Sea: And we thinking every minute long, till we were on Land, came cloſe to the Shore and offered to land; but ſtraight-ways we ſaw divers of the people with Baſtons in their hands, (as it were) forbidding us to land, yet without any cries or fierceneſs, but onely as warning us off by ſigns that they made. Whereupon being not a little diſcomforted, we were adviſing with our ſelves, what we ſhould do. During which time, there made forth to us a ſmall Boat with about eight perſons in it, whereof one of them had in his hand a Tip-ſtaff of a Yellow Cane, tipped at both ends with Blew, who made aboard our Ship without any ſhew of diſtruſt at all: And when he ſaw one of our number preſent himſelf ſomewhat afore the reſt, he drew forth a little Scroul of Parchment (ſomewhat yellower then our Parchment,

and shining like the Leaves of Writing-Tables, but otherwise soft and flexible) and delivered it to our foremost man. In which Scroul were written in ancient *Hebrew*, and in ancient *Greek*, and in good *Latine* of the School, and in *Spanish*, these words, "Land ye not, none of you, and provide to be "gone from this Coast within sixteen days, except you have further time "given you: Mean while, if you want Fresh-water or Victual, or help for "your Sick, or that your Ship needeth repair, write down your wants, and "you shall have that which belongeth to Mercy. This Scroul was signed with a stamp of *Cherubims Wings*, not spred, but hanging downwards, and by them a *Cross*. This being delivered, the Officer returned, and left onely a Servant with us to receive our answer. Consulting hereupon amongst our selves, we were much perplexed. The denial of Landing, and hasty warning us away, troubled us much. On the other side, to finde that the people had Languages, and were so full of Humanity, did comfort us not a little; and above all, the Sign of the *Cross* to that Instrument, was to us a great rejoycing, and, as it were, a certain presage of good. Our answer was in the *Spanish* Tongue, "That for our Ship it was well, for we had rather "met with Calms and contrary Winds then any Tempests. For our Sick, "they were many, and in very ill case; so that if they were not permitted to "land, they ran in danger of their lives. Our other wants we set down in particular, adding, "That we had some little store of Merchandize, which "if it pleased them to deal for, it might supply our wants without being "chargeable unto them. We offered some reward in Pistolets unto the Servant, and a piece of Crimson Velvet to be presented to the Officer; but the Servant took them not, nor would scarce look upon them, and so left us, and went back in another little Boat which was sent for him.

About three hours after we had dispatched our Answer, there came towards us a person (as it seemed) of place: He had on him a Gown with wide Sleeves of a kinde of Water-Chamolet, of an excellent Azure colour, far more glossie then ours; his under apparel was green, and so was his Hat, being in the form of a Turbant, daintily made, and not so huge as the *Turkish* Turbants; and the Locks of his Hair came down below the brims of it: A Reverend Man was he to behold. He came in a Boat gilt in some part of it, with four persons more onely in that Boat, and was followed by another Boat wherein were some twenty. When he was come within a flight-shot of our Ship, signs were made to us, that we should send forth some to meet him upon the Water; which we presently did in our Ship-boat, sending the principal Man amongst us save one, and four of our number with him. When we were come within six yards of their Boat, they called to us to stay, and not to approach further; which we did: And thereupon the Man whom I before described stood up, and with a loud voice in *Spanish*, asked, *Are ye Christians?* We answered, *We were*; fearing the less, because of the *Cross* we had seen in the Subscription. At which answer, the said person lift up his right hand towards Heaven, and drew it softly to his mouth, (which is the gesture they use when they thank *God*) and then said, "If you will swear (all of you) by the Merits of the *Saviour* that ye are no "Pirates, nor have shed blood, lawfully nor unlawfully, within forty "days past, you may have License to come on Land. *We said*, "We were "all ready to take that Oath. Whereupon one of those that were with him, being (as it seemed) a *Notary*, made an Entry of this Act. Which done, another of the attendants of the Great Person, which was with

him in the ſame Boat, after his Lord had ſpoken a little to him, ſaid aloud, "My Lord, would have you know, that it is not of Pride or Greatneſs that "he cometh not aboard your Ship; but for that, in your Anſwer, you de- "clare, That you have many ſick amongſt you, he was warned by the *Con- "ſervator of Health* of the City, that he ſhould keep a diſtance. We bowed our ſelves towards him, and anſwered, "We were his humble Servants, "and accounted for great Honor and ſingular Humanity towards us, that "which was already done; but hoped well, that the nature of the ſickneſs "of our Men was not infectious. So he returned, and a while after came the *Notary* to us aboard our Ship, holding in his hand a Fruit of that Coun- trey like an *Orenge*, but of colour between *Orenge-tawny* and *Scarlet*, which caſt a moſt excellent Odor: He uſed it (as it ſeemeth) for a Preſervative againſt Infection. He gave us our Oath, *By the Name of Jeſus, and his Merits*; and after told us, that the next day by ſix of the clock in the morning we ſhould be ſent to, and brought to the *Strangers Houſe*, (ſo he called it) where we ſhould be accommodated of things both for our whole and for our ſick. So he left us; and when we offered him ſome Piſtolets, he ſmiling, ſaid, *He muſt not be twice paid for one labor*, meaning (as I take it) that he had ſalary ſufficient of the State for his ſervice; for (as I after learned) they call an Officer that taketh rewards, *Twice paid*.

The next morning early, there came to us the ſame Officer that came to us at firſt with his Cane, and told us, "He came to conduct us to the *Strangers* "*Houſe*, and that he had prevented the hour, becauſe we might have the whole "day before us for our buſineſs: For (*ſaid he*) if you will follow my ad- "vice, there ſhall firſt go with me ſome few of you, and ſee the place, and "how it may be made convenient for you; and then you may ſend for your "ſick, and the reſt of your number which ye will bring on Land. *We thanked him, and ſaid*, "That this care which he took of deſolate Strangers, *God* "would reward. And ſo ſix of us went on Land with him; and when we were on Land, he went before us, and turned to us, and ſaid, *He was but our Servant, and our Guide*. He led us through three fair Streets, and all the way we went there were gathered ſome people on both ſides, ſtanding in a row, but in ſo civil a faſhion, as if it had been not to wonder at us, but to welcome us; and divers of them, as we paſſed by them, put their arms a little abroad, which is their geſture when they bid any welcome. The *Strangers Houſe* is a fair and ſpacious Houſe, built of Brick, of ſome- what a bluer colour then our Brick, and with handſome Windows, ſome of Glaſs, ſome of a kinde of Cambrick oiled. He brought us firſt into a fair Parlor above-ſtairs, and then asked us, "What number of perſons "we were, and how many ſick. *We anſwered*, "We were in all (ſick and "whole) One and fifty perſons, whereof our ſick were ſeventeen. He deſired us to have patience a little, and to ſtay till he came back to us, which was about an hour after; and then he led us to ſee the Chambers which were provided for us, being in number Nineteen. They having caſt it (as it ſeemeth) that four of thoſe Chambers, which were better then the reſt, might receive four of the principal men of our company, and lodge them alone by themſelves; and the other fifteen Chambers were to lodge us, two and two together; the Chambers were handſome and chearful Chambers, and furniſhed civilly. Then he led us to a long Gal- lery, like a Dorture, where he ſhewed us all along the one ſide (for the other ſide was but Wall and Window) ſeventeen Cells, very neat ones, having Partitions of Cedar-wood. Which Gallery and Cells, being in

all

all forty, (many more then we needed) were instituted as an Infirmary for sick persons. And he told us withal, that as any of our sick waxed well, he might be removed from his Cell to a Chamber; for which purpose, there were set forth ten spare Chambers, besides the number we spake of before. This done, he brought us back to the Parlor, and lifting up his Cane a little (as they do when they give any charge or command) said to us, "Ye are to know, that the Custom of the Land requireth, that after this "day and to morrow (which we give you for removing your People from "your Ship) you are to keep within doors for three days: But let it not "trouble you, nor do not think your selves restrained, but rather left to "your Rest and Ease. You shall want nothing, and there are six of our "people appointed to attend you for any business you may have abroad. We gave him thanks with all affection and respect, and said; *God surely is manifested in this Land.* We offered him also twenty Pistolets; but he smiled, and onely said, *What, twice paid?* and so he left us. Soon after our Dinner was served in, which was right good Viands, both for Bread and Meat, better then any Collegiate Diet, that I have known in *Europe.* We had also drink of three sorts, all wholesome and good; Wine of the Grape, a Drink of Grain, such as is with us our Ale, but more clear; and a kinde of Sider made of a Fruit of that Countrey, a wonderful pleasing and refreshing drink. Besides, there were brought in to us great store of those Scarlet Orenges for our sick, which (they said) were an assured remedy for sickness taken at Sea. There was given us also a Box of small gray or whitish Pills, which they wished our sick should take, one of the Pills every night before sleep, which (they said) would hasten their recovery. The next day, after that our trouble of carriage and removing of our Men and Goods out of our Ship, was somewhat setled and quiet, I thought good to call our company together, and when they were assembled, said unto them, "My dear Friends, let us know our selves, and how it standeth "with us. We are Men cast on Land, as *Jonas* was out of the Whales "Belly, when we were as buried in the deep; and now we are on Land, "we are but between Death and Life, for we are beyond both the Old "World and the New, and whether ever we shall see *Europe*, God onely "knoweth: It is a kinde of miracle hath brought us hither, and it must be "little less that shall bring us hence. Therefore in regard of our deliver-"ance past, and our danger present and to come, let us look up to God, "and every man reform his own ways. Besides, we are come here amongst "a *Christian People*, full of Piety and Humanity; let us not bring that con-"fusion of face upon our selves, as to shew our vices or unworthiness be-"fore them. Yet there is more; for they have by commandment (though "in form of courtesie) cloistered us within these Walls for three days; "who knoweth whether it be not to take some taste of our manners and "conditions; and if they finde them bad, to banish us straight-ways; if "good, to give us further time? For these men that they have given us for "attendance, may withal have an eye upon us. Therefore for Gods love, "and as we love the weal of our Souls and Bodies, let us so behave our "selves as we may be at peace with God, and may finde grace in the eyes "of this people. Our Company with one voice thanked me for my good admonition, and promised me to live soberly and civilly, and without giving any the least occasion of offence. So we spent our three days joyfully and without care, in expectation what would be done with us when they were expired: During which time, we had every hour joy

of

of the amendment of our ſick, who thought themſelves caſt into ſome divine *Pool of Healing*, they mended ſo kindly and ſo faſt.

The morrow after our three days were paſt, there came to us a new Man that we had not ſeen before, cloathed in blew as the former was, ſave that his Turbant was white with a ſmall Red Croſs on the top; he had alſo a Tippet of fine Linnen. At his coming in he did bend to us a little, and put his arms abroad. We of our parts ſaluted him in a very lowly and ſubmiſſive manner, as looking, that from him we ſhould receive ſentence of Life or Death. He deſired to ſpeak with ſome few of us; whereupon ſix of us onely ſtaid, and the reſt avoided the room. He ſaid, "I am by office Governor of this *Houſe of Strangers*, and by Vocation I am a *Chriſtian Prieſt*; "and therefore am come to you to offer you my ſervice, both as Strangers, "and chiefly as *Chriſtians*. Some things I may tell you, which I think you "will not be unwilling to hear. The State hath given you licence to ſtay on "Land for the ſpace of ſix weeks; and let it not trouble you, if your occa- "ſions ask further time, for the Law in this Point is not preciſe; and I do "not doubt, but my ſelf ſhall be able to obtain for you ſuch further time as "ſhall be convenient. Ye ſhall alſo underſtand, that the *Strangers Houſe* is at "this time rich and much aforehand, for it hath laid up Revenue theſe Thir- "ty ſeven years; for ſo long it is ſince any Stranger arrived in this part: And "therefore take ye no care, the State will defray you all the time you ſtay, "neither ſhall you ſtay one day leſs for that. As for any Merchandize you "have brought, ye ſhall be well uſed, and have your Return, either in Mer- "chandize, or in Gold and Silver; for to us it is all one. And if you have "any other requeſt to make, hide it not, for ye ſhall finde we will not make "your countenance to fall by the anſwer ye ſhall receive. Onely this I muſt "tell you, that none of you muſt go above a *Karan* (*that is with them a mile and* "*an half*) from the Walls of the City without ſpecial leave. We anſwered, after we had looked a while upon one another, admiring this gracious and parent-like uſage, "That we could not tell what to ſay, for we wanted "words to expreſs our thanks, and his noble free offers left us nothing to "ask. It ſeemed to us, that we had before us a Picture of our *Salvation* in "*Heaven*; for we that were a while ſince in the Jaws of Death, were now "brought into a place where we found nothing but Conſolations. For the "Commandment laid upon us, we would not fail to obey it, though it "was impoſſible but our hearts ſhould be inflamed to tread further upon "this happy and holy Ground. *We added*, "That our Tongues ſhould firſt "cleave to the Roofs of our Mouths, ere we ſhould forget either this Re- "verend Perſon, or this whole Nation, in our Prayers. We alſo moſt humbly beſought him to accept of us as his true Servants, by as juſt a right as ever Men on Earth were bounden, laying and preſenting both our perſons and all we had at his feet. He ſaid, *He was a Prieſt, and looked for a Prieſts reward, which was our Brotherly love, and the good of our Souls and Bodies.* So he went from us, not without tears of tenderneſs in his eyes; and left us alſo confuſed with joy and kindneſs, ſaying amongſt our ſelves, *That we were come into a Land of Angels, which did appear to us daily, and prevent us with comforts which we thought not of, much leſs expected.*

The next day about ten of the clock the Governor came to us again, and after ſalutations, ſaid familiarly, *That he was come to viſit us*, and called for a Chair, and ſate him down; and we being ſometen of us (the reſt were of the meaner ſort, or elſe gone abroad) ſate down with him: And when we were ſet, he began thus, "We of this Iſland of *Benſalem* (*for ſo they call it in*

their

" *their Language*,) have this, That by means of our ſolitary ſituation, and of " the Laws of Secrecy which we have for our Travellers, and our rare " admiſſion of ſtrangers, we know well moſt part of the Habitable World, " and are our ſelves unknown. Therefore, becauſe he that knoweth leaſt, " is fitteſt to ask Queſtions, it is more reaſon, for the entertainment of the " time, that ye ask me Queſtions, than that I ask you. *We anſwered*, That " we humbly thanked him, that he would give us leave ſo to do, and that " we conceived by the taſte we had already, that there was no worldly thing " on Earth, more worthy to be known, then the ſtate of that happy Land. " But above all (*we ſaid*) ſince that we were met from the ſeveral Ends of " the World, and hoped aſſuredly, that we ſhould meet one day in the " Kingdom of Heaven, (for that we were both parts *Chriſtians*) we deſired " to know (in reſpect that Land was ſo remote, and ſo divided by vaſt and " unknown Seas, from the Land where our *Saviour* walked on Earth) " who was the Apoſtle of that Nation, and how it was converted to the " Faith. *It appeared in his face, that he took great contentment in this our Queſtion. He ſaid*, " Ye knit my heart to you by asking this Queſtion in the firſt place, " for it ſheweth that you *firſt ſeek the Kingdom of Heaven*; and I ſhall gladly and " briefly ſatisfie your demand.

" About twenty years after the Aſcenſion of our *Saviour*, it came to " paſs, that there was ſeen by the people of *Renfuſa* (a City upon the " Eaſtern Coaſt of our Iſland) within night (the night was cloudy and " calm) as it might be ſome mile in the Sea, a great *Pillar of Light*, not ſharp, " but in form of a Column or Cylinder, riſing from the Sea a great way up " towards Heaven, and on the top of it was ſeen a large *Croſs of Light*, more " bright and reſplendent then the Body of the Pillar: Upon which ſo " ſtrange a ſpectacle the people of the City gathered apace together upon " the Sands to wonder, and ſo after put themſelves into a number of ſmall " Boats to go nearer to this marvellous ſight. But when the Boats were " come within (about) ſixty yards of the Pillar, they found themſelves all " bound, and could go no further, yet ſo as they might move to go about, " but might not approach nearer; ſo as the Boats ſtood all as in a Theatre, " beholding this Light as an Heavenly Sign. It ſo fell out, that there was in " one of the Boats, one of the wiſe Men of the Society of *Solomons Houſe*, " (which *Houſe* or *College* (my good Brethren) is the very Eye of this King- " dom) who having a while attentively and devoutly viewed and contem- " plated this Pillar and Croſs, fell down upon his face, and then raiſed him- " ſelf upon his knees, and lifting up his hands to Heaven made his Prayers " in this manner.

LOrd God *of Heaven and Earth, thou haſt vouch-ſafed of thy Grace to thoſe of our* Order, *to know thy Works of Creation, and true Secrets of them, and to diſcern (as far as appertaineth to the Generations of Men) between Divine Miracles, Works of Nature, Works of Art, and Impoſtures and Illuſions of all ſorts. I do here acknowledge and teſtifie before this People, that the Thing*

we

we now see before our eyes is thy Finger, *and a true* Miracle. *And forasmuch as we learn in our Books, that thou never workest Miracles but to a Divine and excellent End, (for the Laws of Nature, are thine own Laws, and thou exceedest them not but upon good cause) we most humbly beseech thee to prosper this great Sign, and to give us the Interpretation, and use of it in mercy, which thou dost in some part secretly promise, by sending it unto us.*

" When he had made his Prayer, he presently found the Boat he was " in, moveable and unbound, whereas all the rest remained still fast; and " taking that for an assurance of leave to approach, he caused the Boat to be " softly, and with silence, rowed towards the *Pillar*; but ere he came near it, " the *Pillar* and *Cross of Light* brake up, and cast it self abroad, as it were, into " a Firmament of many Stars; which also vanished soon after, and there was " nothing left to be seen but a small *Ark* or *Chest of Cedar*, dry, and not wet " at all with Water, though it swam; and in the fore-end of it, which was " towards him, grew a small green Branch of Palm. And when the Wise- " man had taken it with all reverence into his Boat, it opened of it self, and " there was found in it a *Book* and a *Letter*, both written in fine Parchment, " and wrapped in Sindons of Linnen. The *Book* contained all the *Canonical* " *Books* of the *Old* and *New Testament*, according as you have them, (for we " know well what the *Churches* with you receive;) and the *Apocalypse* it self, " and some other *Books* of the *New Testament*, which were not at that time " written, were nevertheless in the *Book*. And for the *Letter*, it was in these " words.

I *Bartholomew*, a Servant of the Highest, and Apostle of *JESUS CHRIST*, was warned by an Angel that appeared to me in a Vision of Glory, that I should commit this *Ark* to the Floods of the Sea. Therefore I do testifie and declare unto that People, where *GOD* shall ordain this *Ark* to come to Land, that in the same day is come unto them Salvation, and Peace, and Good Will from the *FATHER*, and from the *LORD JESUS*.

" There was also in both these Writings, as well the *Book* as the " *Letter*, wrought a great Miracle, conform to that of the *Apostles* in the " Original *Gift of Tongues*. For there being at that time in this Land *Hebrews*, " *Persians*, and *Indians*, besides the Natives, every one read upon the *Book* " and

"and *Letter*, as if they had been written in his own Language. And thus "was this Land saved from Infidelity (as the Remain of the old World "was from Water) by an Ark, through the Apostolical and Miraculous "Evangelism of S. *Bartholomevv*. And here he pausèd, and a Messenger came and called him forth from us. So this was all that passed in that Conference.

The next day the same Governor came again to us immediately after Dinner, and excused himself, saying, "That the day before he was called from us "somewhat abruptly, but now he would make us amends, and spend time "with us, if we held his Company and Conference agreeable. *We answered*, "That we held it so agreeable and pleasing to us, as we forgot both dangers "past and fears to come, for the time we heard him speak, and that we "thought an hour spent with him, was worth years of our former life. *He bovved himself a little to us, and after vve vvere set again, he said*, "Well, the Questi- "ons are on your part. *One of our number said, after a little pause*, "That there "was a matter we were no less desirous to know then fearful to ask, lest we "might presume too far; but encouraged by his rare Humanity towards us, "(that could scarce think our selves strangers, being his vowed and professed "Servants) we would take the hardiness to propound it: Humbly beseech- "ing him, if he thought it not fit to be answered, that he would pardon it, "though he rejected it. *VVe said*, We well observed those his words "which he formerly spake, That this happy Island where we now stood "vvas knovvn to fevv, and yet knevv most of the Nations of the World; "vvhich vve found to be true, considering they had the Languages of "*Europe*, and knevv much of our state and business; and yet vve in *Europe* "(notvvithstanding all the remote Discoveries and Navigations of this last "Age) never heard any of the least inkling or glimpse of this Island. This "vve found vvonderful strange, for that all Nations have interknovvledge "one of another, either by Voyage into Forein Parts, or by Strangers "that come to them: And though the Traveller into a Forein Countrey, "doth commonly know more by the Eye, then he that staid at home can "by relation of the Traveller; yet both ways suffice to make a mutual "knowledge in some degree on both parts: But for this Island, we never "heard tell of any Ship of theirs that had been seen to arrive upon any "shore of *Europe*, no nor of either the *East* or *VVest-Indies*, nor yet of any "Ship of any other part of the World that had made return for them. And "yet the marvel rested not in this; for the situation of it (as his Lordship "said) in the secret Conclave of such a vast Sea might cause it: But then, "that they should have knowledge of the Languages, Books, Affairs of "those that lie such a distance from them, it was a thing we could not tell "what to make of; for that it seemed to us a condition and propriety of "Divine Powers and Beings, to be hidden and unseen to others, and yet "to have others open, and as in a light to them. At this Speech the Governor gave a gracious smile, and said, "That we did well to ask pardon "for this Question we now asked, for that it imported as if we thought "this Land, a Land of Magicians, that sent forth Spirits of the Air into all "parts to bring them news, and intelligence of other Countreys. It was answered by us all, in all possible humbleness, but yet with a countenance taking knowledge, that we knew, that he spake it but merrily, "That we "were apt enough to think, there was somewhat supernatural in this "Island, but yet rather as Angelical then Magical. But to let his Lord- "ship know truly what it was that made us tender and doubtful to ask this

"Question,

" Queſtion; it was not any ſuch conceit, but becauſe we remembred he " had given a touch in his former Speech, that this Land had Laws of Se- " crecy, touching Strangers. *To this he ſaid,* " You remember it right; and " therefore in that, I ſhall ſay to you, I muſt reſerve ſome particulars which " it is not lawful for me to reveal, but there will be enough left to give you " ſatisfaction.

" You ſhall underſtand (that which perhaps you will ſcarce think cre- " dible) that about Three thouſand years ago, or ſomewhat more, the Na- " vigation of the VVorld (ſpecially for remote Voyages) was greater then " at this day. Do not think with your ſelves, that I know not how much " it is increaſed with you within theſe threeſcore years, I know it well; and " yet I ſay, greater then then now. VVhether it was, that the example of " the Ark that ſaved the remnant of Men from the Univerſal Deluge, gave " men confidence to adventure upon the VVaters, or what it was, but ſuch " is the truth. The *Phœnicians*, and ſpecially the *Tyrians*, had great Fleets; " ſo had the *Carthaginians* their Colony, which is yet further VVeſt: To- " ward the Eaſt the Shipping of *Egypt* and of *Paleſtina* was likewiſe great; " *China* alſo, and the *Great Atlantis* (that you call *America*) which have now " but Junks and Canoaes, abounded then in tall Ships. This Iſland (as " appeareth by faithful Regiſters of thoſe times) had then Fifteen hundred " ſtrong Ships of great content. Of all this, there is with you ſparing memory " or none, but we have large knowledge thereof.

" At that time this Land was known, and frequented by the Ships and " Veſſels of all the Nations beforenamed, and (as it cometh to paſs) they " had many times Men of other Countreys that were no Sailers, that came " with them, as *Perſians*, *Chaldeans*, *Arabians*; ſo as almoſt all Nations of " might and fame reſorted hither, of whom we have ſome Stirps and little " Tribes with us at this day. And for our own Ships, they went ſundry " Voyages, as well to your *Streights*, which you call the *Pillars of Hercules*, " as to other parts in the *Atlantick* and *Mediterranean Seas*; as to *Peguin* (which " is the ſame with *Cambalu*) and *Quinſay* upon the *Oriental Seas*, as far as to " the Borders of the *Eaſt Tartary*.

" At the ſame time, and an Age after or more, the Inhabitants of the " *Great Atlantis* did flouriſh. For though the Narration and Deſcription " which is made by a great Man with you, of the Deſcendents of *Neptune* " planted there, and of the magnificent Temple, Palace, City, and Hill, " and the manifold ſtreams of goodly Navigable Rivers, which (as ſo many " Chains) inviroued the ſame Site and Temple, and the ſeveral degrees of " aſcent, whereby men did climb up to the ſame, as if it had been a *Scala* " *Cœli*, be all Poetical and Fabulous; yet ſo much is true That the ſaid " Countrey of *Atlantis*, as well that of *Peru* then called *Coya*, as that of " *Mexico* then named *Tyrambel*; were mighty and proud King doms in " Arms, Shipping, and Riches; ſo mighty, as at one time (or a leaſt with- " in the ſpace of ten years) they both made two great expeditions, they of " *Tyrambel* through the *Atlantick* to the *Mediterranean Sea*, and they of *Coya* " through the South-ſea upon this our Iſland. And for the former of theſe, " which was into *Europe*, the ſame Author amongſt you (as it ſeemeth) had " ſome relation from the *Egyptian Prieſt* whom he citeth, for aſſuredly ſuch " a thing there was. But whether it were the ancient *Athenians* that had " the glory of the repulſe and reſiſtance of thoſe Forces, I can ſay nothing; " but certain it is, there never came back either Ship or Man from that Voy- " age. Neither had the other Voyage of thoſe of *Coya*, upon us, had better

"fortune, if they had not met with enemies of greater clemency. For the "King of this Island (by name *Altabin*) a wise Man, and a great Warrior, "knowing well both his own strength, and that of his enemies, handled the "matter so, as he cut off their Land forces from their Ships, and entoiled "both their Navy and their Camp, with a greater power than theirs, both "by Sea and Land, and compelled them to render themselves without "striking stroke; and after they were at his mercy, contenting himself one-"ly with their Oath, that they should no more bear Arms against him, dis-"missed them all in safety. But the Divine revenge overtook not long "after those proud enterprises; for within less then the space of One hun-"dred years the *Great Atlantis* was utterly lost and destroyed, not by a great "Earthquake, as your *Man* saith, (for that whole Tract is little subject to "Earthquakes) but by a particular Deluge or Inundation, those Countreys "having at this day far greater Rivers, and far higher Mountains to pour "down Waters, than any part of the Old World. But it is true, that the "same Inundation was not deep, not past forty foot in most places from "the ground; so that although it destroyed Man and Beast generally, "yet some few wilde Inhabitants of the Wood escaped: Birds also were "saved by flying to the high Trees and Woods. For as for Men, although "they had Buildings in many places higher then the depth of the VVater; "yet that Inundation, though it were shallow, had a long continuance, "whereby they of the Vale, that were not drowned, perished for want of "food, and other things necessary. So as marvel you not at the thin Popu-"lation of *America*, nor at the Rudeness and Ignorance of the People; for "you must account your Inhabitants of *America* as a young People, "younger a thousand years at the least than the rest of the VVorld, for "that there was so much time between the Universal Flood, and their par-"ticular Inundation. For the poor remnant of Humane Seed which re-"mained in their Mountains peopled the Countrey again slowly, by little "and little: And being simple and a savage people (not like *Noah* and his "Sons, which was the chief Family of the Earth) they were not able to "leave Letters, Arts, and Civility to their Posterity. And having likewise "in their Mountainous Habitations been used (in respect of the extream "Cold of those Regions) to cloath themselves with the skins of *Tigers*, "*Bears*, and great *Hairy Goats*, that they have in those parts; when after "they came down into the Valley, and found the intolerable Heats which "are there, and knew no means of lighter Apparel, they were forced to "begin the custom of going naked, which continueth at this day; onely "they take great pride and delight in the Feathers of Birds: And this also "they took from those their Ancestors of the Mountains, who were in-"vited unto it by the infinite flight of Birds that came up to the high "Grounds, while the Waters stood below. So you see by this main "accident of time, we lost our Traffick with the *Americans*, with whom, "of all others, in regard they lay nearest to us, we had most commerce. "As for the other parts of the World, it is most manifest, that in the "Ages following (whether it were in respect of VVars, or by a Natural "revolution of time) Navigation did every where greatly decay, and "especially far voyages (the rather by the use of Gallies, and such Vessels "as could hardly brook the Ocean) were altogether left and omitted. "So then, that part of entercourse which could be from other Nations "to sail to us, you see how it hath long since ceased, except it were by "some rare accident, as this of yours. But now of the cessation of that

"other

"other part of entercourſe, which might be by our ſailing to other Nations; "I muſt yield you ſome other cauſe: For I cannot ſay (if I ſhould ſay truly) "but our ſhipping for number, ſtrength, Mariners, Pilots, and all things that "appertain to Navigation, is as great as ever; and therefore why we ſhould "ſit at home, I ſhall now give you an account by it ſelf, and it will draw nearer "to give you ſatisfaction to your principal Queſtion.

"There reigned in this Iſland about One thouſand nine hundred years "ago, a King, whoſe memory of all others we moſt adore, not ſuperſtitiouſly, "but as a Divine Inſtrument, though a Mortal Man; his name was *Salomona*; "and we eſteem him as the Law-giver of our Nation. This King had a large "heart inſcrutable for good, and was wholly bent to make his Kingdom and "People happy: He therefore taking into conſideration, how ſufficient and "ſubſtantive this Land was to maintain it ſelf without any aid (at all) of the "Foreigner, being Five thouſand ſix hundred miles in circuit, and of rare "fertility of ſoil in the greateſt part thereof; and finding alſo the ſhipping of "this Countrey might be plentifully ſet on work, both by Fiſhing, and by "Tranſportations from Port to Port, and likewiſe by ſailing unto ſome ſmall "Iſlands that are not far from us, and are under the Crown and Laws of this "State; and recalling into his memory the happy and flouriſhing eſtate "wherein this Land then was, ſo as it might be a thouſand ways altered to "the worſe, but ſcarce any one way to the better; thought nothing wanted "to his Noble and Heroical Intentions, but onely (as far as Humane fore-"ſight might reach) to give perpetuity to that which was in his time ſo happily "eſtabliſhed; therefore amongſt his other Fundamental Laws of this King-"dom, he did ordain the Interdicts and Prohibitions which we have touch-"ing entrance of ſtrangers, which at that time (though it was after the cala-"mity of *America*) was frequent, doubting novelties and commixture of "manners. It is true, the like Law againſt the admiſſion of ſtrangers, with-"out licence, is an ancient Law in the Kingdom of *China*, and yet continued "in uſe; but there it is a poor thing, and hath made them a curious, igno-"rant, fearful, fooliſh Nation. But our Law-giver made his Law of another "temper. For firſt, he hath preſerved all points of humanity, in taking or-"der and making proviſion for the relief of ſtrangers diſtreſſed, whereof you "have taſted. *At which Speech (as reaſon was) we all roſe up and bowed our ſelves.* *He went on.* "That King alſo ſtill deſiring to joyn Humanity and Policy to-"gether, and thinking it againſt Humanity to detain Strangers here againſt "their Wills, and againſt Policy, that they ſhould return and diſcover their "knowledge of this State, he took this courſe. He did ordain, that of the "Strangers that ſhould be permitted to Land, as many (at all times) might "depart as would, but as many as would ſtay, ſhould have very good con-"ditions and means to live from the State. Wherein he ſaw ſo far, that "now in ſo many Ages, ſince the Prohibition, we have memory not of one "Ship that ever returned, and but of thirteen perſons onely at ſeveral times "that choſe to return in our Bottoms. What thoſe few that returned, may "have reported abroad, I know not; but you muſt think, whatſoever they "have ſaid, could be taken where they came, but for a dream. Now for "our travelling from hence into parts abroad, our Law-giver thought fit al-"together to reſtrain it. So is it not in *China*, for the *Chineſes* ſail where they "will, or can; which ſheweth, that their Law of keeping out Strangers, is "a Law of puſillanimity and fear. But this reſtraint of ours hath one onely "exception, which is admirable, preſerving the good which cometh by "communicating with ſtrangers, and avoiding the hurt; and I will now

"open it to you. And here I shall seem a little to digress, but you will by "and by finde it pertinent. Ye shall understand (my dear Friends) that "amongst the excellent acts of that King, one above all hath the preemi- "nence: It was the erection and institution of an Order or Society which "we call *Solomons* House, the noblest Foundation (as we think) that ever "was upon the Earth, and the Lanthorn of this Kingdom. It is dedicated "to the study of the Works and creatures of *God*. Some think it beareth "the Founders name a little corrupted, as if it should be *Solomons* House; "but the Records write it as it is spoken, so as I take it to be denomi- "nate of the King of the *Hebrews*, which is famous with you, and no stranger "to us; for we have some parts of his Works which with you are lost, "namely, that *Natural History* which he wrote of all Plants, from the *Cedar* "of *Libanus* to the *Moss that groweth out of the Wall*, and of all *things that have* "*Life and Motion*. This maketh me think that our King finding himself to "symbolize in many things with that King of the *Hebrews* (which lived "many years before him) honored him with the Title of this Foundation. "And I am the rather induced to be of this opinion, for that I finde in an- "cient Records this Order or Society is sometimes called *Solomons* House, "and sometimes *The Colledge of the Six days Works*; whereby I am satisfied, "that our Excellent King had learned from the *Hebrews*, that *God* had "created the World, and all that therein is within Six days; and therefore "he instituting that House for the finding out of the true Nature of all "things (whereby God might have the more glory in the workmanship of "them, and Men the more Fruit in their use of them) did give it also that "second name. But now to come to our present purpose.

"When the King had forbidden to all his People Navigation in any "part that was not under his Crown, he made nevertheless this Ordinance, "That every twelve years there should be set forth out of this Kingdom "two Ships appointed to several Voyages; that in either of these Ships, "there should be a Mission of three of the Fellows or Brethren of *Solomons* "House, whose errand was onely to give us knowledge of the affairs and "state of those Countreys, to which they were designed, and especially of the "Sciences, Arts, Manufactures and Inventions of all the World; and withal "to bring unto us Books, Instruments, and Patterns in every kinde. That "the Ships after they had landed the Brethren should return, and that the "Brethren should stay abroad till the new Mission. The Ships are not other- "wise fraught than with store of Victuals, and good quantity of Treasure, "to remain with the Brethren for the buying of such things, and rewarding "of such persons as they should think fit. Now for me to tell you how the "vulgar sort of Mariners are contained from being discovered at Land, "and how they that must be put on shore for any time colour themselves "under the names of other Nations, and to what places these Voyages have "been designed, and what places of Rendezvous are appointed for the new "Missions, and the like circumstances of the practick, I may not do it, neither "is it much to your desire. But thus you see we maintain a Trade, not for "Gold, Silver, or Jewels, nor for Silks, nor for Spices, nor any other com- "modity of Matter, but onely for *Gods* first Creature, which was Light; to "have Light (I say) of the growth of all parts of the World. And when he had said this, he was silent, and so were we all; for indeed, we were all astonish- ed to hear so strange things so probably told. And he perceiving, that we were willing to say somewhat, but had it not ready, in great courtesie, took us off, and descended to ask us Questions of our Voyage and Fortunes; and

and in the end concluded, that we might do well to think with our selves what time of stay we would demand of the State; and bad us not to scant our selves, for he would procure such time as we desired. Whereupon we all rose up and presented our selves to skiss the skirt of his Tippet; but he would not suffer us, and so took his leave. But when it came once amongst our people, that the State used to offer conditions to strangers that would stay, we had work enough to get any of our men to look to our Ship, and to keep them from going presently to the Governor to crave conditions; but with much ado, we refrained them till we might agree what course to take.

We took our selves now for Freemen, seeing there was no danger of our utter perdition, and lived most joyfully, going abroad, and seeing what was to be seen in the City and places adjacent within our *Tedder*, and obtaining acquaintance with many of the City, not of the meanest quality, at whose hands we found such humanity, and such a freedom and desire to take strangers, as it were into their bosom, as was enough to make us forget all that was dear to us in our own Countreys, and continually we met with many things right worthy of observation and relation: As indeed, if there be a Mirror in the World, worthy to hold mens eyes, it is that Countrey. One day there were two of our company bidden to a Feast of the *Family*, as they call it; a most natural, pious and reverend custom it is, shewing that Nation to be compounded of all goodness. This is the manner of it. It is granted to any man that shall live to see thirty persons descended of his body alive together, and all above three years old, to make this Feast, which is done at the cost of the State. The *Father* of the *Family*, whom they call the *Tirsan*, two days before the Feast taketh to him three of such Friends as he liketh to chuse, and is assisted also by the Governor of the City or place where the Feast is celebrated; and all the Persons of the *Family*, of both Sexes are summoned to attend him. These two days the *Tirsan* sitteth in consultation concerning the good estate of the Family; there, if there be any Discord or Suits between any of the Family, they are compounded and appeased; there, if any of the Family be distressed or decayed, order is taken for their relief and competent means to live; there, if any be subject to vice or take ill courses, they are reproved and censured. So likewise, direction is given touching Marriages, and the courses of life which any of them should take, with divers other the like orders and advices. The Governor assisteth to the end, to put in execution by his publick Authority, the Decrees and Orders of the *Tirsan*; if they should be disobeyed, though that seldom needeth; such reverence and obedience they give to the order of Nature. The *Tirsan* doth also then ever chuse one man from amongst his Sons to live in House with him, who is called ever after the *Son of the Vine*; the reason will hereafter appear. On the Feast-day, the *Father* or *Tirsan* cometh forth after Divine Service into a large Room where the Feast is celebrated; which Room hath an Half-pace at the upper end. Against the Wall, in the middle of the Half-pace, is a Chair placed for him, with a Table and Carpet before it: Over the Chair is a State made round or oval, and it is of Ivy; an Ivy somewhat whiter then ours, like the Leaf of a Silver Asp, but more shining, for it is Green all Winter. And the State is curiously wrought with Silver and Silk of divers colours, broiding or binding in the Ivy; and is ever of the work of some of the Daughters of the Family, and veiled

over at the top with a fine Net of Silk and Silver: But the ſubſtance of it is true Ivy, whereof, after it is taken down, the Friends of the Family are deſirous to have ſome Leaf or Sprig to keep. The *Tirſan* cometh forth with all his Generation or Lineage, the Males before him, and the Females following him. And if there be a Mother, from whoſe body the whole Lineage is deſcended, there is a Traverſe placed in a Loft above on the right hand of the Chair, with a Privy Door, and a carved Window of Glaſs, leaded with Gold and Blew, where ſhe ſitteth, but is not ſeen. When the *Tirſan* is come forth, he ſitteth down in the Chair, and all the Lineage place themſelves againſt the Wall, both at his back, and upon the return of the Half-pace, in order of their years, without difference of Sex, and ſtand upon their Feet. When he is ſet, the room being always full of company, but well kept, and without diſorder, after ſome paule there cometh in from the lower end of the room a *Taratan*, (which is as much as an *Herauld*) and on either ſide of him two young Lads, whereof one carrieth a Scroul of their ſhining yellow Parchment, and the other a cluſter of Grapes of Gold, with a long foot or ſtalk: The Herauld and Children are clothed with Mantles of Sea-water-green Sattin, but the Heraulds Mantle is ſtreamed with Gold, and hath a Train. Then the Herauld, with three Courteſies, or rather Inclinations, cometh up as far as the Half pace, and there firſt taketh into his hand the Scroul. This Scoul is the Kings Charter, containing Gift of Revenue, and many Priviledges, Exemptions, and Points of Honor granted to the Father of the Family; and it is ever ſtiled and directed, *To ſuch an one, Our well-beloved Friend and Creditor*, which is a Title proper onely to this caſe: For they ſay, the King is Debtor to no Man, but for propagation of his Subjects. The Seal ſet to the Kings Charter, is the Kings Image imboſſed or moulded in Gold. And though ſuch Charters be expedited of courſe, and as of right, yet they are varied by diſcretion, according to the number and dignity of the Family. This Charter the Herauld readeth aloud; and while it is read, the *Father* or *Tirſan* ſtandeth up, ſupported by two of his Sons, ſuch as he chuſeth. Then the Herauld mounteth the Half-pace, and delivereth the Charter into his hand, and with that there is an acclamation by all that are preſent in their Language, which is thus much, *Happy are the People of* Benſalem. Then the Herauld taketh into his hand from the other Childe the cluſter of Grapes, which is of Gold, both the Stalk and the Grapes; but the Grapes are daintily enamelled: And if the Males of the Family be the greater number, the Grapes are enamelled Purple, with a little Sun ſet on the top; if the Females, then they are enamelled into a greeniſh yellow, with a Creſcent on the top. The Grapes are in number as many as there are Deſcendants of the Family. This Golden Cluſter the Herauld delivereth alſo to the *Tirſan*, who preſently delivereth it over to that Son that he had formerly choſen to be in houſe with him; who beareth it before his Father as an Enſign of Honor when he goeth in publick ever after, and is thereupon called *The Son of the Vine*. After this Ceremony ended, the *Father* or *Tirſan* retireth, and after ſome time cometh forth again to Dinner, where he ſitteth alone under the State as before; and none of his Deſcendants ſit with him; of what degree or dignity ſoever, except he hap to be of *Solomons* Houſe. He is ſerved onely by his own Children, ſuch as are Male, who perform unto him all ſervice of the Table upon the knee; and the Women onely ſtand about him, leaning againſt the Wall. The Room below his Half-pace hath

hath Tables on the ſides for the Gueſts that are bidden, who are ſerved with great and comely order; and toward the end of Dinner (which in the greateſt Feaſts with them, laſteth never above an hour and a half) there is an *Hymn* ſung, varied according to the Invention of him that compoſed it, (for they have excellent Poeſie;) but the ſubject of it is (always) the praiſes of *Adam*, and *Noah*, and *Abraham*; whereof the former two peopled the World, and the laſt was the *Father* of the *Faithful*; concluding ever with a Thankſgiving for the Nativity of our *Saviour*, in whoſe Birth the Births of all are onely Bleſſed. Dinner being done, the *Tirſan* retireth again, and having withdrawn himſelf alone into a place, where he maketh ſome private Prayers, he cometh forth the third time to give the Bleſſing, with all his Deſcendants, who ſtand about him as at the firſt. Then he calleth them forth, by one and by one, by name, as he pleaſeth, though ſeldom the order of age be inverted. The perſon that is called (the Table being before removed) kneeleth down before the Chair, and the *Father* layeth his hand upon his head, or her head, and giveth the Bleſſing in theſe words; *Son of* Benſalem (or Daughter of *Benſalem*) *thy Father ſaith it, the Man by whom thou haſt breath and life ſpeaketh the Word: The Bleſſing of the Everlaſting Father, the Prince of Peace, and the Holy Dove be upon thee, and make the days of thy Pilgrimage good and many.* This he ſaith to every of them; and that done, if there be any of his Sons of eminent Merit and Vertue, (ſo they be not above two) he calleth for them again, and ſaith, laying his arm over their ſhoulders, they ſtanding, *Sons, it is well you are born; give God the praiſe, and perſevere to the end.* And withal delivereth to either of them a Jewel, made in the figure of an Ear of Wheat, which they ever after wear in the front of their Turbant or Hat. This done, they fall to Muſick and Dances, and other Recreations after their manner for the reſt of the day. This is the full order of that Feaſt.

By that time ſix or ſeven days were ſpent, I was faln into ſtraight acquaintance with a Merchant of that City, whoſe name was *Joabin*; he was a *Jew*, and circumciſed: For they have ſome few ſtirps of *Jews* yet remaining among them, whom they leave to their own Religion; which they may the better do, becauſe they are of a far differing diſpoſition from the *Jews* in other parts. For whereas they hate the Name of CHRIST, and have a ſecret inbred rancor againſt the people, among whom they live: Theſe (contrariwiſe) give unto our SAVIOUR many high Attributes, and love the Nation of *Benſalem* extreamly. Surely this Man, of whom I ſpeak, would ever acknowledge that CHRIST was born of a Virgin, and that he was more then a Man; and he would tell how GOD made him Ruler of the Seraphims which guard his Throne; and they call him alſo the *Milken way*, and the *Eliah* of the *Meſſiah*, and many other high Names; which though they be inferior to his *Divine Majeſty*, yet they are far from the Language of other *Jews*. And for the Countrey of *Benſalem*, this Man would make no end of commending it, being deſirous, by Tradition among the *Jews* there, to have it believed, that the people thereof were of the Generations of *Abraham* by another Son, whom they call *Nachoran*; and that *Moſes* by a ſecret *Cabala* ordained the Laws of *Benſalem*, which they now uſe; and that when the *Meſſiah* ſhould come and ſit in his Throne at *Jeruſalem*, the King of *Benſalem* ſhould ſit at his Feet, whereas other Kings ſhould keep a great diſtance. But yet ſetting aſide theſe Jewiſh Dreams, the Man was a wiſe man and learned, and of great policy, and excellently ſeen in the Laws and Cuſtoms of that Nation.

Nation. Amongſt other diſcourſes, one day I told him, I was much affected with the Relation I had from ſome of the company, of their Cuſtom in holding the Feaſt of the Family, for that (me thought) I had never heard of a Solemnity wherein Nature did ſo much preſide. And becauſe Propagation of Families proceedeth from the Nuptial Copulation, I deſired to know of him what Laws and Cuſtoms they had concerning Marriage, and whether they kept Marriage well, and whether they were tied to one Wife. For that where Population is ſo much affected, and ſuch as with them it ſeemed to be, there is commonly permiſſion of Plurality of Wives. To this he ſaid, "You have reaſon for to commend "that excellent Inſtitution of the Feaſt of the Family; and indeed we "have experience, that thoſe Families that are partakers of the Bleſſings "of that Feaſt do flouriſh and proſper ever after in an extraordinary manner. But hear me now, and I will tell you what I know. You ſhall underſtand, that there is not under the Heavens, ſo chaſte a Nation as this "of *Benſalem*, nor ſo free from all pollution or foulneſs; it is the Virgin "of the World. I remember I have read in one of your *European Books* "of an holy Hermit amongſt you, that deſired to ſee the *Spirit of Fornication*, "and there appeared to him a little foul ugly *Æthiope*: But if he had "deſired to ſee the *Spirit of Chaſtity* of *Benſalem*, it would have appeared to "him in the likeneſs of a fair beautiful Cherubin; for there is nothing "amongſt Mortal Men more fair and admirable, then the chaſte Mindes "of this People. Know therefore, that with them there are no Stews, "no diſſolute Houſes, no Courteſans, nor any thing of that kinde; nay "they wonder (with deteſtation) at you in *Europe* which permit ſuch "things. They ſay you have put Marriage out of office; for Marriage "is ordained a remedy for unlawful concupiſcence, and natural concupiſcence ſeemeth as a ſpur to Marriage: But when Men have at hand "a remedy more agreeable to their corrupt will, Marriage is almoſt expulſed. And therefore, there are with you ſeen infinite Men that marry not, but chuſe rather a Libertine, and impure ſingle life, then to be "yoaked in Marriage; and many that do marry, marry late, when the "prime and ſtrength of their years is paſt; and when they do marry, "what is Marriage to them, but a very Bargain, wherein is ſought Alliance, or Portion, or Reputation, with ſome deſire (almoſt indifferent) "of iſſue, and not the faithful Nuptial Union of Man and Wife that was "firſt inſtituted? Neither is it poſſible, that thoſe that have caſt away ſo "baſely ſo much of their ſtrength, ſhould greatly eſteem Children (being of the ſame matter) as chaſt Men do. So likewiſe during Marriage, "is the caſe much amended, as it ought to be, if thoſe things were tolerated onely for neceſſity? No, but they remain ſtill as a very affront to "Marriage; the hunting of thoſe diſſolute places, or reſort to Courteſans, "are no more puniſhed in Married men, then in Batchelors: And the depraved cuſtom of change, and the delight in meretricious embracements, (where Sin is turned into Art) maketh Marriage a dull thing, and "a kinde of Impoſition or Tax. They hear you defend theſe things as "done to avoid greater evils, as Advowtries, Deflouring of Virgins, "Unnatural Luſt, and the like: But they ſay this is a prepoſterous Wiſdom; and they call it *Lots* offer, who to ſave his Gueſts from abuſing "offered his Daughters: Nay, they ſay further, that there is little gained "in this, for that the ſame Vices and Appetites do ſtill remain and abound, "Unlawful Luſt being like a Furnace, that if you ſtop the Flames altogether,

"gether, it will quench but if you give it any vent, it will rage. As fo "Maſculine Love, they have no touch of it, and yet there are not ſo faith- "ful and inviolate. Friendſhips in the World again as are there; and ſo "ſpeak generally (as I ſaid before) I have not read of any ſuch Chaſtity in "any Peopleas theirs. *And their uſual ſaying is,* That whoſoever is unchaſte, "cannot reverence himſelf. *And they ſay,* That the reverence of a Mans ſelf "is, next Religion, the chiefeſt Bridle of all Vices. And when he had ſaid this, the good *Jevv* pauſed a little. Whereupon, I far more willing to hear him ſpeak on, than to ſpeak my ſelf; yet thinking it decent, that upon his pauſe of Speech I ſhould not be altogether ſilent, ſaid onely this. "That I "would ſay to him, as the Widow of *Sarepta* ſaid to *Elias,* That he was "come to bring to memory our ſins; and that I confeſs the righteouſneſs of "*Benſalem* was greater than the righteouſneſs of *Europe.* *At vvhich Speech, he bovved his Head, and vvent on in this manner.* "They have alſo many wiſe and "excellent Laws touching Marriage; they allow no Polygamy; they have "ordained, that none do intermarry or contract until a moneth be paſt from "their firſt interview. Marriage without conſent of Parents, they do not "make void, but they mulct it in the Inheritors; for the Children of ſuch "Marriages are not admitted to inherit above a third part of their Parents "Inheritance. I have read in a Book of one of your Men, of a Feigned "Commonwealth, where the married couple are permitted before they "contract to ſee one another naked. This they diſlike, for they think it a "ſcorn to give a refuſal after ſo familiar knowledge; but becauſe of many "hidden defects in Men and Womens Bodies, they have a more civil way; "for they have near every Town, a couple of Pools (which they call "*Adam* and *Eves* Pools) where it is permitted to one of the Friends of the "Man, and another of the Friends of the Woman, to ſee them ſeverally "bath naked.

And as we were thus in Conference, there came one that ſeemed to be a Meſſenger, in a rich Hüke, that ſpake with the *Jevv*; whereupon he turned to me, and ſaid, *You vvill pardon me, for I am commanded avvay in haſte.* The next morning he came to me again, joyful, as it ſeemed, and ſaid, "There is word come to the Governor of the City, that one of the Fathers "of *Solomons* Houſe will be here this day ſeven-night; we have ſeen none of "them this dozen years. His coming is in ſtate, but the cauſe of his coming "is ſecret. I will provide you and your Fellows of a good ſtanding to ſee "his entry. I thanked him, and told him, *I was moſt glad of the nevvs.* The day being come, he made his entry. He was a Man of middle ſtature and age, comely of perſon, and had an aſpect as if he pitied men: He was cloathed in a robe of fine black Cloth, with wide Sleeves, and a Cape; his under Garment was of excellent white Linnen down to the Foot, girt with a Girdle of the ſame, and a Sindon or Tippet of the ſame about his Neck; he had Gloves that were curious, and ſet with Stone, and Shooes of Peach-coloured Velvet; his Neck was bare to the Shoulders; his Hat was like a Helmet or *Spaniſh Montera,* and his Locks curled below it decently, they were of colour brown; his Beard was cut round, and of the ſame colour with his Hair, ſomewhat lighter. He was carried in a rich Chariot without Wheels, Litter-wiſe, with two Horſes at either end, richly trapped in blew Velvet embroidered, and two Footmen on each ſide in the like attire. The Chariot was all of Cedar, gilt and adorned with Cryſtal, ſave that the fore-end had Pannels of Saphires ſet in borders of Gold, and the hinder-end the like of Emeralds of the *Peru* colour.

There

There was also a Sun of Gold, radiant upon the top in the midst; and on the top before a small Cherub of Gold, with Wings displayed. The Chariot was covered with Cloth of Gold tissued upon blew. He had before him fifty attendants, young men all, in white Sattin loose Coats, up to the mid-leg, and Stockins of white Silk, and Shooes of blew Velvet, and Hats of blew Velvet, with fine Plumes of divers colours set round like Hatbands. Next before the Chariot, went two men bare-headed, in Linnen Garments down to the Foot, girt, and Shooes of blew Velvet, who carried, the one a Crosier, the other a Pastoral Staff like a Sheep-hook, neither of them of Metal, but the Crosier of Balm-wood, the Pastoral-Staff of Cedar. Horsemen he had none, neither before, nor behinde his Chariot, as it seemeth, to avoid all tumult and trouble. Behinde his Chariot went all the Officers and Principals of the Companies of the City. He sate alone upon Cushions, of a kinde of excellent Plush, blew, and under his Foot curious Carpets of Silk of divers colours, like the *Persian*, but far finer. He held up his bare hand as he went, as blessing the People, but in silence. The Street was wonderfully well kept, so that there was never any Army had their Men stand in better battel-array, then the people stood. The Windows likewise were not crouded, but every one stood in them, as if they had been placed. When the show was past, the *Jew* said to me, "I shall not be able to attend you as I "would, in regard of some charge the City hath laid upon me for the en-"tertaining of this great Person. *Three days after the* Jew *came to me again, and said,* "Ye are happy men, for the Father of *Solomons* House taketh knowledge of "your being here, and commanded me to tell you, that he will admit all "your company to his presence, and have private conference with one of "you that ye shall chuse; and for this, hath appointed the next day after to-"morrow. And because he meaneth to give you his Blessing, he hath "appointed it in the forenoon. We came at our day and hour, and I was chosen by my fellows for the private access. We found him in a fair Chamber richly hanged, and carpeted under Foot, without any degrees to the State: He was set upon a low Throne, richly adorned, and a rich Cloth of State over his head of blew Sattin embroidered. He was alone, save that he had two Pages of Honor on either hand one, finely attired in white. His under Garments were the like, that we saw him wear in the Chariot; but instead of his Gown, he had on him a Mantle with a Cape of the same fine Black, fastned about him. When we came in, as we were taught, we bowed low at our first entrance; and when we were come near his Chair, he stood up, holding forth his hand ungloved, and in posture of Blessing; and we every one of us stooped down and kissed the hem of his Tippet. That done, the rest departed, and I remained. Then he warned the Pages forth of the Room, and caused me to sit down beside him, and spake to me thus in the *Spanish* Tongue.

GOD

"GOD Bleſs thee, my Son, I will give thee the greateſt Jewel I "have; for I will impart unto thee, for the love of God and Men, "a Relation of the true ſtate of *Solomons* Houſe. Son, to make "you know the true ſtate of *Solomons* Houſe, I will keep this order. "Firſt, I will ſet forth unto you the End of our Foundation. Secondly, "The Preparations and Inſtruments we have for our Works. Thirdly, "The ſeveral Employments and Functions whereto our Fellows are aſſign-"ed: And fourthly, The Ordinances and Rites which we obſerve.

"The End of our Foundation, is the Knowledge of Cauſes and Secret "Motions of things, and the enlarging of the Bounds of Humane Empire, "to the effecting of all things poſſible.

"The Preparations and Inſtruments, are theſe. We have large and "deep Caves of ſeveral depths; the deepeſt are ſunk Six hundred fathom, "and ſome of them are digged and made under great Hills and Mountains; "ſo that if you reckon together the depth of the Hill, and the depth of the "Cave, they are (ſome of them) above three miles deep: For we finde that "the depth of an Hill, and the depth of a Cave from the Flat, is the ſame "thing, both remote alike from the Sun and Heavens Beams, and from the "open Air. Theſe Caves we call the Lower Region, and we uſe them for "all Coagulations, Indurations, Refrigerations, and Conſervations of "Bodies. We uſe them likewiſe for the Imitation of Natural Mines, and "the producing alſo of new Artificial Metals, by Compoſitions and Mate-"rials which we uſe and lay there for many years. We uſe them alſo ſome-"times (which may ſeem ſtrange) for curing of ſome Diſeaſes, and for pro-"longation of life in ſome Hermits that chuſe to live there, well accommo-"dated of all things neceſſary, and indeed live very long; by whom alſo we "learn many things.

"We have Burials in ſeveral Earths, where we put divers Cements "as the *Chineſes* do their Porcellane; but we have them in greater variety "and ſome of them more fine. We alſo have great variety of Compoſts "and Soils for the making of the Earth fruitful.

"We have high Towers, the higheſt about half a mile in height, and "ſome of them likewiſe ſet upon high Mountains, ſo that the vantage of the "Hill with the Tower, is in the higheſt of them, three miles at leaſt. And "theſe places we call the Upper Region, accounting the Air between the "high places, and the Low as a Middle Region. We uſe theſe Towers, "according to their ſeveral heights and ſituations, for Inſolation, Refrige-"ration, Conſervation, and for the view of divers Meteors, as Winds, Rain, "Snow, Hail, and ſome of the Fiery Meteors alſo. And upon them, in ſome "places, are dwellings of Hermits, whom we viſit ſometimes, and inſtruct "what to obſerve.

"We have great Lakes, both ſalt and freſh, whereof we have uſe for "the Fiſh and Fowl. We uſe them alſo for Burials of ſome Natural Bodies; "for we finde a difference in things buried in Earth, or in Air below the Earth, "and things buried in Water. We have alſo Pools, of which ſome do ſtrain "Freſh Water out of Salt, and others by Art do turn Freſh Water into Salt. "We have alſo ſome Rocks in the midſt of the Sea, and ſome Bays upon "the Shore for ſome Works, wherein is required the Air and Vapor of the "Sea. We have likewiſe violent ſtreams and cataracts, which ſerve us for "many Motions; and likewiſe Engins for multiplying and enforcing of "Winds, to ſet alſo on going divers Motions.

We

"We have also a number of artificial Wells and Fountains, made in "imitation of the Natural Sources and Baths; as tincted upon Vitriol, Sul- "phur, Steel, Brass, Lead, Nitre, and other Minerals. And again we have "little Wells for Infusions of many things, where the Waters take the vir- "tue quicker and better then in Vessels or Basins: And amongst them we have "a Water which we call *Water of Paradise*, being by that we do to it, made "very sovereign for Health, and Prolongation of Life.

"We also great and spacious Houses, where we imitate and demon- "strate Meteors; as Snow, Hail, Rain, some Artificial Rains of Bodies, and "not of Water, Thunders, Lightnings; also Generations of Bodies in Air, "as Frogs, Flies, and divers others.

"We have also certain Chambers which we call Chambers of Health, "where we qualifie the Air, as we think good and proper for the cure of di- "vers Diseases, and preservation of Health.

"We have also fair and large Baths of several mixtures, for the cure of "Diseases, and the restoring of Mans Body from Arefaction; and other, for "the confirming of it in strength of Sinews, Vital Parts, and the very Juice "and Substance of the Body.

"We have also large and various Orchards and Gardens, wherein we "do not so much respect Beauty, as variety of ground and soyl, proper for "divers Trees and Herbs; and some very spacious, where Trees and Berries "are set, whereof we make divers kindes of Drinks, besides the Vineyards. "In these we practise likewise all conclusions of Grafting and Inoculating, as "well of Wild-trees as Fruit-trees, which produceth many effects. And we "make (by Art) in the same Orchards and Gardens, Trees and Flowers to "come earlier or later then their seasons, and to come up and bear more "speedily then by their natural course they do. We make them also (by Art) "much greater then their nature, and their Fruit greater and sweeter, and of "differing taste, smell, colour and figure from their nature; and many of them "we so order, that they become of Medicinal use.

"We have also means to make divers Plants rise, by mixtures of "Earths without Seeds, and likewise to make divers new Plants differing "from the Vulgar, and to make one Tree or Plant turn into another.

"We have also Parks and Enclosures of all sorts of Beasts and Birds; "which we use not only for view or rareness, but likewise for Dissections "and Tryals, that thereby we may take light, what may be wrought upon "the Body of Man, wherein we finde many strange effects; as continuing "life in them, though divers parts, which you account vital, be perished "and taken forth; Resuscitating of some that seem dead in appearance, "and the like. We try also all poysons and other medicines upon them, "as well of Chirurgery as Physick. By Art likewise we make them greater "or taller then their kind is, and contrariwise dwarf them, and stay their "growth: We make them more fruitful and bearing, then their kind "is, and contrariwise barren, and not generative. Also we make them "differ in colour, shape, activity, many ways. We finde means to make "commixtures and copulations of divers kinds, which have produced "many new kinds, and them not barren, as the general opinion is. We "make a number of kindes of Serpents, Worms, Flies, Fishes, of Putre- "faction; whereof some are advanced (in effect) to be perfect Creatures, "like Beasts or Birds, and have Sexes, and do propagate. Neither do we "this by chance, but we know beforehand of what matter and commixture "what kind of those Creatures will arise.

"We

" We have also particular Pools where we make tryals upon Fishes, " as we have said before of Beasts and Birds.

" We have also places for Breed and Generation of those Kinds of " Worms and Flies which are of special use, such as are with you, your " Silk-worms and Bees.

" I will not hold you long with recounting of our Brew-houses, Bake- " houses and Kitchins, where are made divers Drinks, Breads, and Meats, " rare and of special effects. Wines we have of Grapes, and Drinks of " other Juice, of Fruits, of Grains, and of Roots; and of mixtures with " Honey, Sugar, Manna, and Fruits dried and decocted; also of the Tears " or Woundings of Trees, and of the Pulp of Canes; and these Drinks are " of several Ages, some to the age or last of forty years. We have Drinks " also brewed with several Herbs, and Roots, and Spices, yea, with several " Fleshes, and White-meats; whereof some of the Drinks are such as they " are in effect Meat and Drink both; so that divers, especially in Age, do " desire to live with them with little or no Meat or Bread. And above all, we " strive to have Drinks of extream thin parts, to insinuate into the Body, " and yet without all biting, sharpness, or fretting; insomuch, as some of " them put upon the back of your hand, will, with a little stay, pass through " to the palm, and yet taste milde to the mouth. We have also Waters " which we ripen in that fashion as they become nourishing; so that they " are indeed excellent Drink, and many will use no other. Breads we have " of several Grains, Roots and Kernels, yea, and some of Flesh and Fish " dried, with divers kinds of Levenings and Seasonings; so that some do " extreamly move Appetites; some do nourish so, as divers do live of them " without any other Meat, who live very long. So for Meats, we have some " of them so beaten, and made tender and mortified, yet without all cor- " rupting, as a weak heat of the Stomach will turn them into good *Chylus*, " as well as a strong heat would meat otherwise prepared. We have some " Meats also, and Breads, and Drinks, which taken by men, enable them to " fast long after; and some other that used, make the very Flesh of Mens " Bodies sensibly more hard and tough, and their strength far greater then " otherwise it would be.

" We have Dispensatories or Shops of Medicines, wherein you may " easily think, if we have such variety of Plants and Living Creatures, more " then you have in *Europe*, (for we know what you have) the Simples, Drugs, " and Ingredients of Medicines, must likewise be in so much the greater " variety. We have them likewise of divers Ages, and long Fermenta- " tions. And for their Preparations, we have not onely all manner of ex- " quisit Distillations and Separations, and especially by gentle Heats, and " Percolations through divers Strainers, yea, and Substances; but also exact " Forms of Composition, whereby they incorporate almost as they were " Natural Simples.

" We have also divers Mechanical Arts, which you have not, and " Stuffs made by them; as Papers, Linnen, Silks, Tissues, dainty works of " Feathers of wonderful lustre, excellent Dies, and many others; and Shops " likewise as well for such as are not brought into vulgar use amongst us, " as for those that are. For you must know, that of the things before re- " cited, many are grown into use throughout the Kingdom; but yet, if " they did flow from our Invention, we have of them also for Patterns and " Principals.

"VVe have also Furnaces of great diversities, and that keep great di-
"versity of heats, fierce and quick strong and constant, soft and milde,
"blown, quiet, dry, moist, and the like. But above all we have heats, in
"imitation of the Suns and Heavenly Bodies heats, that pass divers Inequa-
"lities, and (as it were) Orbs, Progresses and Returns, whereby we may
"produce admirable effects Besides, we have heats of Dungs, and of Bel-
"lies and Maws of Living Creatures, and of their Bloods and Bodies; and
"of Hays and Herbs laid up moist; of Lime unquenched, and such like.
"Instruments also which generate heat onely by motion; and further, places
"for strong Insolations; and again, places under the Earth, which by Na-
"ture or Art yield Heat. These divers heats we use, as the nature of the ope-
"ration which we intend, requireth.

"VVe have also Perspective Houses where we make Demonstration
"of all Lights and Radiations, and of all Colours; and out of things un-
"coloured and transparent, we can represent unto you all several colours,
"not in Rainbows (as it is in Gems and Prisms) but of themselves single.
"VVe represent also all Multiplications of Light, which we carry to great
"distance, and make so sharp as to discern small Points and Lines; also all
"colourations of Light, all delusions and deceits of the Sight, in Figures,
"Magnitudes, Motions, Colours; all demonstrations of Shadows. VVe
"finde also divers means yet unknown to you of producing of Light origi
"nally from divers Bodies. VVe procure means of seeing objects afar off,
"as in the Heaven, and remote places; and represent things near as afar off,
"and things afar off as near, making feigned distances. VVe have also helps
"for the Sight, far above Spectacles and Glasses in use. VVe have also
"Glasses and Means to see small and minute Bodies perfectly and distinctly,
"as the shapes and colours of small Flies and VVorms, grains and flaws in
"Gems, which cannot otherwise be seen, observations in Urine and Blood,
"not otherwise to be seen. VVe make Artificial Rainbows, Halo's, and
"Circles about Light. VVe represent also all manner of Reflexions, Re-
"fractions, and Multiplication of Visual Beams of Objects.

"VVe have also Precious Stones of all kindes, many of them of great
"beauty, and to you unknown; Crystals likewise, and Glasses of divers
"kindes, and amongst them some of Metals vitrificated, and other Materi-
"als, beside those of which you make Glass: Also a number of Fossiles
"and imperfect Minerals, which you have not; likewise Loadstones of pro-
"digious virtue, and other rare Stones, both Natural and Artificial.

"VVe have also Sound-houses, where we practise and demonstrate all
"Sounds and their Generation. We have Harmonies which you have not,
"of Quarter-sounds, and lesser Slides of Sounds; divers Instruments of
"Musick likewise to you unknown, some sweeter then any you have, with
"Bells and Rings that are dainty and sweet. We represent small Sounds as
"great and deep, likewise great Sounds extenuate and sharp. We make
"divers tremblings and warblings of Sounds, which in their original are
"entire. We represent and imitate all articulate Sounds and Letters, and
"the Voices and Notes of Beasts and Birds. VVe have certain helps, which
"set to the Ear, do further the hearing greatly. We have also divers strange
"and artificial Echo's reflecting the voice many times, and as it were toss-
"ing it; and some that give back the voice louder then it came, some shriller,
"and some deeper, yea, some rendring the voice differing in the Letters or
"articulate Sound from that they receive. We have all means to convey
"Sounds in Trunks and Pipes in strange lines and distances.

"We

" We have also Perfume-houses, wherewith we joyn also practices of " Taste; we multiply Smells, which may seem strange; we imitate Smells, " making all Smells to breath out of other mixtures then those that give them. " We make divers imitations of Taste likewise, so that they will deceive any " Mans taste. And in this House we contain also a Confi.ure-house; where " we make all Sweet-meats, dry and moist, and divers pleasant Wines, Milks, " Broths, and Sallets, far in greater variety then you have.

" We have also Engine-houses, where are prepared Ergines and Instru- " ments for all sorts of motions. There we imitate and practise to make " swifter motions then any you have, either out of your Muskets or any En- " gine that you have; and to make them, and multiply them more easily, and " with small force, by wheels and other means; and to make them stronger " and more violent then yours are, exceeding your greatest Cannons and " Basilisks. We represent also Ordnance and Instruments of War, and En- " gines of all kindes; and likewise new mixtures and compositions of Gun- " powder, Wildefires burning in Water and unquenchable; also Fireworks " of all variety, both for pleasure and use. We imitate also flights of Birds; " we have some degrees of flying in the Air; we have Ships and Boats for " going under Water, and brooking of Seas; also Swimming-girdles and " Supporters. We have divers curious Clocks, and other like motions of " Return, and some perpetual motions. We imitate also motions of Living " Creatures by Images of Men, Beasts, Birds, Fishes, and Serpents; we have " also a great number of other various motions, strange for quality, fineness " and subtilty.

" We have also a Mathematical-house, where are represented all Instru- " ments, as well of Geometry as Astronomy, exquisitely made.

" We have also Houses of Deceits of the Senses, where we represent " all manner of feats of Jugling, false Apparitions, Impostures and Illusions, " and their Fallacies. And surely, you will easily believe that we that have so " many things truly Natural, which induce admiration, could in a world of " particulars deceive the Senses, if we would disguise those things, and labor " to make them more miraculous: But we do hate all Impostures and Lies " insomuch, as we have severely forbidden it to all our Fellows, under pain " of Ignominy and Fines, that they do not shew any natural work or thing, " adorned or swelling, but onely pure as it is, and without all affectation of " strangeness.

" These are (my Son) the riches of *Solomons* House.

" For the several employments and offices of our Fellows; we have " twelve that sail into Foreign Countreys under the names of other Nations, " (for our own we conceal) who bring us the Books, and Abstracts, and Pat- " terns of Experiments of all other Parts. These we call *Merchants of* " *Light.*

" We have three that collect the Experiments, which are in all Books. " These we call *Depredators.*

" We have three that collect the Experiments of all Mechanical Arts, " and also of Liberal Sciences, and also of Practices which are not brought " into Arts. These we call *Mystery-men.*

" We have three that try new Experiments, such as themselves think " good. These we call *Pioneers* or *Miners.*

" We have three that draw the Experiments of the former four into " Titles and Tables, to give the better light for the drawing of Observations " and Axioms out of them. These we call *Compilers.*

"We have three that bend themselves, looking into the Experiments "of their Fellows, and cast about how to draw out of them things of use "and practice for Mans life and knowledge, as well for Works, as for plain "demonstration of Causes, means of Natural Divinations, and the easie "and clear discovery of the Virtues and Parts of Bodies. These we call "Dowry-men or Benefactors.

"Then after divers Meetings and Consults of our whole number, to "consider of the former Labors and Collections, we have three that take "care out of them to direct new Experiments of a higher Light, more pene-"trating into Nature then the former. These we call Lamps.

"We have three others that do execute the Experiment so directed, "and report them. These we call Inoculators.

"Lastly, We have three that raise the former Discoveries by Experi-"ments into greater Observations, Axioms, and Aphorisms. These we call "Interpreters of Nature.

"We have also, as you must think, Novices and Apprentices, that "the succession of the former employed Men do not fail; besides a great "number of Servants and Attendants, Men and Women. And this we do "also, We have Consultations which of the Inventions and Experiences, "which we have discovered shall be published, and which not; and take all "an Oath of Secrecy for the concealing of those which we think meet to keep "secret; though some of those we do reveal sometime to the State, and "some not.

"For our Ordinances and Rites; we have two very long and fair Gal-"leries. In one of these we place Patterns and Samples of all manner of the "more rare and excellent Inventions; in the other we place the Statues of "all principal Inventors. There we have the Statue of your *Columbus*, that "discovered the *West-Indies*, also the Inventor of Ships; your Monk that "was the Inventor of Ordnance, and of Gun-powder; the Inventor of "Musick; the Inventor of Letters; the Inventor of Printing; the Inventor "of Observations of Astronomy; the Inventor of Works in Metal; the "Inventor of Glass; the Inventor of Silk of the Worm; the Inventor of "Wine; the Inventor of Corn and Bread; the Inventor of Sugars: And "all these by more certain Tradition, then you have. Then we have divers "Inventors of our own of excellent Works, which since you have not seen, "it were too long to make Descriptions of them; and besides, in the right "understanding of those Descriptions, you might easily err. For upon every "Invention of value we erect a Statue to the Inventor, and give him a libe-"ral and honorable reward. These Statues are some of Brass, some of Marble "and Touch-stone, some of Cedar, and other special Woods gilt and adorn-"ed, some of Iron, some of Silver, some of Gold.

"We have certain Hymns and Services which we say daily, of *Laud* and "and *Thanks* to God for his marvellous Works; and Forms of Prayers, im-"ploring his aid and blessing for the Illumination of our Labors, and the "turning them into good and holy uses.

"Lastly, We have Circuits or Visits of divers principal Cities of the "Kingdom, where, as it cometh to pass, we do publish such new profitable "Inventions, as we think good. And we do also declare Natural Divinati-"ons of Diseases, Plagues, Swarms of hurtful Creatures, Scarcity, Tempest, "Earth quakes, great Inundations, Comets, Temperature of the Year, and "divers other things; and we give counsel thereupon, what the People shall "do for the prevention and remedy of them.

"And

And when he had ſaid this, he ſtood up: And I, as I had been taught, kneeled down, and he laid his right hand upon my head, and ſaid, *God bleſs thee, my Son, and God bleſs this Relation which I have made: I give thee leave to publiſh it for the good of other Nations, for we here are in Gods Boſome, a Land unknown.* And ſo he left me, having aſſigned a value of about Two thouſand Ducats for a Bounty to me, and my Fellows; for they give great largeſſes where they come upon all occaſions.

The reſt was not perfected.

Magnalia Naturæ præcipue quoad usus Humanos.

The
- Prolongation of Life.
- Restitution of Youth in some degree.
- Retardation of Age.
- Curing of Diseases, counted Incurable.
- Mitigation of Pain.

More easie and less loathsome Purgings.

The
- increasing of Strength and Activity.
- increasing of Ability, to suffer Torture or Pain.
- altering of Complexions, and Fatness, and Leanness.
- altering of Statures.
- altering of Features.
- increasing and exalting of the Intellectual Parts.

Version of Bodies into other Bodies.

Making of new Species.

Transplanting of one Species into another.

Instruments of Destruction, as of War and Poyson.

Exhilaration of the Spirits, and putting them in good disposition.

Force of the Imagination, either upon another Body, or upon the Body it self.

Acceleration of
- Time in Maturations.
- Time in Clarifications.
- Putrefaction.
- Decoction.
- Germination.

Making rich Composts for the Earth.

Im-

Impreſsions of the Air, and raiſing of Tempeſts.
Great alteration, as in Induration, Emollition, &c.
Turning Crude and Watry Subſtances into Oyly and Unctuous Subſtances.
Drawing of new Foods out of Subſtances not now in uſe.
Making new Threds for Apparel, and new Stuffs, ſuch as are Paper, Glaſs, &c.
Natural Divinations.
Deceptions of the Senſes.
Greater Pleaſures of the Senſes.
Artificial Minerals and Cements.

FINIS.

NATURAL HISTORY.

Century I.

1. Experiments in Conſort, touching the *Straining and Paſſing of Bodies one thorow another; which they call* Percolation.

DIg a Pit upon the Sea-ſhore, ſomewhat above the High-water Mark, and ſink it as deep as the Low-water Mark; And as the Tide cometh in, it will fill with Water, Freſh and Potable. This is commonly practiſed upon the Coaſt of *Barbary*, where other Freſh Water is wanting. And *Cæſar* knew this well, when he was beſieged in *Alexandria*; for by digging of Pits in the Sea-ſhore, he did fruſtrate the laborious Works of the Enemies, which had turned the Sea-water upon the Wells of *Alexandria*, and ſo ſaved his Army, being then in Deſperation. But *Cæſar* miſtook the cauſe; for he thought that all Sea-ſands had Natural Springs of Freſh-water. But it is plain, that it is the Sea-water, becauſe the Pit filleth according to the Meaſure of the Tide: And the Sea-water paſſing or ſtraining through the Sands, leaveth the Saltneſs.

2. I remember to have read, that Tryal hath been made of Salt-water paſſed through Earth; through ten Veſſels, one within another, and yet it hath not loſt his Saltneſs, as to become potable: But the ſame Man ſaith, that (by the relation of another) Salt-water drained through twenty Veſſels, hath become freſh. This Experiment ſeemeth to croſs that other of Pits, made by the Sea-ſide; and yet but in part, if it be true, that twenty Repetitions do the effect. But it is worth the note, how poor the Imitations of Nature are, in common courſe of Experiments, except they be led by great Judgment, and ſome good Light of *Axioms*. For firſt, there is no ſmall difference between a Paſſage of Water through twenty ſmall Veſſels, and through ſuch a diſtance, as between the Low-water and High-water Mark. Secondly, there is a great difference between Earth and Sand; for all Earth hath in it a kinde of Nitrous Salt, from which, Sand is more free: And beſides, Earth doth not ſtrain the Water ſo finely as Sand doth. But there is a third point, that I ſuſpect as much, or more than the other two; and that is, that in the Experiment of *Tranſmiſſion* of the Sea-water into the Pits, the Water riſeth; but in the Experiment of *Tranſmiſſion* of the Water, through the Veſſels, it falleth: Now certain it is, that the Salter part of Water (once

salted throughout) goeth to the bottom. And therefore no marvel if the draining of Water by descent, doth make it fresh: Besides; I do somewhat doubt, that the very dashing of the Water that cometh from the Sea, is more proper to strike off the salt part, than where the Water slideth of her own motion.

3. It seemeth *Percolation* or *Transmission* (which is commonly called *Straining*) is a good kinde of *Separation*, not onely of thick from thin, and gross from fine, but of more subtile Natures; and varieth according to the Body, through which the *Transmission* is made. As if through a Woollen-bag, the liquor leaveth the fatness; if through Sand, the saltness, &c. They speak of severing Wine from Water, passing it through Ivy-wood, or through other the like porous body, but *Non constat.*

4. The Gum of Trees (which we see to be commonly shining and clear) is but a fine passage, or straining of the Juice of the Tree, through the Wood and Bark. And in like manner, *Cornish Diamonds*, and *Rock Rubies*, (which are yet more resplendent than Gums) are the fine Exudations of Stone.

5. *Aristotle* giveth the cause vainly, Why the *Feathers* of Birds are of more lively colours than the Hairs of Beasts; for no Beast hath any fine Azure, or Carnation, or Green Hair. He saith it is, because Birds are more in the Beams of the Sun than Beasts, but that is manifestly untrue; for Cattle are more in the Sun than Birds, that live commonly in the Woods, or in some Covert. The true cause is, that the excrementitious moisture of living Creatures, which maketh as well the Feathers in Birds as the Hair in Beasts, passeth in Birds through a finer and more delicate Strainer, than it doth in Beasts: For Feathers pass through Quills, and Hair through Skin.

6. The *Clarifying* of *Liquors* by Adhesion, is an inward *Percolation*, and is effected, when some cleaving Body is mixed and agitated with the *Liquors*; whereby the grosser part of the Liquor sticks to that cleaving Body; and so the finer parts are freed from the grosser. So the *Apothecaries* clarifie their Syrups by Whites of Eggs, beaten with the Juices which they would clarifie; which whites of Eggs, gather all the dregs and grosser parts of the Juice to them; and after the Syrup being set on the fire, the whites of Eggs themselves harden, and are taken forth. So *Ippocras* is clarified by mixing with Milk, and stirring it about, and then passing it through a Woollen-bag, which they call *Hippocrates Sleeve*; and the cleaving Nature of the Milk, draweth the Powder of the Spices, and grosser parts of the Liquor to it, and in the passage they stick upon the Woollen-bag.

7. The clarifying of Water, is an experiment tending to Health, besides the pleasure of the Eye, when Water is Crystaline. It is effected by casting in, and placing Pebbles at the head of a Current, that the Water may strain through them.

8. It may be *Percolation* doth not onely cause clearness and splendor, but sweetness of savor; for that also followeth, as well as clearness, when the finer parts are severed from the grosser. So it is found, that the sweats of men that have much heat, and exercise much, and have clean Bodies and fine Skins, do smell sweet, as was said of *Alexander*; and we see commonly, that Gums have sweet odors.

9. Experiments in Consort, touching *Motion of Bodies upon their Pressure.*

TAke a Glass, and put Water into it, and wet your finger, and draw it round about the lip of the Glass, pressing it somewhat hard; and after you have drawn it some few times about, it will make the Water frisk and

and ſprinkle up in a fine Dew. This inſtance doth excellently demonſtrate the force of *Compreſſion* in a ſolid Body. For whenſoever a ſolid Body (as Wood, Stone, Metal, &c.) is preſſed, there is an inward tumult in the parts thereof, ſeeking to deliver themſelves from the Compreſſion: And this is the cauſe of all *Violent Motion*. Wherein it is ſtrange in the higheſt degree, that this Motion hath never been obſerved, nor enquired; it being of all Motions, the moſt common, and the chief root of all *Mechanical Operations*. This Motion worketh in round at firſt, by way of Proof and Search, which way to deliver it ſelf, and then worketh in Progreſs, where it findeth the deliverance eaſieſt. In *Liquors* this Motion is viſible; for all Liquors ſtrucken, make round circles, and withal daſh, but in *Solids* (which break not) it is ſo ſubtile, as it is inviſible; but nevertheleſs bewrayeth it ſelf by many effects, as in this inſtance whereof we ſpeak. For the *Preſſure* of the *Finger* furthered by the wetting (becauſe it ſticketh ſo much the better unto the Lip of the Glaſs) after ſome continuance, putteth all the ſmall parts of the Glaſs into work, that they ſtrike the Water ſharply; from which *Percuſſion*, that ſprinkling cometh.

10. If you ſtrike or pierce a *Solid Body* that is brittle, as Glaſs or Sugar, it breaketh not onely where the immediate force is, but breaketh all about into ſhivers and fitters; the Motion upon the Preſſure ſearching all ways, and breaking where it findeth the Body weakeſt.

11. The Powder in Shot being dilated into ſuch a Flame, as endureth not Compreſſion, moveth likewiſe in round (the Flame being in the nature of a *Liquid Body*) ſometimes recoyling, ſometimes breaking the Peece, but generally diſcharging the Bullet, becauſe there it findeth eaſieſt deliverance.

12. This Motion upon Preſſure, and the Reciprocal thereof, which is Motion upon Tenſure; we uſe to call (by one common name) *Motion of Liberty*; which is, when any Body being forced to a *Preternatural* Extent or Dimenſion, delivereth and reſtoreth it ſelf to the natural: As when a blown Bladder (preſſed) riſeth again; or when *Leather* or *Cloth* tentured, ſpring back. Theſe two Motions (of which there be infinite inſtances) we ſhall handle in due place.

13. This Motion upon *Preſſure* is excellently alſo demonſtrated in *Sounds*: As when one chimeth upon a Bell, it ſoundeth; but as ſoon as he layeth his hand upon it, the *Sound* ceaſeth: And ſo, the ſound of a *Virginal String*, as ſoon as the Quill of the Jack falleth from it, ſtoppeth. For theſe ſounds are produced by the ſubtile Percuſſion of the Minute parts of the Bell or String upon the Air; All one, as the *Water* is cauſed to leap by the ſubtile Percuſſion of the Minute parts of the Glaſs upon the *Water*, whereof we ſpake a little before in the *Ninth Experiment*. For you muſt not take it to be the local ſhaking of the Bell or String that doth it. As we ſhall fully declare when we come hereafter to handle *Sounds*.

14. Experiments in Conſort, touching *Separations of Bodies by weight*.

TAke a *Glaſs* with a *Belly*, and a long *Neb*, fill the *Belly* (in part) with *Water*: Take alſo another *Glaſs*, whereinto put *Claret Wine* and *Water* mingled. Reverſe the firſt Glaſs, with the Belly upwards, ſtopping the Neb with your Finger; then dip the mouth of it within the ſecond Glaſs, and remove your Finger. Continue it in that poſture for a time, and it will unmingle the Wine from the Water; the Wine aſcending and ſetling in the top of the upper Glaſs, and the Water deſcending and ſetling in the bottom of the lower Glaſs. The paſſage is apparent to the Eye; for

you shall see the Wine, as it were, in a small vein, rising through the Water. For handsomness sake (because the working requireth some small time) it were good you hang the upper *Glass* upon a Nail. But as soon as there is gathered so much pure and unmixed Water in the bottom of the lower *Glass*, as that the Mouth of the upper *Glass* dippeth into it, the Motion ceaseth.

15. Let the upper *Glass* be Wine, and the lower Water; there followeth no Motion at all. Let the upper *Glass* be Water pure, the lower Water coloured, or contrariwise there followeth no Motion at all. But it hath been tryed, that though the mixture of Wine and Water, in the lower *Glass*, be three parts Water, and but one Wine; yet it doth not dead the Motion. This separation of Water and Wine appeareth to be made by weight; for it must be of *Bodies* of unequal weight, or else it worketh not; and the heavier *Body* must ever be in the upper *Glass*. But then note withal, that the water being made pensible, and there being a great weight of Water in the Belly of the *Glass*, sustained by a small Pillar of Water in the neck of the *Glass*; it is that which setteth the Motion on work: For Water and Wine in one *Glass*, with long standing, will hardly sever.

16. This *Experiment* would be extended from mixtures of several *Liquors* to *Simple Bodies*, which consist of several similiar parts: Try it therefore with *Broyn* or *Salt-water* and *Fresh-water*, placing the *Salt-water* (which is the heavier) in the upper *Glass*, and see whether the fresh will come above. Try it also with Water thick Sugred, and pure Water; and see whether the Water which cometh above, will lose his sweetness: For which purpose, it were good there were a little Cock made in the Belly of the upper *Glass*.

17. Experiments in Consort, touching *Iudicious* and *Accurate Infusions*, both in *Liquors*, and *Air*.

IN *Bodies* containing *fine Spirits*, which do easily dissipate when you make *Infusions*; the Rule is, A short stay of the *Body* in the *Liquor* receiveth the Spirit, and a longer stay confoundeth it; because it draweth forth the Earthy part withal, which embaseth the finer. And therefore it is an Error in *Physitians*, to rest simply upon the length of stay for encreasing the vertue. But if you will have the *Infusion* strong, in those kinde of *Bodies*, which have *fine Spirits*, your way is not to give longer time, but to repeat the *Infusion* of the *Body* oftner. Take *Violets*, and infuse a good Pugil of them in a Quart of Vinegar, let them stay three quarters of an hour, and take them forth, and refresh the *Infusion* with like quantity of new *Violets* seven times, and it will make a *Vinegar* so fresh of the *Flower*, as if a Twelvemoneth after it be brought you in a Saucer, you shall smell it before it come at you. Note, that it smelleth more perfectly of the Flower a good while after, then at first.

18. This Rule which we have given, is of singular use for the preparations of *Medicines*, and other *Infusions*. As for example, the Leaf of *Burrage* hath an excellent Spirit, to repress the fuliginous vapor of Dusky Melancholy, and so to cure Madness: But nevertheless, if the Leaf be infused long, it yeildeth forth but a raw substance of no vertue: Therefore I suppose, that if in the Must of Wine or Wort of Beer, while it worketh before it be Tunned, the *Burrage* stay a small time, and be often changed with fresh, it will make a soveraign Drink for *Melancholy Passions*. And the like I conceive of *Orange Flowers*.

19. *Rubarb* hath manifestly in it Parts of contrary Operations: Parts that purge, and parts that binde the *Body*; and the first lay looser, and the latter lay deeper:

deeper; So that if you infuſe *Rubarb* for an hour, and cruſh it well, it will purge better, and binde the Body leſs after the purging, than if it ſtood Twenty four hours: This is tried, but I conceive likewiſe, that by repeating the Infuſion of *Rubarb*, ſeveral times (as was ſaid of Violets) letting each ſtay in but a ſmall time, you may make it as ſtrong a Purging Medicine, as *Scammony*. And it is not a ſmall thing won in *Phyſick*, if you can make *Rubarb*, and other Medicines that are *Benedict*, as ſtrong Purgers, as thoſe that are not without ſome malignity.

20. *Purging Medicines*, for the moſt part, have their *Purgative Vertue* in a fine Spirit, as appeareth by that they indure not boiling, without much loſs of vertue. And therefore it is of good uſe in *Phyſick*, if you can retain the Purging of Vertue, and take away the unpleaſant taſte of the Purger; which it is like you may do, by this courſe of infuſing oft with little ſtay. For it is probable, that the horrible and odious taſte is in the groſſer part.

21. Generally, the working by *Infuſions* is groſs and blind, except you firſt try the iſſuing of the ſeveral parts of the Body, which of them iſſue more ſpeedily, and which more ſlowly; and ſo by apportioning the time, can take and leave that quality which you deſire. This to know, there be two ways; the one to try what long ſtay, and what ſhort ſtay worketh, as hath been ſaid; the other to try, in order, the ſucceeding *Infuſions*, of one and the ſame Body, ſucceſſively, in ſeveral Liquors. As for example, Take *Orange-Pills*, or *Roſemary*, or *Cinnamon*, or what you will; and let them infuſe half an hour in Water; then take them out, and infuſe them again in other Water; and ſo the third time; and then taſte and conſider the firſt Water, the ſecond, and the third, and you will finde them differing, not onely in ſtrength and weakneſs, but otherwiſe in taſte, or odor; for it may be the firſt Water will have more of the ſent, as more fragrant; and the ſecond more of the taſte, as more bitter or biting, &c.

22. *Infuſions* in *Air* (for ſo we may call *Odors*) have the ſame diverſities with *Infuſions* in *Water*; in that the ſeveral Odors (which are in one Flower, or other Body) iſſue at ſeveral times, ſome earlier, ſome later: So we finde, that *Violets*, *Woodbines*, *Strawberries*, yield a pleaſing ſent, that cometh forth firſt; but ſoon after an ill ſent quite differing from the former. Which is cauſed not ſo much by mellowing, as by the late iſſuing of the groſſer Spirit.

23. As we may deſire to extract the fineſt Spirits in ſome caſes; ſo we may deſire alſo to diſcharge them (as hurtful) in ſome other. So Wine burnt, by reaſon of the evaporating of the finer Spirit, inflameth leſs, and is beſt in Agues: *Opium* leeſeth ſome of his poyſonous quality, if it be vapored out, mingled with Spirit of Wine, or the like: *Sean* leeſeth ſomewhat of his windineſs by decocting; and (generally) ſubtile or windy Spirits are taken off by Incenſion, or Evaporation. And even in Infuſions in things that are of too high a ſpirit, you were better pour off the firſt Infuſion, after a ſmall time, and uſe the latter.

24. Experiment Solitary, touching the *Appetite* of *Continuation* in *Liquids*.

BUbbles are in the form of an Hemiſphere; *Air* within, and a little Skin of Water without: And it ſeemeth ſomewhat ſtrange, that the *Air* ſhould riſe ſo ſwiftly, while it is in the Water; and when it cometh to the top, ſhould be ſtaid by ſo weak a cover, as that of the Bubble is. But as for the ſwift aſcent of the *Air*, while it is under the Water, that is a motion of Percuſſion from the Water, which it ſelf deſcending, driveth up the *Air*; and no motion of *Levity* in the *Air*. And this *Democritus*

called *Motus Plagæ*. In this common *Experiment*, the cause of the enclosure of the *Bubble* is for that the Appetite to resist Separation, or Discontinuance (which in solid *Bodies* is strong) is also in *Liquors*, though fainter and weaker: As we see in this of the *Bubble*; we see it also in little Glasses of Spittle that Children make of Rushes; and in Castles of Bubbles, which they make by blowing into *Water*, having obtained a little degree of Tenacity by Mixture of Soap: We see it also in the *Stillicides* of *Water*, which, if there be *Water* enough to follow, will draw themselves into a small Thred, because they will discontinue; but if there be no remedy, then they cast themselves into round Drops; which is the Figure, that saveth the Body most from Discontinuance: The same reason is of the Roundness of the *Bubble*, as well for the Skin of *Water*, as for the *Air* within: For the *Air* likewise avoideth *Discontinuance*; and therefore casteth it self into a round Figure. And for the stop and arrest of the *Air* a little while, it sheweth, that the *Air* of it self hath little, or no Appetite of Ascending.

25. Experiment Solitary, touching the making of *Artificial Springs*.

THe Rejection, which I continually use, of *Experiments* (though it appeareth not) is infinite; but yet if an *Experiment* be probable in the Work, and of great use, I receive it, but deliver it as doubtful. It was reported by a sober man, that an *Artificial Spring* may be made thus: Finde out a hanging Ground, where there is a good quick Fall of Rain-water. Lay a Half-Trough of Stone, of a good length, three or four foot deep within the same Ground; with one end upon the high Ground, the other upon the low. Cover the Trough with Brakes a good thickness, and cast Sand upon the top of the Brakes: You shall see (saith he) that after some showres are past, the lower end of the Trough will be like a *Spring* of *Water*; which is no marvel, if it hold, while the Rain-water lasteth; but he said it would continue long time after the Rain is past: As if the Water did multiply it self upon the Air, by the help of the Coldness and Condensation of the Earth, and the Consort of the first Water.

26. Experiment Solitary, touching the *Venomous quality of Mans Flesh*.

THe *French* (which put off the name of the *French Disease*, unto the name of the Disease of *Naples*) do report, That at the siege of *Naples*, there were certain wicked Merchants that barrelled up *Mans Flesh* (of some that had been lately slain in *Barbary*) and sold it for *Tunney*; and that, upon that foul and high Nourishment, was the Original of that *Disease*. Which may well be; For that it is certain, that the *Canibals*, in the *VVest-Indies*, eat *Mans Flesh*; and the *VVest-Indies* were full of the Pox when they were first discovered: And at this day the *Mortalest poysons*, practised by the *VVest-Indians*, have some mixture of the Blood, or Fat, or Flesh of Man. And divers Witches, and Sorceresses, as well amongst the *Heathen*, as amongst the *Christians*, have fed upon Mans flesh, to aid (as it seemeth) their Imagination, with high and foul Vapors.

27. Experiment Solitary, touching the *Version* and *Transmutation* of *Air* into *Water*.

IT seemeth that there be these ways (in likelihood) of *Version* of *Vapors* or *Air*, into Water and Moisture. The first is *Cold*, which doth manifestly Condense; as we see in the contracting of the *Air* in the Weather-Glass; whereby it is a degree nearer to Water. We see it also in the *Generation of Springs*, which the *Ancients* thought (very probably) to be made by the *Version* of *Air* into *VVater*, holpen by the *Rest*, which the *Air* hath in those parts, whereby it cannot dissipate. And by the coldness of *Rocks*; for

there

there *Springs* are chiefly generated. We see it also in the Effects of the *Cold* of the *Middle Region* (as they call it) of the *Air*; which produceth *Dews* and *Rains*. And the Experiment of turning Water into Ice, by Snow, Nitre, and Salt (whereof we shall speak hereafter) would be transferred to the turning of Air into Water. The second way is by *Compression*; as in *Stillatories*, where the Vapor is turned back, upon it self, by the Encounter of the Sides of the *Stillatory*; and in the *Dew* upon the Covers of *Boiling Pots*; and in the *Dew* towards *Rain*, upon *Marble*, and *Wainscot*. But this is like to do no great effect; except it be upon Vapors, and gross *Air*, that are already very near in Degree to Water. The third is that, which may be searched into, but doth not yet appear; which is, by Mingling of moist Vapors with Air; and trying if they will not bring a Return of more Water, than the Water was at first: For if so, That Increase is a *Version* of the Air: Therefore put VVater into the bottom of a *Stillatory*, with the Neb stopped; weigh the VVater first; hang in the Middle of the *Stillatory* a large Spunge; and see what quantity of VVater you can crush out of it; and what it is, more, or less, compared with the VVater spent; for you must understand, that if any Version can be wrought, it will be easily done in small Pores: And that is the reason why we prescribe a *Spunge*. The fourth way is probable also, though not appearing; which is, by receiving the *Air* into the small *Pores of Bodies*; For (as hath been said) every thing in small quantity is more easie for *Version*; and Tangible Bodies have no pleasure in the consort of Air, but endeavor to subact it into a more *Dense Body*: But in *Entire Bodies* it is checked; because, if the *Air* should Condense, there is nothing to succeed: Therefore it must be in loose Bodies, as Sand, and Powder, which we see, if they lie close, of themselves gather Moisture.

28. Experiment Solitary, touching the *Helps* towards the *Beauty* and *good Features* of *Persons*.

IT is reported by some of the *Ancients*, That Whelps, or other Creatures, if they be put young into such a Cage, or Box, as they cannot rise to their Stature, but may increase in breadth or length, will grow accordingly, as they can get room; which, if it be true, and feasible, and that the young Creature so pressed, and streightned, doth not thereupon die; it is a means to produce *Dwarf Creatures*, and in a very strange Figure. This is certain, and noted long since, That the Pressure, or Forming of Parts of Creatures, when they are very young, doth alter the shape not a little: As the stroaking of the Heads of Infants, between the Hands, was noted of old, to make *Macrocephali*; which shape of the Head, at that time, was esteemed. And the raising gently of the Bridge of the Nose, doth prevent the Deformity of a Saddle Nose. Which observation well weighed, may teach a means, to make the Persons of Men and Women, in many kindes, more comely and better featured, than otherwise they would be; by the Forming and Shaping of them in their Infancy: As by Stroaking up the Calves of the Legs, to keep them from falling down too low; and by Stroaking up the Forehead, to keep them from being low Foreheaded. And it is a common practice to swathe Infants, that they may grow more straight, and better shaped; and we see young Women, by wearing straight Bodies, keep themselves from being Gross and Corpulent.

29. Experiments Solitary, touching the *Condensing* of *Air* in such sort as it may put on *Weight*, and yield *Nourishment*.

ONions, as they hang, will many of them shoot forth; and so will *Pennyroyal*; and so will an Herb called *Orpin*; with which they use, in the Countrey, to trim their Houses, binding it to a Lath, or Stick, and setting it against a Wall. VVe see it likewise, more especially, in the greater *Semper-*

Semper-vive, which will put out Branches, two or three years: But it is true, that commonly they wrap the Root in a cloth besmeared with Oyl; and renew it once in a half year. The like is reported by some of the Ancients of the stalks of *Lillies*. The cause is, for that these *Plants* have a strong dense, and succulent moisture, which is not apt to exhale; and so is able, from the old store, without drawing help from the Earth, to suffice the sprouting of the *Plant*: And this sprouting is chiefly in the late Spring, or early Summer; which are the times of putting forth. We see also, that stumps of Trees, lying out of the Ground, will put forth Sprouts for a time. But it is a noble tryal, and of very great consequence, to try whether these things, in the sprouting, do encrease weight; which must be tryed, by weighing them before they be hanged up; and afterwards again, when they are sprouted. For if they increase not in weight, then it is no more but this, That what they send forth in the sprout, they leese in some other part; but if they gather weight, then it is *Magnale Naturæ*: For it sheweth, that *Air* may be made so to be condensed, as to be converted into a dense Body; whereas the race and period of all things, here above the Earth, is to extenuate and turn things to be more pneumatical, and rare; and not to be retrograde, from pneumatical to that which is dense. It sheweth also, that *Air* can nourish; which is another great matter of consequence. Note, that to try this, the Experiment of the *Semper-vive*, must be made without oyling the cloth; for else, it may be, the Plant receiveth nourishment from the Oyl.

30. Experiment Solitary, touching the *Commixture* of *Flame* and *Air*, and the great force thereof.

Flame and *Air* do not mingle, except it be in an instant; or in the *Vital Spirits* of vegetables, and living Creatures. In *Gunpowder*, the force of it hath been ascribed to rarefaction of the earthly substance into *Flame*. And thus far it is true; and then (forsooth) it is become another Element; the form whereof occupieth more place; and so, of Necessity, followeth a Dilatation: And therefore, lest two Bodies should be in one place, there must needs also follow an Expulsion of the Pellet, or blowing up of the Mine. But these are crude and ignorant speculations: For *Flame*, if there were nothing else, except it were in a very great quantity, will be suffocate with any hard body, such as a Pellet is, or the Barrel of a Gun; so as the *flame* would not expel the hard *body*, but the hard *body* would kill the *flame*, and not suffer it to kindle, or spred. But the cause of this so potent a motion is the *Nitre* (which we call otherwise *Salt-Peter*) which having in it a notable crude and windy Spirit, first by the heat of the *Fire* suddenly dilateth it self; (and we know that simple Air, being preternaturally attenuated by heat, will make it self room, and break, and blow up that which resisteth it.) And secondly, when the *Nitre* hath dilated it self, it bloweth abroad the *flame* as an inward Bellows. And therefore we see that *Brimstone*, *Pitch*, *Camphire*, *Wildfire*, and divers other inflamable matters; though they burn cruelly, and are hard to quench, yet they make no such fiery wind, as *Gunpowder* doth: And on the other side, we see that *Quick-silver* (which is a most crude and watry Body) heated, and pent in, hath the like force with *Gunpowder*. As for living Creatures, it is certain, their *Vital Spirits* are a substance compounded of an airy and flamy matter; and though Air and Flame, being free, will not well mingle; yet bound in by a Body that hath some fixing, they will. For that you may best see in those two Bodies (which are their Aliments) *Water* and *Oyl*; for they likewise will not well mingle of themselves, but in the Bodies of Plants, and

and *Living Creatures*, they will. It is no marvel therefore, that a ſmall *Quantity of Spirits*, in the Cells of the Brain, and Cannals of the Sinews, are able to move a whole *Body* (which is of ſo great maſs) both with ſo great force, as in Wreſtling, Leaping; and with ſo great ſwiftneſs, as in playing Diviſion upon the *Lute*: Such is the force of theſe two *Natures*, *Air* and *Flame* when they incorporate.

31. Experiment Solitary, touching the *Secret Nature of Flame.*

TAke a ſmall *Wax-Candle*, and put it in a Socket of Braſs or Iron, then ſet it upright in a Porringer full of Spirit of Wine, heated; then ſet both the Candle, and Spirit of Wine on fire, and you ſhall ſee the flame of the Candle open it ſelf, and become four or five times bigger then otherwiſe it would have been, and appear in figure *Globular*, and not in *Pyramis*. You ſhall ſee alſo, that the inward flame of the Candle keepeth colour, and doth not wax any whit blew towards the colour of the outward flame of the Spirit of Wine. This is a noble inſtance, wherein two things are moſt remarkable; the one, that one flame within another quencheth not, but is a fixed *Body*, and continueth as *Air* or *Water* do; and therefore flame would ſtill aſcend upwards in one greatneſs, if it were not quenched on the ſides; and the greater the flame is at the bottom, the higher is the riſe. The other, that Flame doth not mingle with Flame, as Air doth with Air, or Water with Water, but onely remaineth contiguous; as it cometh to paſs betwixt *Conſiſting Bodies*. It appeareth alſo, that the form of a *Pyramis* in Flame, which we uſually ſee, is meerly by accident, and that the Air about, by quenching the ſides of the Flame, cruſheth it, and extenuateth it into that form; for of it ſelf, it would be round: And therefore Smoak is in the figure of a *Pyramis* reverſed; for the Air quencheth the Flame, and receiveth the Smoak. Note alſo, that the flame of the Candle, within the flame of the Spirit of Wine, is troubled; and doth not onely open and move upwards, but moveth waving, and to and fro: As if Flame of his own Nature (if it were not quenched) would roul and turn as well as move upwards. By all which it ſhould ſeem, that the *Celeſtial Bodies* (moſt of them) are true Fires or Flames, as the *Stoicks* held; more fine (perhaps) and rarified, than our flame is. For they are all *Globular* and *Determate*, they have *Rotation*, and they have the colour and ſplendor of Flame: So that Flame above, is durable and conſiſtent, and in his natural place; but with us, it is a ſtranger, and momentany and impure, like *Vulcan* that halted with his fall.

32. Experiment Solitary, touching the *Different force of Flame in the midſt, and on the ſides.*

TAke an *Arrow*, and hold it in Flame for the ſpace of ten Pulſes; and when it cometh forth, you ſhall finde thoſe parts of the Arrow which were one the outſides of the Flame, more burned, blacked, and turned almoſt into a Coal; whereas that in the midſt of the flame, will be as if the fire had ſcarce touched it. This is an inſtance of great conſequence for the diſcovery of the nature of Flame, and ſheweth manifeſtly, that Flame burneth more violently towards the ſides, then in the midſt: And, which is more, that *Heat* or *Fire* is not violent or furious, but where it is checked and pent. And therefore the *Peripateticks* (howſoever their opinion of an *Element of Fire*, above the *Air*, is juſtly exploded) in that point they acquit themſelves well: For being oppoſed, that if there were a ſphere of Fire, that incompaſſed the Earth ſo near hand, it were impoſſible, but all things ſhould be burnt up; they anſwer, that the pure *Elemental Fire*, in his own place, and not irritate, is but of a moderate heat.

It

33. Experiment Solitary, touching the *Decrease of the Natural Motion of Gravity in great distance from the Earth; or within some depth of the Earth.*

IT is affirmed constantly by many, as an usual Experiment, That a lump of *Vre*, in the bottom of a Mine, will be tumbled and stirred by two Mens strength; which if you bring it to the top of the Earth, will ask six Mens strength at the least to stir it. It is a noble instance, and is fit to be tryed to the full: For it is very probable, that the *Motion of Gravity* worketh weakly, both far from the Earth, and also within the Earth: The former, because the appetite of Union of Dense Bodies with the Earth, in respect of the distance is more dull. The latter, because the Body hath in part attained his nature, when it is some depth in the Earth. For as for the moving to a point or place (which was the opinion of the *Antients*) it is a meer vanity.

34. Experiment Solitary, touching the *Contraction of bodies in bulk, by the mixture of the more Liquid Body, with the more Solid.*

IT is strange, how the *Antients* took up *Experiments* upon credit, and yet did build great Matters upon them. The observation of some of the best of them, delivered confidently, is, That a Vessel filled with *Ashes*, will receive the like quantity of Water, that it would have done if it had been empty. But this is utterly untrue, for the Water will not go in by a fifth part; and I suppose, that that fifth part is the difference of the lying close, or open of the Ashes; as we see, that Ashes alone, if they be hard pressed, will lie in less room; and so the Ashes with Air between, lie looser, and with Water closer. For I have not yet found certainly, that the Water it self by mixture of Ashes or Dust, will shrink or draw into less room.

35. Experiment Solitary, touching the *Making Vines more fruitful.*

IT is reported of credit, That if you lay good store of *Kernels of Grapes*, about the *Root of a Vine*, it will make the Vine come earlier, and prosper better. It may be tried with other *Kernels*, laid about the *Root* of a *Plant* of the same kinde; as *Figs*, *Kernels of Apples*, *&c.* The cause may be, for that the Kernels draw out of the Earth Juice fit to nourish the Tree, as those that would be Trees of themselves, though there were no Root; but the Root being of greater strength, robbeth and devoureth the nourishment, when they have drawn it; as great Fishes devour little.

36. Experiments in Consort, touching *Purging Medicines.*

THe operation of *Purging Medicines*, and the causes thereof, have been thought to be a great Secret; and so according to the slothful manner of Men, it is referred to a *Hidden Propriety*, a *Specifical Vertue*, and a *Fourth Quality*, and the like shifts of Ignorance. The Causes of Purging, are divers, All plain and perspicuous, and throughly maintained by experience. The first is, That whatsoever cannot be overcome and digested by the Stomack, is by the Stomack, either put up by *Vomit*, or put down to the *Guts*; and by that Motion of Expulsion in the Stomack and Guts, other Parts of the Body (as the *Orifices* of the Veins, and the like) are moved to expel by Consent: For nothing is more frequent then *Motion of Consent* in the *Body of Man*. This Surcharge of the Stomack, is caused either by the Quality of the Medicine, or by the Quantity. The Qualities are three, *Extream Bitter*, as in *Aloes*, *Coloquintida*, *&c.* *Loathsome*, and of horrible taste, as in *Agarik*, *Black Hellebore*, *&c.* And of *secret Malignity*, and disagreement towards *Mans Body*, many times not appearing much in the taste, as in *Scammony*, *Machoacham*, *Antimony*, *&c.* And note well, that if there be any *Medicine* that *Purgeth*, and hath neither of the first two *Manifest Qualities*, is to be held suspected as a kinde of Poyson; For that it worketh either by *Corrosion*, or by a *secret Malignity*, and *Enmity to Nature*; and therefore such Medicines are warily to be prepared and used. The quantity of that which is taken, doth also cause Purging, as we see in a great quantity of new Milk from the Cow, yea, and a great quantity of Meat: For

Surfeits

Surfeits many times turn to *Purges*, both upwards and downwards. Therefore we see generally, that the working of *Purging Medicines* cometh two or three hours after the *Medicines* taken: For that the *Stomack* first maketh a proof, whether it can concoct them. And the like happeneth after *Surfeits*, or Milk in too great quantity.

37. A second cause is *Mordication* of the *Orifices* of the Parts, especially of the *Mesentery Veins*; as it is seen, that Salt, or any such thing that is sharp and biting, put into the Fundament, doth provoke the part to expel, and *Mustard* provoketh sneezing; and any sharp thing to the eyes provoketh tears. And therefore we see, that almost all *Purgers* have a kinde of twitching and vellication, besides the griping which cometh of wind. And if this *Mordication* be in an over-high degree, it is little better than the *Corosion of Poyson*; and it cometh to pass sometimes in *Antimony*, especially if it be given to Bodies not repleat with humors; for where humors abound, the humors save the parts.

38. The third cause is *Attraction*: For I do not deny, but that *Purging Medicines* have in them a direct force of *Attraction*; as Drawing-Plaisters have in *Surgery*: And we see *Sage*, or *Bittony* bruised, *Sneezing-powder*, and other *Powders* or *Liquors* (which the *Physitians* call *Errhines*) put into the Nose, draw Flegm and Water from the Head; and so it is in *Apophlegmatisms* and *Gargarisms* that draw the Rheume down by the Palat. And by this vertue, no doubt, some *Purgers* draw more one humor, and some another, according to the opinion received: As *Rubarb* draweth Choler, *Sean* Melancholy, *Agarack* Flegm, &c. but yet (more or less) they draw promiscuously. And note also, that besides Sympathy between the *Purger* and the *Humor*, there is also another cause, why some *Medicines* draw some humor more than another; and it is, for that some *Medicines* work quicker than others; and they that draw quick, draw onely the lighter, and more fluid humors; they that draw slow, work upon the more tough, and viscuous humors. And therefore, men must beware how they take *Rubarb*, and the like, alone, familiarly; for it taketh onely the lightest part of the humor away, and leaveth the Mass of Humors more obstinate. And the like may be said of *Worm-wood*, which is so much magnified.

39. The fourth cause is *Flatuosity*: For wind stirred, moveth to expel; and we finde that (in effect) all *Purgers* have in them a raw *Spirit* or *Wind*, which is the principal cause of *Tortion* in the Stomack and Belly. And therefore *Purgers* leese (most of them) the virtue, by decoction upon the fire; and for that cause are chiefly given in Infusion, Juyce, or Powder.

40. The fifth cause is *Compression* or *Crushing*: As when Water is crushed out of a Spunge: So we see that taking cold moveth loosness by contraction of the Skin, and outward parts; and so doth Cold likewise cause Rheums and Defluctions from the Head, and some *Astringent Plaisters* crush out purulent Matter. This kinde of operation is not found in many *Medicines*: *Mirabolanes* have it, and it may be the *Barks* of *Peaches*; for this vertue requireth an *Astriction*, but such an *Astriction*, as is not grateful to the Body (for a pleasing *Astriction* doth rather binde in the humors, than expel them:) And therefore such *Astriction* is found in things of an harrish taste.

41. The sixth cause is *Lubrefaction* and *Relaxation*: As we see in *Medicines Emollient*, such as are *Milk*, *Honey*, *Mallows*, *Lettuce*, *Mercurial*, *Pellitory of the Wall*, and others. There is also a secret vertue of *Relaxation of Cold*; for the heat of the Body bindeth the Parts and Humors together, which

Cold

Cold, relaxeth: As it is seen in *Urine*, *Blood*, *Pottage*, or the like; which, if they be cold, break and dissolve. And by this kinde of *Relaxation*, Fear looseneth the Belly; because the heat retiring inwards towards the Heart, the Guts, and other parts are relaxed; in the same manner as Fear also causeth trembling in the Sinews. And of this kinde of Purgers are some *Medicines* made of *Mercury*.

42. The seventh cause is *Abstersion*, which is plainly a *scouring off*, or *Incision* of the more *viscuous humors*, and making the *humors* more fluid, and cutting between them, and the part; as is found in *Nitrous Water*, which scoureth Linnen-Cloth (speedily) from the foulness. But this *Incision* must be by a *Sharpness*, without *Astriction*; which we finde in *Salt*, *Wormwood*, *Oxymel*, and the like.

43. There be *Medicines* that move *Stools*, and not *Urine*; some other *Urine*, and not *Stools*. Those that *Purge by Stool*, are such as enter not at all, or little into the *Mesentery Veins*; but either at the first, are not digestible by the Stomack, and therefore move immediately downwards to the Guts; or else are afterwards rejected by the *Mesentery Veins*, and so turn likewise downwards to the Guts; and of these two kindes, are most Purgers. But those that move *Urine*, are such as are well digested of the Stomack, and well received also of the *Mesentery Veins*; so they come as far as the Liver, which sendeth *Urine* to the *Bladder*, as the *Whey of Blood*: And those *Medicines*, being opening and piercing, do fortifie the operation of the *Liver*, in sending down the Wheyey part of the Blood to the *Reins*. For *Medicines Urinative* do not work by rejection and indigestion, as *Solutive* do.

44. There be divers *Medicines*, which in greater quantity move Stool, and in smaller, Urine; and so contrariwise, some that in greater quantity move Urine, and in smaller Stool. Of the former sort is *Rubarb*, and some others. The cause is, for that *Rubarb* is a *Medicine*, which the Stomack in a small quantity doth digest, and overcome (being not Flatuous nor Loathsome,) and so sendeth it to the *Mesentery Veins*; and so being opening, it helpeth down Urine: But in a greater quantity, the Stomack cannot overcome it, and so it goeth to the Guts. *Pepper*, by some of the *Ancients*, is noted to be of the second sort; which being in small quantity, moveth wind in the Stomack or Guts, and so expelled by Stool; but being in greater quantity, dissipateth the wind, and it self getteth to the *Mesentery Veins*, and so to the Liver and Reins; where, by Heating and Opening, it sendeth down Urine more plentifully.

45. Experiments in Consort, touching *Meats and Drinks that are most nourishing.*

WE have spoken of *Evacuating* of the *Body*, we will now speak something of the filling of it by *Restoratives* in *Consumptions* and *Emaciating Diseases*. In Vetegables, there is one part that is more nourishing than another; as *Grains* and *Roots* nourish more than the *Leaves*, insomuch as the Order of the *Foliatans* was put down by the *Pope*, as finding Leaves unable to nourish Mans Body. Whether there be that difference in the Flesh of Living Creatures, is not well enquired; as whether *Livers*, and other *Entrails*, be not more nourishing than the outward Flesh. We finde that amongst the *Romans*, a *Gooses* Liver was a great delicacy; insomuch, as they had artificial means to make it fair, and great; but whether it were more nourishing, appeareth not. It is certain, that *Marrow* is more nourishing than *Fat*. And I conceive, that some decoction of *Bones* and *Sinews*, stamped and well strained, would be a very nourishing Broth: We finde also, that *Scotch Skinck* (which is a Pottage of strong nourishment) is made

made with the Knees and Sinews of Beef, but long boiled: *Jelly* alſo, which they uſe for a Reſtorative, is chiefly made of Knuckles of Veal. The Pulp, that is within the Crafiſh or Crab, which they ſpice and butter, is more nouriſhing then the fleſh of the Crab, or Crafiſh. The Yolks of Eggs are clearly more nouriſhing than the Whites. So that it ſhould ſeem, that the parts of *Living Creatures* that lie more inwards, nouriſh more than the outward fleſh; except it be the Brain, which the Spirits prey too much upon, to leave it any great vertue of nouriſhing. It ſeemeth for the nouriſhing of aged Men, or Men in Conſumptions, ſome ſuch thing ſhould be deviſed, as ſhould be half *Chylus*, before it be put into the ſtomach.

Take two large Capons, perboil them upon a ſoft fire, by the ſpace of an hour or more, till in effect all the Blood be gone. Add in the decoction the Pill of a Sweet-Lemmon, or a good part of the Pill of a Citron, and a little Mace. Cut off the Shanks, and throw them away; then with a good ſtrong Chopping-knife, mince the two Capons, Bones and all, as ſmall as ordinary minced Meat; put them into a large neat Boulter, then take a Kilderkin, ſweet, and well-ſeaſoned, of four Gallons of Beer of Eight ſhillings ſtrength, new as it cometh from the Tunning; make in the Kilderkin a great Bung-hole of purpoſe, then thruſt into it, the Boulter (in which the Capons are) drawn out in length; let it ſteep in it three days and three nights, the Bung-hole open to work, then cloſe the Bung hole, and ſo let it continue a day and a half, then draw it into Bottles, and you may drink it well after three days Bottling, and it will laſt ſix weeks (approved). It drinketh freſh, flowreth, and mantleth exceedingly, it drinketh not newiſh at all, it is an excellent drink for a Conſumption to be drunk either alone, or carded with ſome other Beer. It quencheth thirſt, and hath no whit of windineſs. Note, that it is not poſſible, that Meat and Bread, either in Broths, or taken with Drink, as is uſed, ſhould get forth into the Veins, and outward Parts, ſo finely, and eaſily, as when it is thus incorporate, and made almoſt a *Chylus* aforehand. 46.

Tryal would be made of the like Brew with *Potado-Roots*, or *Bur-Roots*, or the Pith of *Artichoaks*, which are nouriſhing Meats: It may be tryed alſo, with other fleſh; as *Pheſant*, *Patridge*, *Young Pork*, *Pig*, *Veniſon*, eſpecially of *Young Deer*, *&c.* 47.

A *Mortreſs* made with the *Brawn* of *Capons*, ſtamped, and ſtrained, and mingled (after it is made) with like quantity, at the leaſt, of *Almond Butter*; is an excellent Meat to nouriſh thoſe that are weak, better than Black-Manger or Jelly: And ſo is the *Cullice* of *Cocks*, boiled thick with the like mixture of Almond Butter: For the Mortreſs or Cullice of it ſelf, is more ſavory and ſtrong, and not ſo fit for nouriſhing of weak Bodies, but the Almonds that are not of ſo high a taſte as fleſh, do excellently qualifie it. 48.

Indian Maiz hath (of certain) an excellent Spirit of Nouriſhment, but it muſt be throughly boiled, and made into a Maiz-Cream like a Barley-Cream. I judge the ſame of Rice, made into a Cream; for Rice is in Turky, and other Countreys of the Eaſt, moſt fed upon, but it muſt be throughly boiled in reſpect of the hardneſs of it; and alſo, becauſe otherwiſe it bindeth the Body too much. 49.

Piſtachoes, ſo they be good and not muſty, joyned with Almonds in Almond Milk, or made into a Milk of themſelves, like unto Almond Milk, but more green, are an excellent nouriſher. But you ſhall do well, to add a little Ginger ſcraped, becauſe they are not without ſome ſubtil windineſs. 50.

51. *Milk* warm from the *Cow*, is found to be a great nouriſher, and a good remedy in Conſumptions: But then you muſt put into it, when you Milk the Cow, two little Bags; the one of *Powder of Mint*, the other of *Powder of Red Roſes*; for they keep the Milk ſomewhat from turning, or crudling in the Stomack; and put in Sugar alſo for the ſame cauſe, and partly for the taſtes ſake: But you muſt drink a good draught, that it may ſtay leſs time in the Stomack, leſt it cruddle: And let the Cup, into which you milk the Cow, be ſet in a greater Cup of hot Water, that you may take it warm. And *Cow-milk* thus prepared, I judge to be better for a Conſumption, than *Aſs-milk*, which (it is true) turneth not ſo eaſily, but it is a little harſh: Marry it is more proper for ſharpneſs of Urine, and Exulceration of the Bladder, and all manner of Lenifyings. *Womens-milk* likewiſe is preſcribed, when all fail; but I commend it not, as being a little too near the Juyce of Mans Body, to be a good nouriſher; except it be in Infants, to whom it is natural.

52. *Oyl of ſweet Almonds* newly drawn, with Sugar and a little Spice, ſpred upon Bread toſted, is an excellent nouriſher; but then to keep the Oyl from frying in the Stomack, you muſt drink a good draught of Milde-Beer after it; and to keep it from relaxing the Stomack too much, you muſt put in a little *Powder of Cinnamon*.

53. The *Yolks of Eggs* are of themſelves ſo well prepared by *Nature* for nouriſhment, as (ſo they be Potched, or Rear boyled) they need no other preparation or mixture; yet they may be taken alſo raw, when they are new laid, with *Malmſey* or *Sweet Wine*. You ſhall do well to put in ſome few ſlices of *Eringium Roots*, and a little *Amber-greece*: For by this means, beſides the immediate faculty of nouriſhment, ſuch drink will ſtrengthen the Back, ſo that it will not draw down the Urine too faſt. For too much Urine doth always hinder nouriſhment.

54. *Mincing of Meat*, as in *Pies*, and *Buttered minced Meat*, ſaveth the grinding of the Teeth; and therefore (no doubt) it is more nouriſhing, eſpecially in Age, or to them that have weak Teeth; but the Butter is not ſo proper for weak Bodies, and therefore it were good to moiſten it with a little Claret Wine, Pill of *Lemmon* or *Orenge* cut ſmall, Sugar, and a very little Cinnamon, or Nutmeg. As for *Chuets*, which are likewiſe Minced-meat; inſtead of Butter, and Fat, it were good to moiſten them, partly with Cream, or Almond, or Piſtachomilk, or Barley, or Maiz Cream; adding a little Coriander-ſeed, and Carraway-ſeed, and a very little Saffron. The more full handling of Alimentation, we reſerve to the due place.

We have hitherto handled the Particulars, which yield beſt, and eaſieſt, and plentifulleſt, Nourishment; and now we will ſpeak of the beſt Means of conveying, and converting the Nourishment.

55. The firſt Means is to procure, that the Nouriſhment may not be robbed and drawn away; wherein that which we have already ſaid, is very material, to provide, that the Reins draw not too ſtrongly an over-great part of the Blood into Urine. To this add that Precept of *Ariſtotle*, That Wine be forborn in all Conſumptions; for that the Spirits of the Wine do prey upon the Roſcide Juyce of the Body, and inter-common with the Spirits of the Body, and ſo deceive and rob them of their Nouriſhment. And therefore if the Conſumption, growing from the weakneſs of the Stomack, do force you to uſe Wine; let it always be burnt, that the quicker Spirits may evaporate, or (at the leaſt) quenched with two little Wedges of Gold, ſix or ſeven times repeated. Add alſo this Proviſion, that there be not too much expence

of

of the nourishment, by Exhaling and Sweating: And therefore if the Patient be apt to sweat, it must be gently restrained. But chiefly *Hipocrates* Rule is to be followed, who adviseth quite contrary to that which is in use: Namely, That the Linnen or Garment next the Flesh, be in Winter dry and oft changed; and in Summer seldom changed, and smeared over with Oyl: For certain it is, that any substance that is fat, doth a little fill the Pores of the Body and stay Sweat in some degree. But the more cleanly way is to have the Linnen smeared lightly over with Oyl of sweet Almonds, and not to forbear shifting as oft as is fit.

56. The second Means is to send forth the nourishment into the parts more strongly, for which, the working must be by strengthning of the Stomack; and in this, because the Stomack is chiefly comforted by Wine and hot things, which otherwise hurt, it is good to resort to outward applications to the Stomack: Wherein it hath been tryed, that the Quilts of Roses, Spices, Mastick, Wormwood, Mint, &c. are not so helpful, as to take a Cake of New Bread, and to bedew it with a little *Sack* or *Alegant*, and to dry it, and after it be dryed a little before the Fire, to put it within a clean Napkin, and to lay it to the Stomack: For it is certain, that all Flower hath a potent Vertue of *Astriction*, insomuch, as it hardneth a piece of Flesh, or a Flower that is laid in it. And therefore a Bag quilted with Bran, is likewise very good, but it dryeth somewhat too much, and therefore it must not lie long.

57. The third Means (which may be a branch of the former) is to send forth the nourishment the better by sleep. For we see, that Bears and other Creatures that sleep in the Winter, was exceeding fat: And certain it is, (as it is commonly believed) that Sleep doth nourish much, both for that the Spirits do less spend the nourishment in Sleep, than when living Creatures are awake: And because (that which is to the present purpose) it helpeth to thrust out the nourishment into the parts. Therefore in aged-men, and weak Bodies, and such as abound not with Choler, a short sleep after dinner doth help to nourish; for in such Bodies there is no fear of an over-hasty digestion, which is the inconvenience of *Post-meridian Sleeps*. Sleep also in the morning, after the taking of somewhat of easie digestion; as Milk from the Cow, nourishing Broth, or the like, doth further nourishment: But this would be done sitting upright, that the Milk or Broth may pass the more speedily to the bottom of the Stomack.

58. The fourth Means is to provide, that the parts themselves may draw to them the nourishment strongly. There is an excellent observation of *Aristotle*, that a great reason why Plants (some of them) are of greater age than Living Creatures is, for that they yearly put forth new Leaves and Boughs; whereas Living Creatures put forth (after their period of growth) nothing that is young, but Hair and Nails, which are Excrements, and no Parts. And it is most certain, that whatsoever is young, doth draw nourishment better, than that which is old; and then (that which is the mystery of that observation) young Boughs and Leaves, calling the Sap up to them, the same nourisheth the Body in the passage. And this we see notably proved also, in that the oft cutting or polling of *Hedges*, *Trees*, and *Herbs*, doth conduce much to their lasting. Transfer therefore this observation to the helping of nourishment in Living Creatures: The Noblest and Principal Use whereof is, for the Prolongation of Life; Restauration of some degree of Youth, and Inteneration of the Parts: For certain it is, that there are in Living Creatures Parts that nourish and repair easily, and parts that

nouriſh and repair hardly; and you muſt refreſh, and renew thoſe that are eaſie to nouriſh, that the other may be refreſhed, and (as it were) drink in nouriſhment in the paſſage. Now we ſee that *Draught Oxen* put into good Paſture, recover the Fleſh of young Beef; and Men after long emaciating Diets, wax plump and fat, and almoſt new: So that you may ſurely conclude, that the frequent and wiſe uſe of thoſe emaciating Diets, and of Purgings; and perhaps of ſome kinde of Bleeding, is a principal means of prolongation of life, and reſtoring ſome degree of Youth: For as we have often ſaid, *Death* cometh upon Living Creatures like the Torment of *Mezentius*,

Mortua quinetiam jungebat corpora vivis,
Component Manibuſque Manus, atque oribus ora.

For the parts in Mans body eaſily repairable (as Spirits, Blood, and Fleſh) die in the embracement of the parts hardly repairable, as Bones, Nerves, and Membranes) and likewiſe ſome Entrails (which they reckon amongſt the Spermatical Parts) are hard to repair: Though that diviſion of Spermatical and Menſtrual Parts, be but a conceit. And this ſame obſervation alſo may be drawn to the preſent purpoſe of nouriſhing emaciated Bodies: And therefore *Gentle Frication* draweth forth the nouriſhment, by making the parts a little hungry and heating them, whereby they call forth nouriſhment the better. This *Frication* I wiſh to be done in the morning. It is alſo beſt done by the Hand, or a piece of Scarlet-Wool, wet a little with Oyl of Almonds, mingled with a ſmall quantity of Bay-Salt, or Saffron: We ſee that the very Currying of Horſes doth make them fat, and in good liking.

59. The fifth means is, to further the very act of *Aſſimilation of Nourishment*; which is done by ſome outward *emollients*, that make the parts more apt to Aſſimilate. For which I have compounded an ointment of excellent odor, which I call *Roman* ointment, *vide* the Receit. The uſe of it would be between ſleeps; for in the latter ſleep, the parts aſſimulate chiefly.

60. Experiment Solitary, touching *Filum Medicinale.*

THere be many *Medicines*, which by themſelves would do no cure, but perhaps hurt, but being applied in a certain order, one after another, do great cures. I have tried (my ſelf) a Remedy for the *Gout*, which hath ſeldom failed, but driven it away in Twenty four hours ſpace: It is firſt to apply a *Pultaſs*, of which, *vide* the Receit, and then a Bath or Fomentation, of which, *vide* the Receit, and then a Plaiſter, *vide* the Receit. The *Pultaſs* relaxed the Pores, and maketh the humor apt to exhale. The Fomentation calleth forth the Humor by Vapors; but yet in regard of the way made by the *Pultaſs*, draweth gently; and therefore draweth the Humors out, and doth not draw more to it: For it is a Gentle Fomentation, and hath withal a mixture (though very little) of ſome ſtupefactive. The Plaiſter is a moderate Aſtringent Plaiſter, which repelleth new humor from falling. The *Pultaſs* alone would make the part more ſoft and weak, and apter to take the defluxion and impreſſion of the Humor. The Fomentation alone, if it were too weak, without way made by the *Pultaſs*, would draw forth little; if too ſtrong, it would draw to the part, as well as draw from it. The Plaiſter alone would pen the Humor already contained in the part, and ſo exaſperate it, as well as forbid new Humor; therefore they muſt be all taken in order, as is ſaid: The *Pultaſs* is to be laid to for two or three hours; the Fomentation for a quarter of an hour, or ſomewhat better, being uſed hot, and ſeven or eight times repeated; the Plaiſter to continue on ſtill, till the part be well confirmed.

There

61. Experiment Solitary, touching *Cure by Custom.*

THere is a secret way of *Cure*, unpractised by *Assuetude* of that which in itself hurteth. *Poysons* have been made by some Familiar, as hath been said. *Ordinary Keepers* of the sick of the *Plague*, are seldom infected. Enduring of Tortures, by custom hath been made more easie: The brooking of enormous quantity of Meats, and so of Wine, or strong drink, hath been by custom made to be without Surfeit or Drunkenness. And generally Diseases that are Chronical, as *Coughs*, *Phthisicks*, some kinde of *Palsies*, *Lunacies*, *&c.* are most dangerous at the first: Therefore a wise *Physitian* will consider, whether a Disease be incurable, or whether the just cure of it be not full of peril; and if he finde it to be such, let him resort to *Palliation*, and alleviate the Symptom without busying himself too much with the perfect cure: And many times (if the Patient be indeed patient) that course will exceed all expectation. Likewise the Patient himself may strive, by little and little to overcome the Symptom in the Exacerbation, and so by time turn suffering into Nature.

62. Experiment Solitary, touching *Cure by Excess.*

DIvers Diseases, especially Chronical, (such as *Quartan Agues*) are sometimes cured by *Surfeit* and *Excesses*; as excess of Meat, excess of Drink, extraordinary Fasting, extraordinary stirring, or Lassitude, and the like. The cause is, for that Diseases of continuance, get an adventitious strength from Custom, besides their material cause from the Humors: So that the breaking of the Custom doth leave them onely to their first cause; which, if it be any thing weak, will fall off. Besides, such Excesses do excite and spur *Nature*, which thereupon riseth more forcibly against the Disease.

63. Experiment Solitary, touching *Cure by Motion of Consent.*

THere is in the Body of Man, a great consent in the Motion of the several parts: We see it is Childrens sport, to prove whether they can rub upon their Brest with one hand, and pat upon their Forehead with another; and straight ways they shall sometimes rub with both hands, or pat with both hands. We see, that when the Spirits that come to the Nostrils, expel a bad sent, the Stomack is ready to expel by vomit. We finde that in *Consumptions of the Lungs*, when *Nature* cannot expel by Cough, Men fall into *Fluxes* of the Belly, and then they die. So in *Pestilent Diseases*, if they cannot be expelled by *Sweat*, they fall likewise into *Looseness*, and that is commonly Mortal. Therefore *Physitians* should ingeniously contrive, how by Motions that are in their power, they may excite inward Motions that are not in their power, by consent; as by the stench of Feathers, or the like, they cure the rising of the *Mother*.

64. Experiment Solitary, touching *Cure of Diseases which are contrary to Predisposition.*

HIppocrates *Aphorism*, in *Morbis Minus*, is a good profound *Aphorism*: It importeth, that Diseases contrary to the *Complexion*, *Age*, *Sex*, Season of the year, Diet, &c. are more dangerous than those that are concurrent. A Man would think it should be otherwise; For that when the Accident of Sickness, and the Natural disposition, do second the one the other; the Disease should be more forcible. And (so no doubt) it is, if you suppose like quantity of Matter. But that which maketh good the *Aphorism*, is, because such Diseases do shew a greater collection of Matter, by that they are able to overcome those Natural inclinations to the contrary. And therefore in Diseases of that kinde, let the *Physitian* apply himself more to *Purgation*, than to *Alteration*; because the offence is in the quantity, and the qualities are rectified of themselves.

65. Experiment Solitary, touching *Preparations before Purging, and setling of the Body afterward.*

Physitians do wisely prescribe, that there be Preparatives used before Just Purgations; for certain it is, that *Purgers* do many times great hurt, if the Body be not accommodated, both before and after the Purging. The hurt that they do, for want of Preparation before Purging, is by the sticking of the Humors, and their not coming fair away; which causeth in the Body great perturbations, and ill accidents, during the Purging; and also the diminishing and dulling of the working of the Medicine it self, that it purgeth not sufficiently: Therefore the work of *Preparation* is double, to make the Humors fluide and mature, and to make the passages more open; For those both help to make the Humors pass readily: And for the former of these, *Syrups* are most profitable; and for the latter, *Apozums* or *Preparing Broths*; *Clysters* also help lest the *Medicine* stop in the Guts, and work gripingly. But it is true, that Bodies abounding with Humors, and fat Bodies, and open Weather, are *Preparatives* in themselves; because they make the Humors more fluid: But let a *Physician* beware how he purge after hard Frosty Weather, and in a lean Body, without *Preparation*. For the hurt that they may do after *Purging*, it is caused by the lodging of some Humors in ill places; for it is certain, that there be Humors which somewhere placed in the Body, are quiet, and do little hurt; in other places (especially Passages) do much mischief. Therefore it is good after Purging, to use *Apozums* and *Broths*, not so much opening as those used before Purging, but Absturstive and Mundifying Clysters also are good to conclude with, to draw away the relicks of the Humors that may have descended to the lower region of the Body.

66. Experiment Solitary, touching *Stanching of Blood.*

Blood is stanched divers ways: First, by Astringents and Repercussive *Medicines*. Secondly, by drawing of the Spirits and Blood inwards, which is done by cold; as *Iron* or a *Stone* laid to the Neck doth stanch the Bleeding of the Nose; also it hath been tried, that the *Testicles* being put into sharp Vinegar, hath made a sudden recess of the Spirits, and stanched Blood. Thirdly, by the Recess of the Blood by Sympathy; so it hath been tried, that the part that bleedeth, being thrust into the body of a Capon, Sheep, new ript and bleeding, hath stanched Blood; the Blood, as it seemeth, sucking and drawing up, by similitude of substance, the Blood it meeteth with, and so it self going back. Fourthly, by Custom and Time; so the Prince of *Aurange*, in his first hurt by the Spanish Boy, could finde no means to stanch the Blood, either by *Medicine* or *Ligament*, but was fain to have the Orifice of the Wound stopped by Mens Thumbs, succeeding one another for the space at the least of two days; and at the last the Blood by custom onely retired. There is a fifth way also in use, to let Blood in an adverse part for a Revulsion.

67. Experiment Solitary, touching *Change of Aliments and Medicines.*

IT helpeth, both in *Medicine* and *Aliment*, to change and not to continue the same *Medicine* and *Aliment* still. The cause is, for that Nature by continual use of any thing, groweth to a satiety and dulness, either of Appetite or Working. And we see that Assuetude of things hurtful, doth make them leese their force to hurt; As *Poyson*, which with use some have brought themselves to brook. And therefore it is no marvel, though things helpful by custom, leese their force to help, I count intermission almost the same thing with change; for that, that hath been intermitted, is after a sort new.

It

IT is found by Experience, that in Diets of *Guiacum*, *Sarza*, and the like, (especially, if they be strict) the *Patient* is more troubled in the beginning than after continuance; which hath made some of the more delicate sort of Patients, give them over in the midst; Supposing, that if those Diets trouble them so much at first, they shall not be able to endure them to the end. But the cause is, for that all those Diets, to dry up *Humors*, *Rheums*, and the like; and they cannot dry up until they have first attenuated: And while the *Humor* is attenuated, it is more fluid, than it was before, and troubleth the Body a great deal more, until it be dryed up, and consumed. And therefore *Patients* must expect a due time, and not check at them at the first. 68. Experiment Solitary, touching *Diets*.

THe producing of *Cold* is a thing very worthy the Inquisition, both for use and disclosure of causes. For *Heat* and *Cold* are *Natures* two hands, whereby she chiefly worketh; and *Heat* we have in readiness, in respect of the *Fire*: But for *Cold*, we must stay till it cometh, or seek it in deep Caves, or high Mountains; and when all is done, we cannot obtain it in any great degree: For Furnaces of Fire are far hotter than a Summers Sun, but Vaults or Hills are not much colder than a Winters Frost. Experiments in Consort, touching the *Production of Cold*.

The first means of producing *Cold*, is that which *Nature* presenteth us withal; namely, the expiring of *Cold* out of the inward parts of the Earth in *Winter*, when the Sun hath no power to overcome it; the Earth being (as hath been noted by some (*Primum Frigidum*.) This hath been asserted, as well by Ancient, as by Modern *Philosophers*: It was the tenet of *Parmenides* it was the opinion of the Author of the Discourse in *Plutarch*, (for I take it, that Book was not *Plutarchs* own) *De primo Frigido*. It was the opinion of *Telesius*, who hath renewed the Philosophy of *Parmenides*, and is the best of the *Novelists*. 69.

The second cause of *Cold* is, the contact of cold Bodies; for Cold is Active and Transitive into Bodies adjacent, as well as Heat; which is seen in those things that are touched with Snow or cold Water. And therefore, whosoever will be an *Enquirer* into *Nature*, let him resort to a Conservatory of Snow and Ice; such as they use of delicacy, to cool Wine in Summer: Which is a poor and contemptible use, in respect of other uses that may be made of such Conservatories. 70.

The third cause is the Primary Nature of all Tangible Bodies; for it is well to be noted, That all things whatsoever (Tangible are of themselves) Cold; except they have an accessory heat by Fire, Life, or Motion: For even the Spirit of Wine, or Chymical Oyls, which are so hot in operation, are to the first touch, Cold; and Air it self compressed, and condensed a little by blowing, is Cold. 71.

The fourth cause is, the Density of the Body; for all dense Bodies are colder than most other Bodies, as *Mettals*, *Stone*, *Glass*, and they are longer in heating than safter Bodies. And it is certain, that *Earth*, *Dense*, *Tangable*, hold all of the Nature of Cold: The cause is, for that all *Matters Tangible* being Cold, it must needs follow, that where the Matter is most congregate the Cold is the greater. 72.

The fifth cause of *Cold*, or rather of increase and vehemency of *Cold*, is A quick Spirit inclosed in a cold Body; as will appear to any that shall attentively consider of Nature in many instances. We see *Nitre* (which hath a quick Spirit) is Cold, more cold to the Tongue than a Stone; so Water 73.

is

is colder than Oyl, because it hath a quicker Spirit; for all Oyl, though it hath the tangible parts better digested than Water, yet hath it a duller Spirit: So *Snow* is colder than Water, because it hath more Spirit within it: So we see that *Salt* put to *Ice* (as in the producing of the *Artificial Ice*) encreaseth the activity of cold: So some *Insecta* which have Spirit of Life, as *Snakes* and *Silkworms*, are to the touch, Cold. So *Quick-silver* is the coldest of Metals, because it is fullest of Spirit.

74. The sixth cause of Cold is, the chasing and driving away of Spirits, such as have some degree of Heat; for the banishing of the Heat must needs leave any Body cold. This we see in the operation of *Opium*, and *Stupefactives* upon the Spirits of Living Creatures; and it were not amiss to try *Opium* by laying it upon the top of a *Weather-Glass*, to see whether it will contract the Air; but I doubt it will not succeed: For besides that, the vertue of *Opium* will hardly penetrate thorow such a body as Glass, I conceive that *Opium*, and the like, make the Spirits flie rather by Malignity, than by Cold.

75. Seventhly, the same effect must follow upon the exhaling or drawing out of the warm Spirits, that doth upon the flight of the Spirits. There is an opinion, that the Moon is Magnetical of Heat, as the Sun is of Cold and Moisture: It were not amiss therefore to try it with warm waters; the one exposed to the Beams of the Moon, the other with some skreen betwixt the Beams of the Moon and the Water: As we use to the Sun for shade, and to see whether the former will cool sooner. And it were also good to enquire, what other means there may be, to draw forth the Exile heat which is in the Air; for that may be a secret of great power to produce cold Weather.

Experiments in Consort, touching the *Version* and *Transmutation of the Air in to Water.*

WE have formerly set down the Means of turning Air into Water, in the *Experiment* 27. But because it is *Magnale Naturæ*, and tendeth to the subduing of a very great effect, and is also of manifold use: We wil adde some instances in Consort that give light thereunto.

76. It is teported by some of the Ancients, that Sailers have used every night, to hang Fleeces of Wool on the sides of their *Ships*, the Wool towards the Water; and that they have crushed fresh water out of them, in the Morning, for their use. And thus much we have tried, that a quantity of Wool tied loose together, being let down into a deep Well; and hanging in the middle, some three Fathom from the Water for a night, in the Winter time, increased in weight, (as I now remember) to a fifth Part.

77. It is reported by one of the Ancients, that in *Lydia*, near *Pergamus*, there were certain Workmen in time of Wars, fled into Caves; and the Mouth of the Caves being stopped by the Enemies, they were famished. But long time after, the dead Bodies were found, and some Vessels which they had carried with them, and the Vessels full of Water; and that Water thicker, and more towards Ice, than common Water; which is a notable instance of *Condensation* and *Induration* by *Burial under Earth* (in Caves) for long time; and of *Version* also (as it should seem) of the Air into Water; if any of those Vessels were empty. Try therefore a small Bladder hung in *Snow*, and the like in *Nitre*, and the like in Quick-silver: And if you finde the Bladders faln or shrunk, you may be sure the Air is condensed by the Cold of those Bodies, as it would be in a Cave under Earth.

It

It is reported of very good credit, that in the *East-Indies* if you ſet a Tub of Water open in a Room where *Cloves* are kept, it will be drawn dry in Twenty four hours, though it ſtand at ſome diſtant from the *Cloves*. In the Countrey, they uſe many times in deceit, when their Wooll is new ſhorn, to ſet ſome Pails of Water by in the ſame Room, to encreaſe the weight of the Wooll: But it may be, that the Heat of the Wool remaining from the Body of the Sheep, or the heat gathered by the lying cloſe of the Wool, helpeth to draw the watry vapor; but that is nothing to the Verſion. 78.

It is reported alſo credibly, that Wool new ſhorn, being laid caſually upon a Veſſel of *Verjuice*, after ſome time hath drunk up a great part of the *Verjuice*, though the Veſſel were whole without any flaw, and had not the Bung-hole open. In this inſtance there is (upon the by) to be noted, the *Percolation* or *Suing* of the *Verjuice* thorow the Wood; for *Verjuice* of it ſelf would never have paſſed through the Wood: So, as it ſeemeth, it muſt be firſt in a kinde of vapor before it paſs. 79.

It is eſpecially to be noted, that the cauſe that doth facilitate the Verſion of Air into Water, when the Air is not in groſs, but ſubtilly mingled with tangible Bodies, is, (as hath been partly touched before) for that tangible Bodies have an antipathy with Air; and if they finde any Liquid Body that is more denſe near them, they will draw it; and after they have drawn it, they will condenſe it more, and in effect incorporate it: For we ſee that a Spunge, or Wooll, or Sugar, or a Woollen-cloth, being put but in part, in Water or Wine, will draw the Liquor higher, and beyond the place, where the Water or Wine cometh. We ſee alſo, that *Wood*, *Lute-ſtrings*, and the like, do ſwell in moiſt ſeaſons; as appeareth by the breaking of the ſtrings, the hard turning of the Pegs, and the hard drawing forth of Boxes, and opening of Wainſcot doors, which is a kinde of infuſion; and is much like to an infuſion in Water, which will make VVood to ſwell; as we ſee in the filling of the Chops of Bowls by laying them in VVater. But for that part of theſe *Experiments*, which concerneth *Attraction* we will reſerve into the proper Title of *Attraction*. 80.

There is alſo a Verſion of Air into Water, ſeeing in the ſweating of *Marbles*, and other *Stones*; and of VVainſcot before, and in moiſt weather. This muſt be, either by ſome moiſture the Body yieldeth, or elſe by the moiſt Air thickned againſt the hard Body. But it is plain, that it is the latter; for that we ſee Wood painted with Oyl-colour, will ſooner gather drops in a moiſt night, than Wood alone; which is cauſed by the ſmoothneſs and cloſeneſs, which letteth in no part of the vapor, and ſo turneth it back and thickneth it into Dew. We ſee alſo, that breathing upon a Glaſs, or ſmooth Body, giveth a Dew; and in Froſty mornings (ſuch as we call *Rime Froſts*) you ſhall finde drops of Dew upon the inſide of Glaſs-windows: And the Froſt it ſelf upon the ground, is but a Verſion or Condenſation of the moiſt vapors of the night, into a watry ſubſtance: Dews likewiſe, and Rain, are but the returns of moiſt vapors condenſed; the Dew, by the cold onely of the Suns departure, which is the gentler cold; Rains, by the cold of that which they call the *Middle Region* of the Air, which is the more violent Cold. 81.

It is very probable (as hath been touched) that that which will turn Water into Ice, will likewiſe turn Air ſome degree nearer unto Water. Therefore try the *Experiment* of the Artificial turning Water into Ice (whereof we ſhall ſpeak in another place) with Air in place of Water, and the 82.

the Ice about it. And although it be a greater alteration to turn Air into Water, than Water into Ice; yet there is this hope, that by continuing the Air longer time, the effect will follow; for that artificial conversion of Water into Ice, is the work of a few hours; and this of Air may be tried by a moneths space, or the like.

Experiments in Consort, touching *Induration of Bodies.*

INduration or *Lapidification* of Substances more soft, is likewise another degree of Condensation, and is a great alteration in Nature. The effecting and accelerating thereof, is very worthy to be enquired it is effected by three means.

The first is by Cold, whose property is to condense, and constipate, as hath been said.

The second is by Heat, which is not proper but by consequence; for the heat doth attenuate, and by attenuation doth send forth the Spirit, and moister part of a Body; and upon that, the more gross of the tangible parts do contract and serve themselves together; both to avoid *Vacuum* (as they call it) and also to munite themselves against the force of the Fire, which they have suffered.

And the third is by Assimilation, when a hard Body assimilateth a soft, being contiguous to it.

The examples of *Induration* taking them promiscuously, are many: As the Generation of *Stones* within the Earth, which at the first are but Rude Earth or Clay; and so of *Minerals*, which come (no doubt) at first of Juyces Concrete, which afterward indurate: And so of *Porcellane*, which is an Artificial Cement, buried in the Earth a long time; and so the making of *Brick* and *Tile*; also the making of *Glass*, of a certain *Sand* and *Brake-Roots*, and some other matters; also the *Exudations* of *Rock Diamonds* and *Chrystal*, which harden with time; also the *Induration* of *Bead-Amber*, which at first is a soft substance, as appeareth by the *Flies* and *Spiders*, which are found in it, and many more. But we will speak of them distinctly.

83. For *Indurations* by *Cold*, there be few Trials of it; for we have no strong or intense cold here on the surface of the Earth, so near the Beams of the Sun and the Heavens, the likeliest tryal is by Snow and Ice; for as Snow and Ice, especially being holpen, and their cold activated by Nitre or Salt, will turn Water into Ice, and that in a few hours: So it may be it will turn Wood or stiff Clay into Stone in longer time. Put therefore into a Conserving Pit of Snow and Ice, (adding some quantity of Salt and Nitre) a piece of Wood, or a piece of tough Clay, and let it lie a moneth or more.

84. Another tryal is by *Metalline Waters*, which have virtual Cold in them. Put therefore Wood or Clay into *Smiths* water, or other *Metalline water*, and try whether it will not harden in some reasonable time. But I understand it of *Metalline waters*, that come by washing or quenching, and not of Strong Waters that come by dissolution; for they are too Corrosive to consolidate.

85. It is already found, that there are some Natural Spring-waters that will inlapidate Wood; so as you shall see one piece of Wood, whereof the part above the Water shall continue Wood; and the part under the Water, shall be turned into a kinde of Gravelly Stone. It is likely those Waters are of some Metalline Mixture; but there would be more particular inquiry made of them. It is certain, that an Egg was found, having lain many years in the bottom

bottom of a Moat, where the Earth had somewhat overgrown it: And this Egg was come to the hardness of a stone, and had the colours of the White and Yolk perfect; and the Shell shining in small Grains, like Sugar or Alablaster.

86. Another Experience there is of *Induration by Cold*, which is already found, which is, That *Metals* themselves are hardned by often heating, and quenching in Cold-water: For Cold ever worketh most potently upon Heat precedent.

87. For *Induration by Heat*, it must be considered, That Heat, by the exhaling of the moister parts, doth either harden the Body; as in Bricks, Tiles, &c. Or if the Heat be more fierce, maketh the grosser part of it self, run and melt; as in the making of ordinary Glass, and in the Vitrification of Earth, (as we see in the inner parts of Furnaces) and in the Vitrification of Brick, and of Metals. And in the former of these, which is the hardning by Baking, without Melting, the Heat hath these degrees: First, It Indurateth, and then maketh Fragile; and lastly, It doth Incinerate and Calcinate.

88. But if you desire to make an *Induration with Toughness*, and less *Fragility*, a middle way would be taken, which is that which *Aristotle* hath well noted, but would be throughly verified. It is, to decoct Bodies in Water for two or three days; but they must be such Bodies, into which the Water will not enter; as Stone and Metal. For if they be Bodies, into which the Water will enter, then long seething will rather soften than indurate them, as hath been tried in Eggs, &c. Therefore, softer Bodies must be put into Bottles, and the Bottles hung into Water seething, with the Mouths open above the Water, that no Water may get in: For by this Means the Virtual Heat of the Water will enter; and such a Heat, as will not make the Body adust or fragile: But the Substance of the Water will be shut out. This Experiment we made, and it sorted thus, It was tryed with a piece of Free-stone, and with Pewter, put into the Water at large; the Free-stone we found received in some Water; for it was softer and easier to scrape, than a piece of the same stone kept dry. But the Pewter, into which no Water could enter, became more white, and liker to Silver, and less flexible by much. There were also put into an Earthen Bottle, placed as before, a good pellet of Clay, a piece of Cheese, a piece of Chalk, and a piece of Free-stone. The Clay came forth almost of the hardness of Stone: The Cheese likewise very hard, and not well to be cut: The Chalk and the Free stone much harder then they were. The colour of the Clay inclined not a whit to the colour of Brick, but rather to white, as in ordinary drying by the Sun. Note, that all the former tryals were made by a boyling upon a good hot fire, renewing the Water as it consumed, with other hot Water; but the boyling was but for Twelve hours onely: And it is like, that the Experiment would have been more effectual, if the boyling had been for two or three days, as we prescribed before.

89. As touching *Assimilation* (for there is a degree of *Assimilation*, even in Inanimate Bodies) we see examples of it in some Stones, in Clay-grounds, lying near to the top of the Earth where Pebble is; in which you may manifestly see divers Pebbles gathered together, and a crust of Cement or Stone between them, as hard as the Pebbles themselves. And it were good to make a tryal of purpose, by taking Clay, and putting in it divers Pebble-stones, thick set, to see whether in continuance of time, it will not be harder than other Clay of the same lump, in which no Pebbles are set. We see also in Ruins of

of old Walls, especially towards the bottom, the Morter will become as hard as the Brick: We see also, that the Wood on the sides of Vessels of Wine, gathereth a crust of *Tartar* harder than the Wood it self; and Scales likewise grow to the Teeth, harder than the Teeth themselves.

90. Most of all, *Induration by Assimilation* appeareth in the bodies of Trees, and Living Creatures: For no nourishment that the Tree receiveth, or that the Living Creature receiveth, is so hard as Wood, Bone, or Horn, &c. but is indurated after by Assimilation.

91. Experiment Solitary, touching the *Version of Water into Air.*

THe Eye of the Understanding, is like the Eye of the Sense: For as you may see great objects through small Cranies, or Levels; so you may see great Axioms of Nature, through small and contemptible instances. The speedy depredation of Air upon watry moisture, and version of the same into Air, appeareth in nothing more visible than in the sudden discharge, or vanishing of a little Cloud of Breath, or Vapor, from Glass or the Blade of a Sword, or any such polished Body; such as doth not at all detain or imbibe the moisture: For the mistiness scattereth and breaketh up suddenly. But the like Cloud, if it were oily or fatty, will not discharge; not because it sticketh faster, but because Air preyeth upon Water, and Flame, and Fire, upon Oyl; and therefore, to take out a spot of Grease, they use a Coal upon brown Paper, because fire worketh upon Grease or Oyl, as Air doth upon Water. And we see Paper oiled, or Wood oiled, or the like, last long moist; but wet with Water, dry or putrifie sooner. The cause is, for that Air meddleth little with the moisture of oyl.

92. Experiment Solitary, touching the *Force of Union.*

THere is an admirable demonstration in the same trifling instance of the little Cloud upon Glass, or Gems, or Blades of Swords of the force of Union, even in the least quantities, and weakest Bodies, how much it conduceth to preservation of the present form, and the resisting of a new. For mark well the discharge of that Cloud, and you shall see it ever break up, first in the skirts, and last in the midst. We see likewise, that much Water draweth forth the Juyce of the Body infused, but little Water is imbibed by the Body: And this is a principal cause, why, in operation upon Bodies, for their Version or Alteration, the tryal in great quantities doth not answer the tryal in small, and so deceiveth many; for that (I say) the greater Body resisteth more any alteration of Form, and requireth far greater strength in the Active Body that should subdue it.

93. Experiment Solitary, touching the *Producing of Feathers and Hairs of divers Colours.*

WE have spoken before in the Fifth Instance, of the cause of *Orient Colours* in *Birds*; which is by the fineness of the Strainer, we will now endeavor to reduce the same Axiom to a Work. For this Writing of our *Sylva Sylvarum*, is (to speak properly) not *Natural History*, but a high kinde of *Natural Magick*. For it is not a discription onely of Nature, but a breaking of Nature, into great and strange Works. Try therefore the anointing over of Pigeons, or other Birds, when they are but in their Down, or of Whelps, cutting their Hair as short as may be, or of some other Beast; with some oyntment, that is not hurtful to the flesh, and that will harden and stick very close, and see whether it will not alter the colours of the Feathers, or Hair. It is received, that the pulling off the first Feathers of Birds clean, will make the new come forth White: And it is certain, that White is a penurious colour, and where moisture is scant. So Blew Violets, and other Flowers, if they be starved, turn pale and white.

Birds,

Birds, and Horſes, by age or ſcars, turn white; and the hoar Hairs of Men, come by the ſame reaſon. And therefore in Birds, it is very likely, that the Feathers that come firſt, will be many times of divers colours, according to the nature of the Birds; for that the skin is more porous, but when the skin is more ſhut and cloſe, the Feathers will come white. This is a good Experiment, not onely for the producing of Birds and Beaſts of ſtrange colours, but alſo, for the diſcloſure of the nature of colours themſelves; which of them require a finer poroſity, and which a groſſer.

94. Experiment Solitary, touching the *Nouriſhment of Living Creatures before they be brought forth.*

IT is a work of providence that hath been truly obſerved by ſome; that the Yolk of the Egg conduceth little to the Generation of the Bird, but onely to the nouriſhment of the ſame: For if a Chicken be opened when it is new-hatched, you ſhall finde much of the Yolk remaining. And it is needful, that Birds that are ſhaped without the Females Womb, have in the Egg, as well matter of nouriſhment, as matter of generation for the Body. For after the Egg is laid, and ſevered from the body of the Hen, it hath no more nouriſhment from the Hen, but onely a quickning heat when ſhe ſitteth. But Beaſts and Men need not the matter of nouriſhment within themſelves; becauſe they are ſhaped within the Womb of the Female, and are nouriſhed continually from her body.

95. Experiments in Conſort, touching *Sympathy and Antipathy for Medicinal uſe.*

IT is an inveterate and received opinion, That *Cantharides* applied to any part of the Body, touch the Bladder, and exulcerate it, if they ſtay on long. It is likewiſe received, that a kinde of *Stone*, which they bring out of the *Weſt-Indies*, hath a peculiar force to move Gravel, and to diſſolve the *Stone*; inſomuch, as laid but to the Wreſt, it hath ſo forcibly ſent down Gravel, as Men have been glad to remove it, it was ſo violent.

96.

It is received and confirmed by daily experience, that the Soals of the Feet, have great affinity with the Head, and the Mouth of the Stomack: As we ſee, Going wetſhod, to thoſe that uſe it not, affecteth both; Applications of hot Powders to the Feet, attenuate firſt, and after dry the Rheume. And therefore a Phyſician that would be myſtical, preſcribeth for the cure of the Rheume, That a Man ſhould walk continually upon a Camomil-Alley; meaning, that he ſhould put Camomil within his Socks. Likewiſe, Pigeons bleeding, applied to the Soals of the Feet, eaſe the Head; and Soporiferous Medicines applied unto them, provoke ſleep.

97.

It ſeemeth, that as the Feet have a ſympathy with the Head; ſo the Wreſts and Hands have a ſympathy with the Heart. We ſee the affects and Paſſions of the Heart, and Spirits, are notably diſcloſed by the Pulſe: And it is often tryed, that Juyces of *Stock-gilly-flowers*, *Roſe-campion*, *Garlick*, and other things, applied to the Wreſts, and renewed, have cured long Agues. And I conceive, that waſhing with certain Liquors the Palms of the Hands, doth much good: And they do well in Heats of Agues to hold in the Hands, Eggs of Alablaſter, and Balls of Cryſtal.

Of theſe things we ſhall ſpeak more, when we handle the Title of Sympathy and Antipathy, *in the proper place.*

98. Experiment Solitary, touching the *Secret Proceſſes of Nature.*

THe knowledge of Man (hitherto) hath been determined by the view or ſight; ſo that whatſoever is inviſible, either in reſpect of the fineneſs of the Body it ſelf, or the ſmallneſs of the Parts, or of the ſubtilty of the

Motion, is little inquired. And yet these be the things that govern Nature principally, and without which, you cannot make any true *Analysis* and *Indications* of the proceedings of Nature. The Spirits or Pneumaticals that are in all Tangible Bodies, are scarce known: Sometimes they take them for *Vacuum*, whereas they are the most active of Bodies: Sometimes they take them for Air, from which they differ exceedingly, as much as Wine from Water, and as Wood from Earth: Sometimes they will have them to be Natural Heat, or a Portion of the Element of Fire, whereas some of them are crude and cold: And sometimes they will have them to be the Vertues and Qualities of the Tangible Parts which they see, whereas they are things by themselves: And then, when they come to Plants and Living Creatures, they call them *Souls*. And such superficial speculations they have; like Prospectives that shew things inward, when they are but Paintings. Neither is this a question of words, but infinitely material in Nature: For Spirits are nothing else but a Natural Body, rarified to a Proportion, and included in the Tangible Parts of Bodies, as in an Integument: And they be no less differing one from the other, then the Dense or Tangible Parts: And they are in all Tangible Bodies whatsoever, more or less, and they are never (almost) at rest: And from them, and their Motions, principally proceed *Arefaction*, *Colliquation*, *Concoction*, *Maturation*, *Putrefaction*, *Vivification*, and most of the effects of *Nature*. For, as we have figured them in our *Sapientiâ Veterum*, in the Fable of *Proserpina*, you shall in the Infernal Regiment hear little doings of *Pluto*, but most of *Proserpina*: For Tangible Parts in Bodies, are stupid things, and the Spirits do (in effect) all. As for the differences of Tangible Parts in Bodies, the industry of the *Chymists* hath given some light in discerning by their separations, the *Oily*, *Crude*, *Pure*, *Impure*, *Fine*, *Gross*, *Parts of Bodies*, and the like. And the *Physitians* are content to acknowledge, that *Herbs* and *Drugs* have divers parts; as that *Opium* hath a stupefacting part, and a heating part; the one moving Sleep, the other a Sweat following; and that *Ruburb* hath Purging parts, and Astringing parts, &c. But this whole *Inquisition* is weakly and negligently handled. And for the more subtil differences of the Minute parts, and the posture of them in the Body, (which also hath great effects) they are not at all touched: As for the Motions of the Minute Parts of Bodies, which do so great effects, they have not been observed at all; because they are invisible, and incur not to the eye; but yet they are to be deprehended by experience. As *Democritus* said well, when they charged him to hold, that the World was made of such little Moats, as were seen in the Sun. *Atomus* (saith he) *necessitate Rationis & Experientiæ esse convincitur: Atomum enim nemo nunquam vidit.* And therefore the tumult in the parts of solid Bodies, when they are compressed, which is the cause of all flights of Bodies thorow the Air, and of other Mechanical Motions, (as hath been partly touched before, and shall be throughly handled in due place,) is not seen at all, but nevertheless, if you know it not, or inquire it not attentively and diligently, you shall never be able to discern, and muchless to produce, a number of Mechanical Motions. Again, as to the Motions Corporal, within the Enclosures of Bodies, whereby the effects (which were mentioned before) pass between the Spirits and the Tangible parts (which are *Arefaction*, *Colliquation*, *Concoction*, *Maturation*, *&c.*) they are not at all handled; but they are put off by the names of *Vertues*, and *Natures*, and *Actions*, and *Passions*, and such other *Logical Words*.

It

99. Experiment Solitary, touching the *Power of Heat.*

IT is certain, that of all *Powers in Nature*, Heat is the chief; both in the Frame of *Nature*, and in the Works of *Art*. Certain it is likewise, that the effects of Heat, are most advanced, when it worketh upon a Body without loss or dissipation of the matter; for that ever betrayed the account. And therefore it is true, that the power of Heat is best perceived in Distillations, which are performed in close Vessels and Receptacles. But yet there is a higher degree; For howsoever Distillations do keep the Body in Cells and Cloysters, without going abroad, yet they give space unto Bodies to turn into Vapor, to return into Liquor, and to separate one part from another. So as *Nature* doth expatiate, although it hath not full liberty; whereby the true and ultime operations of Heat, are not attained: But if Bodies may be altered by Heat, and yet no such Reciprocation of Rarefaction, and of Condensation, and of Separation, admitted; then it is like that this *Proteus* of Matter, being held by the Sleeves, will turn and change into many Metamorphoses. Take therefore a square Vessel of Iron, in form of a Cube, and let it have good thick and strong sides; put it into a Cube of Wood, that may fill it as close as may be, and let it have a cover of Iron as strong (at least) as the sides, and let it be well Luted, after the manner of the *Chymists*; then place the Vessel within burning *Coals* kept quick kindled, for some few hours space; then take the Vessel from the Fire, and take off the Cover, and see what is become of the Wood, I conceive, that since all Inflamation and Evaporation are utterly prohibited, and the Body still turned upon it self, that one of these two Effects will follow, Either that the Body of the Wood will be turned into a kinde of *Amalagma*, (as the *Chymists* call it,) or, that the finer part will be turned into Air, and the grosser stick as it were baked, and incrustate upon the sides of the Vessel, being become of a denser matter, than the Wood it self, crude. And for another tryal, take also Water, and put it in the like Vessel, stopped as before; but use a gentler Heat, and remove the Vessel sometimes from the fire; and again, after some small time, when it is cold, renew the heating of it, and repeat this alteration some few times; and if you can once bring to pass, that the Water which is one of the simplest of Bodies, be changed in Colour, Odor, or Taste, after the manner of Compound Bodies, you may be sure that there is a great work wrought in Nature, and a notable entrance made in strange changes of Bodies, and productions; and also a way made to do that by Fire, in small time, which the *Sun* and *Age* do in long time. But if the admirable effects of this *Distillation* in close, (for so we call it) which is like the Wombs and Matrices of Living Creatures, where nothing expireth nor separateth: We will speak fully, in the due place. Not that we aim at the making of *Peracelsus* Pigmeys, or any such prodigious follies; but that we know the effects of Heat will be such, as will scarce fall under the conceit of Man, if the force of it be altogether kept in.

100. Experiment Solitary, touching the *Impossibility of Annihilation.*

THere is nothing more certain in *Nature*, than that it is impossible for any Body to be utterly annihilated; but that as it was the work of the Omnipotency of *God*, to make *Somewhat* of *Nothing*: So it requireth the like omnipotency, to turn *Somewhat* into *Nothing*. And therefore it is well said by an obscure Writer of the Sect of the *Chymists*, That there is no such way to effect the strange *Transmutations* of *Bodies*, as to endeavor and urge by all means, the reducing of them to *Nothing*. And herein is contained also

so a great secret of Preservation of Bodies from change; for if you can prohibit, that they neither turn into *Air*, because no *Air* cometh to them, nor go into the *Bodies Adjacent*, because they are utterly Heterogeneal, nor make a round and circulation within themselves; they will never change; though they be in their Nature never so perishable or mutable. We see how *Flies* and *Spiders*, and the like, get a *Sepulchre* in *Amber*, more durable than the *Monument* and *Embalming* of the *Body* of any *King*. And I conceive the like will be of Bodies put into *Quick-silver*. But then they must be but thin, as a leaf or a peece of Paper or Parchment; for if they have a greater crassitude, they will alter in their own Body, though they spend not. But of this, we shall speak more when we handle the Title of *Conservation of Bodies*.

NATURAL HISTORY.

Century II.

MUsick in the Practice, hath been well pursued, and in good Variety; but in the Theory, and especially in the yielding of the Causes of the Practick, very weakly; being reduced into certain Mystical subtilties, and not much truth. We shall therefore, after our manner, joyn the *Contemplative* and *Active Part* together.

Experiments in Consort touching *Musick.*

101. All Sounds are either *Musical Sounds*, which we call *Tones*; whereunto there may be an *Harmony*, which *Sounds* are ever equal: As Singing, the Sounds of Stringed, and Wind-Instruments, the Ringing of Bells, &c. or Immusical Sounds, which are ever unequal: Such as are the Voice in Speaking, all Whisperings, all Voices of Beasts and Birds (except they be Singing Birds;) all Percussions, of Stones, Wood, Parchment, Skins, (as in Drums) and infinite others.

102. The Sounds that produce Tones, are ever from such *Bodies* as are in their Parts and Pores equal; as well as the Sounds themselves are equal: And such are the Percussions of Metal, as in *Bells*; of *Glass*, as in the fillipping of a *Drinking Glass*; of *Air*, as in *Mens Voices* whilest they sing, in *Pipes*, *Whistles*, *Organs*, *Stringed Instruments*, &c. And of Water, as in the *Nightingals Pipes* of *Regals*, or *Organs*, and other *Hydraulicks*, which the Ancients had; and *Nero* did so much esteem, but are now lost. And if any Man think, that the *String* of the *Bow*, and the *String* of the *Vial*, are neither of them equal Bodies, and yet produce Tones; he is in an error. For the Sound is not created between the *Bow* or *Plectrum*, and the *String*; but between the *String* and the *Air*; no more than it is between the Finger or Quill, and the String in other Instruments. So there are (in effect) but three *Percussions* that

create Tones; Percuſſion of Metals (comprehending *Glaſs*, and the like) Percuſſions of Air, and Percuſſions of Water.

103. The *Diapaſon* or *Eight* in *Muſick*, is the ſweeteſt Concord; inſomuch, as it is in effect an *Vniſon*; as we ſee in *Lutes* that are ſtrung in the baſe ſtrings with two ſtrings, one an *Eighth* above another, which make but as one ſound; and every Eighth Note in Aſcent, (as from Eight to Fifteen, from Fifteen to Twenty two, and ſo *in infinitum*) are but *Scales of Diapaſon*. The cauſe is dark, and hath not been rendred by any, and therefore would be better contemplated. It ſeemeth that Air (which is the ſubject of Sounds) in Sounds that are not Tones (which are all unequal as hath been ſaid) admitteth much variety; as we ſee in the Voices of Living Creatures, and likewiſe in the Voices of ſeveral Men; for we are capable to diſcern ſeveral Men by their Voices) and in the Conjugation of Letters, whence *Articulate Sounds* proceed; which of all others, are moſt various. But in the Sounds which we call Tones (that are ever equal) the Air is not able to caſt it ſelf into any ſuch variety; but is forced to recur into one and the ſame Poſture or Figure, onely differing in greatneſs and ſmallneſs. So we ſee Figures may be made of Lines, crooked and ſtraight, in infinite variety, where there is inequality; but Circles or Squares, or Triangles Equilateral, (which are all Figures of equal Lines) can differ but in greater or leſſer.

104. It is to be noted (the rather, leſt any Man ſhould think that there is any thing in this number of Eight, to create the *Diapaſon*) that this computation of Eight, is a thing rather received than any true computation. For a true computation ought ever to be, by diſtribution into equal Portions. Now there be intervenient in the riſe of Eight (in Tones) two Beemols or Half-Notes; ſo as if you divide the Tones equally, the Eighth is but Seven whole and equal Notes: And if you ſubdivide that into Half-Notes, (as it is in the ſtops of a *Lute*) it maketh the number of Thirteen.

105. Yet this is true, That in the ordinary Riſes and Falls of the Voice of Man (not meaſuring the Tone by whole Notes and Half Notes, which is the equal Meaſure) there fall out to be two Beemols (as hath been ſaid) between the *Vniſon* and the *Diapaſon*; and this varying is natural. For if a Man would endeavor to raiſe or fall his Voice ſtill by Half-Notes, like the ſtops of a Lute, or by whole Notes alone, without Halfs as far as an Eighth; he will not be able to frame his Voice unto it, which ſheweth, that after every three whole Notes, *Nature* requireth, for all Harmonical uſe, one Half-Note to be interpoſed.

106. It is to be conſidered, That whatſoever vertue is in *Numbers*, for conducing to concent of Notes, is rather to be aſcribed to the *Ante-number*, than to the *Entire-number*; as namely, that the Sound returneth after Six, or after Twelve: So that the Seventh or the Thirteenth is not the Matter, but the Sixth, or the Twelfth; and the Seventh and the Thirteenth, are but the Limits and Boundaries of the Return.

107. The Concords in Muſick which are *Perfect*, or *Semiperfect*, between the *Vniſon* and the *Diapaſon*, are the Fifth, which is the moſt *Perfect*; the Third next, and the Sixth which is more harſh: And as the *Ancients* eſteemed, and ſo do my ſelf, and ſome other yet, the Fourth which they call *Diateſſeron*; as for the Tenth, Twelfth, Thirteenth, and ſo *in infinitum*, they be but Recurrences of the former; *viz.* of the Third, the Fifth, and the Sixth, being an Eighth reſpectively from them.

For

For *Discords*, the Second and the Seventh, are of all others, the most odious in *Harmony* to the Sense; whereof, the one is next above the *Vnison*, the other next under the *Diapason*; which may shew, that *Harmony* requireth a competent distance of Notes. 108.

In *Harmony*, if there be not a *Discord* to the *Base*, it doth not disturb the *Harmony*, though there be a *Discord* to the higher parts; so the *Discord* be not of the Two that are odious: And therefore the ordinary Concent of Four parts consisteth of an Eighth, a Fifth, and a Third to the *Base*; but that Fifth is a Fourth to the Trebble, and the Third is a Sixth. And the cause is, for that the Base striking more Air, doth overcome and drown the Trebble (unless the Discord be very odious) and so hideth a small imperfection For we see, that in one of the lower strings of a Lute, there soundeth not the sound of the Trebble, nor any mixt sound, but onely the sound of the *Base*. 109.

We have no *Musick* of *Quarter-Notes*, and it may be, they are not capable of *Harmony*; for we see the *Half-Notes* themselves do but interpose sometimes. Nevertheless, we have some *Slides* or *Relishes* of the Voice or Strings, as it were, continued without Notes, from one Tone to another, rising or falling, which are delightful. 110.

The causes of that which is *Pleasing* or ingrate to the *Hearing*, may receive light by that which is *Pleasing* or ingrate to the *Sight*. There be two things pleasing to the sight (leaving *Pictures* and *Shapes* aside, which are but Secondary Objects, and please or displease but in Memory;) these two are Colours and Order. The pleasing of Colour symbolizeth with the *Pleasing* of any *Single Tone* to the Ear; but the pleasing of Order doth symbolize with *Harmony*. And therefore we see in *Garden-knots*, and the *Frets of Houses*, and all equal and well answering *Figures*, (as *Globes*, *Pyramides*, *Cones*, *Cylinders*, *&c.*) how they please; whereas unequal Figures are but Deformities. And both these pleasures, that of the Eye, and that of the Ear, are but the effects of equality, good proportion, or correspondence: So that (out of question) Equality and Correspondence are the causes of *Harmony*. But to finde the Proportions of that Correspondence, is more abstruse; whereof, notwithstanding we shall speak somewhat (when we handle *Tones*, in the general enquiry of Sounds. 111.

Tones are not so apt altogether to procure *Sleep*, as some other sounds: As the Wind, the Purling of Water, Humming of Bees, a sweet Voice of one that readeth, &c. The cause whereof is, for that *Tones*, because they are equal and slide not, do more strike and erect the Sense, than the other. And overmuch attention hindereth sleep. 112.

There be in *Musick* certain *Figures* or *Tropes*, almost agreeing with the *Figures* of *Rhetorick*, and with the *Affections* of the *Minde*, and other *Senses*. First, The *Division* and *Quavering*, which please so much in *Musick*, have an agreement with the Glittering of Light; As the *Moon-Beams* playing upon a Wave. Again, the *Falling* from a *Discord* to a *Concord*, which maketh great sweetness in *Musick*, hath an agreement with the *Affections*, which are reintegrated to the better, after some dislikes; it agreeth also with the taste, which is soon glutted with that which is sweet alone. The sliding from the Close or Cadence, hath an agreement with the *Figure* in *Rhetorick*, which they call *Prater Expectatum*; for there is a pleasure, even in being deceived. The Reports and Fuges have an agreement with the *Figures* in *Rhetorick* of Repetition and Traduction. The *Tripla's* and *Changing of Times*, have an agreement with the 113.

the changes of Motions; as when Galliard time, and Measure time, are in the Medly of one Dance.

114. It hath been anciently held, and observed, That the *Sense of Hearing*, and the *Kindes of Musick*, have most operation upon *Manners*; as to incourage Men, and make them warlike; to make them soft and effeminate; to make them grave; to make them light; to make them gentle and inclined to pity, &c. The cause is, for that the *Sense of Hearing* striketh the Spirits more immediately, than the other *Senses*, and more incorporeally than the *Smelling*: For the *Sight*, *Taste*, and *Feeling*, have their Organs, not of so present and immediate access to the Spirits, as the Hearing hath. And as for the Smelling (which indeed worketh also immediately upon the Spirits, and is forcible while the object remaineth) it is with a communication of the Breath or Vapor of the object oderate: But Harmony entring easily, and mingling not at all, and coming with a manifest motion; doth by custom of often affecting the Spirits, and putting them into one kinde of posture, alter not a little the nature of the Spirits, even when the object is removed. And therefore we see, that Tunes and Airs, even in their own nature, have in themselves some affinity with the Affections: As there be Merry Tunes, Doleful Tunes, Solemn Tunes; Tunes inclining Mens mindes to Pity, Warlike Tunes, &c. So as it is no marvel, if they alter the Spirits, considering that Tunes have a predispositon to the Motion of the Spirits in themselves. But yet it hath been noted, that though this variety of Tunes, doth dispose the Spirits to variety of Passions, conform unto them; yet generally, *Musick* feedeth that disposition of the Spirits which it findeth. We see also, that several Airs and Tunes, do please several Nations, and Persons according to the sympathy they have with their Spirits.

Experiments in Consort, touching *Sounds*; and first touching the *Nullity*, and *Entity of Sounds*.

Perspective hath been with some diligence inquired; and so hath the Nature of Sounds, in some sort, as far as concerneth *Musick*, but the Nature of Sounds in general, hath been superficially observed. It is one of the subtilest pieces of Nature. And besides, I practise, as I do advise: Which is after long inquiry of things, immerse in matter, to enterpose some subject which is immateriate or less materiate; such as this of Sounds: To the end, that the intellect may be rectified, and become not partial.

115. It is first to be considered, what great motions there are in Nature which pass without sound or noise. The Heavens turn about in a most rapide motion, without noise to us perceived, though in some dreams they have been said to make an excellent Musick. So the motions of the Comets, and Fiery Meteors (as *Stella Cadens*, *&c.*) yield no noise. And if it be thought, that it is the greatness of distance from us, whereby the sound cannot be heard; we see that Lightnings and Coruscations, which are near at hand, yield no sound neither; and yet in all these, there is a percussion and divisions of the Air. The Winds in the Upper Region (which move the Clouds above (which we call the Rack) and are not perceived below) pass without noise. The lower Winds in a Plain, except they be strong, make no noise; but amongst Trees, the noise of such Winds will be perceived. And the Winds (generally) when they make a noise, do ever make it unequally, rising and falling, and sometimes (when they are vehement) trembling at the height of their blast. Rain or Hail falling, though vehemently, yieldeth no noise, in passing through the Air, till it fall upon the Ground, Water, Houses, or the like. Water in a River (though a swift stream) is not heard in the Channel, but

but runneth in silence, if it be of any depth; but the very Stream upon Shallows, or Gravel, or Pebble, will be heard. And Waters, when they beat upon the Shore, or are straitned, (as in the falls of Bridges) or are dashed against themselves by Winds, give a roaring noise. Any peece of Timber, or hard Body, being thrust forwards by another Body continguous, without knocking giveth no noise. And so *Bodies* in weighing, one upon another, though the upper Body press the lower Body down, make no noise. So the motion of the Minute parts of any solid Body, (which is the principal cause of violent Motion, though unobserved) passeth without sound: For that sound, that is heard sometimes, is produced onely by the breaking of the Air, and not by the impulsion of the parts. So it is manifest, that where the anterior Body giveth way as fast as the posterior cometh on, it maketh no noise, be the motion never so great or swift.

Air open and at large, maketh no noise, except it be sharply percussed; 116.
as in the sound of a string, where Air is purcussed by a hard and stiff Body, and with a sharp loose: For if the string be not strained, it maketh no noise; but where the Air is pent and straitned, there breath or other blowing (which carry but a gentle percussion) suffice to create sound; as in Pipes and Wind Instruments. But then you must note, that in *Recorders* which go with a gentle breath, the Concave of the Pipe (were it not for the Fipple that straitneth the Air much more then the simple Concave) would yield no sound. For, as for other Wind-Instruments, they require a forcible breath, as *Trumpets, Cornets, Hunters, Horns, &c.* Which appeareth by the blown Cheeks of him that windeth them. *Organs* also are blown with a strong wind by the Bellows. And note again, that some kinde of Wind-Instruments are blown at a small hole in the side, which straineth the breath at the first entrance; the rather, in respect of their traverse, and stop above the hole which performeth the Fipples part; as it is seen in *Flutes* and *Fifes*, which will not give sound by a blast at the end, as *Recorders* do, &c. Likewise in all Whistling, you contract the Mouth; and to make it more sharp, Men sometimes use their finger.

But in open Air, if you throw a Stone or a Dart, they give no sound: 117.
No more do Bullets, except they happen to be a little hollowed in the casting; which hollowness penneth the Air: Nor yet Arrows, except they be ruffled in their Feathers, which likewise penneth the Air. As for small Whistles or Shepherds Oaten-Pipes, they give a sound, because of their extream slenderness, whereby the Air is more pent than in a wider Pipe. Again, the voices of Men and Living Creatures, pass through the Throat, which penneth the breath. As for the *Jews-Harp*, it is a sharp percussion, and besides hath the vantage of penning the Air in the Mouth.

Solid Bodies, if they be very softly percussed, give no sound; as when a 118.
Man treadeth very softly upon Boards. So Chests or Doors in fair weather, when they open easily, give no sound. And Cart-wheels squeek not when they are liquored.

The *Flame of Tapers* or *Candles*, though it be a swift motion and breaketh 119.
the Air, yet passeth without sound. Air in Ovens, though (no doubt) it doth (as it were) boil, and dilate it self, and is repercussed, yet it is without noise.

Flame percussed by Air, giveth a noise; As in blowing of the Fire by Bellows, greater than if the Bellows should blow upon the Air it self. And so likewise Flame percussing the Air strongly (as when Flame suddenly taketh and openeth) giveth a noise: So great Flames, whiles the one impelleth the other, give a bellowing sound.

There

120. There is a conceit runneth abroad, that there should be a White Powder, which will discharge a piece without noise, which is a dangerous experiment, if it should be true: For it may cause secret Murthers, but it seemeth to me unpossible; for if the Air pent, be driven forth and strike the Air open, it will certainly make a noise. As for the White Powder, (if any such thing be that may extinguish or dead the noise) it is like to be a mixture of Petre and Sulphure, without Coal. For Petre alone will not take Fire. And if any Man think, that the sound may be extinguished or deaded, by discharging the pent Air, before it cometh to the Mouth of the Peece, and to the open Air, that is not probable; for it will make more divided sounds: As if you should make a Cross-barrel hollow, thorow the Barrel of a Peece, it may be it would give several sounds, both at the Nose and the sides. But I conceive, that if it were possible to bring to pass, that there should be no Air pent at the Mouth of the Peece, the Bullet might flie with small or no noise. For first it is certain, there is no noise in the Percussion of the Flame upon the Bullet. Next the Buller, in piercing thorow the Air, maketh no noise, as hath been said; and then, if there be no pent Air, that striketh upon open Air, there is no cause of noise, and yet the flying of the Bullet will not be staid. For that motion (as hath been oft said) is in the parts of the Bullet, and not in the Air. So a tryal must be made by taking some small Concave of *Minal*, no more than you mean to fill with Powder, and laying the Bullet in the Mouth of it half out in the open Air.

121. I heard it affirmed by a Man that was a great dealer in Secrets, but he was but vain; That there was a *Conspiracy* (which himself hindred) to have killed Queen *Mary*, Sister to Queen *Elizabeth*, by a *Burning-Glass*, when she walked in St. *James* Park, from the Leads of the House. But thus much, no doubt, is true, That if *Burning-Glasses* could be brought to a great strength, (as they talk generally of *Burning-Glasses*, that are able to burn a Navy) the Percussion of the Air alone, by such a *Burning-Glass*, would make no noise; no more than is found in *Corruscations*, and *Lightnings* without *Thunders*.

122. I suppose that *Impression* of the *Air* with *Sounds*, asketh a time to be conveighed to the Sense, as well as the *Impression* of *Species visible*, or else they will not be heard. And therefore, as the Bullet moveth so swift, that it is invisible, so the same swiftness of motion maketh it inaudible; for we see that the apprehension of the Eye, is quicker then that of the Ear.

123. All *Eruptions of Air*, though small and slight, give an entity of sound, which we call *Crackling*, *Puffing*, *Spiting*, &c. As in Bay-salt, and Bay-leaves cast into the fire; so in *Chesnuts*, when they leap forth of the Ashes, so in green wood laid upon the fire, especially Roots; so in Candles that spit flame, if they be wet; so in Rasping, Sneezing, &c. So in a Rose leaf gathered together into the fashion of a Purse, and broken upon the Forehead, or Back of the Hand, as Children use.

124. Experiments in Consort, touching *Production*, *Conservation*, *and Delation of Sounds*; *and the office of the Air therein.*

THe cause given of Sound, that it should be an *Elision of the Air* (whereby, if they mean any thing, they mean Cutting or Dividing, or else an Attenuating of the Air) is but a term of Ignorance; and the motion is but a catch of the Wit upon a few Instances, as the manner is in the *Philosophy* received. And it is common with Men, that if they have gotten a pretty expression by a word of *Art*, that expression goeth current, though it be empty of matter. This conceit of *Elision*, appeareth most manifestly

to

to be falſe, in that the Sound of a Bell-ſtring, or the like, continueth melting, ſometime after the Percuſſion; but ceaſeth ſtraight-ways, if the Bell or String be touched and ſtayed; whereas, if it were the *Eliſion* of the *Air*, that made the Sound, it could not be that the touch of the Bell or String, ſhould extinguiſh ſo ſuddenly that motion, cauſed by the *Eliſion* of the *Air*. This appeareth yet more manifeſtly, by Chiming with a Hammer upon the outſide of a Bell; for the Sound will be according to the inward Concave of the Bell: Whereas the *Eliſion* or *Attenuation* of the *Air* cannot be, but onely between the Hammer, and the outſide of the Bell. So again, if it were an *Eliſion*, a broad Hammer, and a Bodkin, ſtruck upon Metal, would give a diverſe Tone, as well as a diverſe Loudneſs: But they do not ſo; for though the Sound of the one be louder, and of the other ſofter, yet the Tone is the ſame. Beſides, in Eccho's (whereof ſome are as loud as the Original Voice) there is no new *Elyſion*, but a Repercuſſion onely. But that, which convinceth it moſt of all, is, That Sounds are generated, where there is no Air at all. But theſe, and the like conceits, when Men have cleared their Underſtanding, by the light of Experience, will ſcatter and break up like a Miſt.

It is certain, that Sounds is not produced at the firſt, but with ſome Local Motion of the Air or Flame, or ſome other *Medium*; nor yet without ſome reſiſtance, either in the Air, or the Body percuſſed. For if there be a meer yielding or ceſſion, it produceth no Sound, as hath been ſaid. And therein Sounds differ from Light or Colours which paſs through the Air, or other Bodies, without any Local Motion of the Air, either at the firſt, or after. But you muſt attentively diſtinguiſh between the Local Motion of the Air (which is but *Vehiculum cauſæ*, *A Carrier of the Sounds*,) and the Sounds themſelves conveighed in the Air. For as to the former, we ſee manifeſtly, that no Sound is produced (no not by Air it ſelf againſt other Air, as in Organs, &c.) but with a perceptible Blaſt of the Air, and with ſome reſiſtance of the Air ſtrucken. For, even all Speech, (which is one of the gentleſt Motions of Air,) is with expulſion of a little Breath. And all Pipes have a blaſt, as well as a Sound. We ſee alſo manifeſtly, that Sounds are carried with Wind: And therefore Sounds will be hard further with the Wind, than againſt the Wind; and likewiſe, do riſe and fall with the intenſion or remiſſion of the Wind: But for the Impreſſion of the Sound, it is quite another thing, and is utterly without Local Motion of the Air, perceptible; and in that reſembleth the ſpecies viſible: For after a Man hath lured, or a Bell is rung, we cannot diſcern any Perceptible Motion (at all) in the Air, as long as the ſound goeth, but onely at the firſt. Neither doth the Wind (as far as it carrieth a Voice) with the Motion thereof, confound any of the delicate, and Articulate Figurations of the Air, in variety of Words. And if a Man ſpeak a good loudneſs againſt the flame of a Candle, it will not make it tremble much; though moſt, when thoſe Letters are pronounced, which contract the mouth, as F, S, V, and ſome others. But gentle breathing, or blowing without ſpeaking, will move the Candle far more. And it is the more probable, that Sound is without any Local Motion of the Air, becauſe as it differeth from the ſight, in that it needeth a Local Motion of the Air at firſt: So it paralleleth in ſo many other things with the ſight, and radiation of things inviſible, which (without all queſtion) induce no Local Motion in the Air, as hath been ſaid. 125.

Nevertheleſs it is true, that upon the noiſe of Thunder, and great Ordnance, Glaſs Windows will ſhake, and Fiſhes are thought to be frayed with the 126.

the Motion, caused by noise upon the Water. But these effects are from the local motion of the Air, which is a concomitant of the Sound (as hath been said) and not from the Sound.

127. It hath been anciently reported, and is still received, that extream applauses, and shouting of people, assembled in great multitudes, have so rarified, and broken the Air, that Birds flying over, have fain down, the Air being not able to support them. And it is believed by some, that great Ringing of Bells in populous Cities, hath chased away Thunder; and also dissipated pestilent Air: All which may be also from the concussion of the Air, and not from the Sound.

128. A very great sound near hand, hath stricken many deaf; and at the instant they have found, as it were, the breaking of a Skin of Parchment in their Ear: And my self, standing near one that lured loud and shrill, had suddenly an offence, as if somewhat had broken, or been dislocated in my Ear, and immediately after a loud Ringing; (not an ordinary Singing, or Hissing, but far louder, and differing; so as I feared some Deafness. But after some half quarter of an hour, it vanished. This effect may be truly referred unto the Sound; for (as is commonly received) an overpotent Object doth destroy the Sense; and Spiritual Species, (both Visible and Audible,) will work upon the sensories, though they move not any other Body.

129. In *Delation of Sounds*, the enclosure of them preserveth them, and causeth them to be heard further. And we finde in Rowls of Parchment, or Truncks, the Mouth being laid to the one end of the Rowl of Parchment, or Trunck, and the Ear to the other, the Sound is heard much further then in the open Air. The cause is, for that the Sound spendeth, and is dissipated in the open Air; but in such Concaves, it is conserved and contracted. So also in a Piece of Ordnance, if you speak in the Touch-hole, and another lay his Ear to the Mouth of the Piece, the Sound passeth, and is far better heard than in the open Air.

130. It is further to be considered, how it proveth and worketh when the Sound is not enclosed, all the length of his way, but passeth partly through open Air; as where you speak some distance from a Trunck, or where the Ear is some distance from the Trunck, at the other end; or where both Mouth and Ear are distant from the Trunck. And it is tryed, that in a long Trunck of some Eight or ten foot, the sound is holpen, though both the Mouth, and the Ear be a handful or more, from the ends of the Trunck; and somewhat more holpen, when the Ear of the Hearer is near, than when the Mouth of the Speaker. And it is certain, that the Voice is better heard in a Chamber from abroad, than abroad from within the Chamber.

131. As the *Enclosure*, that is round about and entire, preserveth the Sound; so doth a Semi-concave, though in a less degree. And therefore, if you divide a Trunck, or a Cane into two, and one speak at the one end, and you lay your Ear at the other, it will carry the Voice further, than in the Ait at large. Nay further, if it be not a full Semi-concave; but if you do the like upon the Mast of a Ship, or a long Pole, or a Piece of Ordnance (though one speak upon Surface of the Ordnance, and not at any of the Bores) the Voice will be heard further then in the Air at large.

132. It would be tryed, how, and with what proportion of disadvantage, the Voice will be carried in an Horn, which is a Line Arched; or in a Trumpet, which is a Line Retorted; or in some Pipe that were Sinuous.

It

It is certain, (howsoever it cross the received opinion) that Sounds may be created without Air, though Air be the most favorable different of Sounds. Take a Vessel of Water, and knap a pair of Tongs some depth within the Water, and you shall hear the Sound of the Tongs well, and not much diminished, and yet there is no Air at all present. 133.

Take one Vessel of Silver, and another of Wood, and fill each of them full of water, and then knap the Tongs together as before, about an handful from the bottom, and you shall finde the Sound much more resounding from the Vessel of Silver, than from that of Wood; and yet if there be no Water in the Vessel, so that you knap the Tongs in the Air, you shall finde no difference between the Silver, and the Wooden Vessel, whereby beside the main point of creating sound without Air, you may collect two things; the one, that the sound communicateth with the bottom of the Vessel; the other, that such a communication passeth far better thorow Water than Air. 134.

Strike any hard Bodies together in the midst of a flame, and you shall hear the sound with little difference, from the sound in the Air. 135.

The *Pneumatical part*, which is in all *Tangible Bodies*, and hath some affinity with the Air, performeth in some degree, the parts of the Air; as when you knock upon an empty Barrel, the sound is (in part) created by the Air on the outside, and (in part) by the Air in the inside; for the sound will be greater or lesser, as the Barrel is more empty, or more full; but yet the sound participateth also with the Spirit in the Wood, thorow which it passeth from the outside to the inside; and so it cometh to pass in the chiming of Bells on the outside, where also the sound passeth to the inside; and a number of other like instances, whereof we shall speak more when we handle the *Communication of Sounds*. 136.

It were extream grosness to think (as we have partly touched before) that the sound in Strings is made, or produced between the Hand and the String, or the Quill and the String, or the Bow and the String: For those are but *Vehicula motus*, passages to the Creation of the sound, the sound being produced between the String and the Air; and that not by any impulsion of the Air, from the first Motion of the String; but by the return or result of the String, which was strained by the touch to his former place; which Motion of Result is quick and sharp, whereas the first Motion is soft and dull. So the Bow tortureth the String continually, and thereby holdeth it in a continual Trepidation. 137.

TAke a Trunk, and let one whistle at the one end, and hold your ear at the other and you shall finde the sound strike so sharp, as you can scarce endure it. The cause is, for that sound diffuseth it self in round, and so spendeth it self: But if the sound, which would scatter in open Air, be made to go all into a *Canalo*; it must needs give greater force to the sound. And so you may note, that inclosures do not onely preserve sound, but also encrease and sharpen it. 138. Experiments in Consort, touching the *Magnitude and Exility, and Dampe of Sounds*.

A *Hunters Horn*, being greater at one end, than at the other, doth encrease the sound more, than if the Horn were all of an equal bore. The cause is, for that the Air and Sound, being first contracted at the lesser end, and afterwards having more room to spred at the greater end, do dilate themselves, and in coming out, strike more Air, whereby the sound is the greater, and baser. And even Hunters Horns, which are sometimes

made straight, and not oblick, are ever greater at the lower end. It would be tryed also in Pipes, being made far larger at the lower end, or being made with a Belly towards the lower end, and then issuing into a straight concave again.

140. There is in St. *Jamses* Fields, a Conduit of Brick, unto which joyneth a low Vault; and at the end of that, a round House of Stone; and in the Brick Conduit there is a Window, and in the round House a Slit or Rift of some little breadth; if you cry out in the Rift, it will make a fearful roaring at the Window. The cause is the same with the former: For that all Concaves that proceed from more narrow to more broad, do amplifie the Sound at the coming out.

141. *Hawks Bells* that have holes in the sides, give a greater ring, than if the Pellet did strike upon Brass in the open Air. The cause is the same with the first instance of the Trunck: Namely, for that the Sound, enclosed with the sides of the Bell, cometh forth at the holes unspent and more strong.

142. In *Drums*, the closeness round about, that preserveth the Sound from dispersing, maketh the noise come forth at the Drum-hole, far more loud and strong, than if you should strike upon the like skin, extended in the open Air. The cause is the same with the two precedent.

143. *Sounds* are better heard, and further off in an Evening, or in the Night, than at the Noon or in the Day. The cause is, for that in the Day, when the Air is more thin (no doubt) the Sound pierceth better; but when the Air is more thick (as in the Night) the Sound spendeth and spredeth abroad less; and so it is a degree of Enclosure. As for the night, it is true also, that the general silence helpeth.

144. There be two kindes of *Reflections of Sounds*; the one at Distance, which is the Eccho; wherein the original is heard distinctly, and the Reflexion also distinctly; of which, we shall speak hereafter. The other in Concurrence; when the Sound reflecting (the Reflexion being near at hand) returneth immediately upon the original, and so iterateth it not, but amplifieth it. Therefore we see, that Musick upon the Water soundeth more; and so likewise, Musick is better in Chambers Wainscotted than Hanged.

145. The Strings of a *Lute*, or *Viol*, or *Virginals*, do give a far greater Sound, by reason of the Knot, and Board, and Concave underneath, than if there were nothing but onely the Flat of a Board, without that Hollow and Knot, to let in the upper Air into the lower. The cause is, the Communication of the upper Air with the lower, and penning of both from expence or dispersing.

146. An *Irish Harp* hath open Air on both sides of the Strings; and it hath the Concave or Belly, not a long the Strings, but at the end of the Strings. It maketh a more resounding Sound, than a *Bandora*, *Orpharion*, or *Cittern*, which have likewise Wire-strings. I judge the cause to be, for that open Air on both sides helpeth, so that there be a Concave; which is therefore best placed at the end.

147. In a *Virginal*, when the Lid is down, it maketh a more exile Sound than when the Lid is open. The cause is, for that all shutting in of Air, where there is no competent Vent, dampeth the Sound; which maintaineth likewise the former instance: For the Belly of the Lute, or Viol, doth pen the Air somewhat.

There

There is a Church at *Gloceſter*, (and as I have heard, the like is in ſome other places) where if you ſpeak againſt a Wall ſoftly, another ſhall hear your voice better a good way off, than near hand. Inquire more particularly of the fame of that place. I ſuppoſe there is ſome Vault, or Hollow, or Iſle, behinde the Wall, and ſome paſſage to it, towards the further end of that Wall againſt which you ſpeak: So as the voice of him that ſpeaketh ſlideth along the Wall, and then entreth at ſome paſſage, and communicateth with the Air of the Hollow; for it is preſerved ſomewhat by the plain Wall; but that is too weak to give a Sound audible, till it hath communicated with the back Air. 148.

Strike upon a Bow-ſtring, and lay the Horn of the Bow near your Ear, and it will increaſe the Sound, and make a degree of a Tone. The cauſe is for that the ſenſory, by reaſon of the cloſe holding is percuſſed, before the Air diſperſeth. The like is, if you hold the Horn betwixt your Teeth. But that is a plain *Dilation* of the *Sound*, from the Teeth to the *Inſtrument of Hearing*; for there is a great entercourſe between thoſe two parts, as appeareth by this, that a harſh grating Tune ſetteth the Teeth one edge. The like falleth out, if the Horn of the Bow be put upon the Temples; but that is but the ſlide of the Sound from thence to the ear. 149.

If you take a Rod of Iron or Braſs, and hold the one end to your ear and ſtrike upon the other, it maketh a far greater Sound, than the like ſtroke upon the Rod, not made ſo contiguous to the Ear. By which, and by ſome other inſtances that have been partly touched, it ſhould appear; that Sounds do not onely ſlide upon the ſurface of a ſmooth Body, but do alſo communicate with the Spirits that are in the Pores of the Body. 150.

I remember in *Trinity-Colledge* in *Cambridge*, there was an upper Chamber, which being thought weak in the Roof of it, was ſupported by a Pillar of Iron, of the bigneſs of ones arm, in the midſt of the Chamber, which, if you had ſtruck, it would make a little flat noiſe in the Room where it was ſtruck; but it would make a great bomb in the Chamber beneath. 151.

The ſound which is made by Buckets in a Well, when they touch upon the Water, or when they ſtrike upon the ſide of the Well; or when two Buckets daſh the one againſt the other. Theſe Sounds are deeper and fuller, than if the like Percuſſion were made in the open Air. The cauſe is the penning and encloſure of the Air in the Concave of the Well. 152.

Barrels placed in a Room under the Floor of a Chamber, make all noiſes in the ſame Chamber more full and reſounding. 153.

So that there be five ways (in general) of *Majoration of Sounds*, *Encloſure Simple*, *Encloſure in the Dilatation*, *Communication*, *Reflexion*, *Concurrent*, and *Approach to the Senſory*.

For Exility of the Voice, or other Sounds: It is certain, that the Voice doth paſs thorow ſolid and hard Bodies, if they be not too thick; and thorow Water, which is likewiſe a very cloſe Body, and ſuch an one as letteth not in Air. But then the Voice or other Sound is reduced, by ſuch paſſage to a great weakneſs or exility. If therefore you ſtop the Holes of a *Hawks Bell*, it will make no ring, but a flat noiſe or rattle. And ſo doth the *Ætities* or *Eagles Stone*, which hath a little ſtone within it. 154.

And as for Water, it is a certain Tryal: Let a man go into a Bath, and take a Pail and turn the bottom upward, and carry the mouth of it (even) down to the level of the Water, and ſo preſs it down under the Water ſome handful and an half, ſtill keeping it even, that it may not tilt on either ſide, and ſo the Air get out: Then let him that is in the Bath, dive 155.

with his head so far under Water, as he may put his head into the Pail, and there will come as much Air bubbling forth, as will make room for his head. Then let him speak, and any that shall stand without, shall hear his voice plainly, but yet made extream sharp and exile, like the voice of Puppets: But yet the Articulate Sounds of the words will not be confounded. Note, that it may be much more handsomly done, if the Pail be put over the Mans head above Water, and then he cowre down, and the Pail be pressed down with him. Note, that a man must kneel or sit, that he may be lower than the Water. A man would think, that the *Sicilian* Poet had knowledge of this Experiment; for he saith, that *Hercules*'s Page *Hylas* went with a Water-pot, to fill it at a pleasant Fountain that was near the shore, and that the Nymphs of the Fountain fell in love with the Boy, and pulled him under the Water, keeping him alive; and that *Hercules* missing his Page, called him by his name aloud, that all the shore rang of it; and that *Hylas* from within the Water answered his Master; but (that which is to the present purpose) with so small and exile a voice, as *Hercules* thought he had been three miles off, when the Fountain (indeed) was fast by.

156. In *Lutes* and Instruments of Strings, if you stop a string high, whereby it hath less scope to tremble, the Sound is more Trebble, but yet more dead.

157. Take two Sawcers, and strike the edge of the one against the bottom of the other, within a Pail of Water, and you shall finde that as you put the Sawcers lower and lower, the Sound groweth more flat, even while part of the Sawcer is above the Water; but that flatness of Sound is joyned with a harshness of Sound, which, no doubt, is caused by the inequality of the Sound, which cometh from the part of the Sawcer under the Water, and from the part above. But when the Sawcer is wholly under the Water, the sound becometh more clear, but far more low, and as if the sound came from a far off.

158. A soft body dampeth the sound, much more than a hard; and if a Bell hath cloth or silk wrapped about it, it deadeth the sound more than if it were Wood. And therefore in *Clericals*, the Keyes are lined, and in Colledges they use to line the Table-men.

159. Tryal was made in a *Recorder* after these several manners. The bottom of it was set against the Palm of the Hand, stopped with Wax round about, set against a Damask Cushion, thrust into Sand, into Ashes, into Water, (half an inch under the Water) close to the bottom of a Silver Basin, and still the Tone remained: But the bottom of it was set against a Woollen Carpet, a Lining of Plush, a Lock of Wool, (though loosly put in;) against Snow, and the sound of it was quite deaded, and but breath.

160. Iron hot produceth not so full a sound, as when it is cold; for while it is hot, it appeareth to be more soft, and less resounding. So likewise warm Water, when it faileth maketh not so full a sound as cold; and I conceive it is softer, and nearer the nature of Oyl; for it is more slippery, as may be perceived, in that it scowreth better.

161. Let there be a *Recorder* made with two Fipples at each end one; the Trunck of it of the length of two Recorders, and the holes answerable towards each end, and let two play the same Lesson upon it, at an Unison; and let it be noted, whether the sound be confounded, or amplified, or dulled. So likewise let a Cross be made of two Truncks (thorowout) hollow,

hollow; and let two ſpeak or ſing, the one long ways the other traverſe. And let two hear at the oppoſite ends; and note, whether the Sound be confounded, amplified, or dulled. Which two inſtances will alſo give light to the mixture of Sounds, whereof we ſhall ſpeak hereafter.

A *Bellows*, blown into the hole of a Drum, and the Drum then ſtrucken, maketh the Sound a little flatter, but no other apparent alteration. The cauſe is manifeſt; partly for that it hindreth the iſſue of the Sound; and partly for that it maketh the Air being blown together, leſs moveable. 162.

THe Loudneſs and Softneſs of Sounds, is a thing diſtinct from the Magnitude and Exility of Sounds; for a *Baſe-ſtring*, though ſoftly ſtrucken, giveth the greater Sound; but a *Trebble-ſtring*, if hard ſtrucken, will be heard much further off. And the cauſe is, for that the *Baſe-ſtring* ſtriketh more Air; and the *Trebble* leſs Air, but with a ſharper percuſſion. 163. Experiments in Conſort, touching the *Loudneſs or Softneſs of Sounds, and their Carriage at longer or ſhorter diſtance.*

It is therefore the ſtrength of the Percuſſion, that is a principal cauſe of the loudneſs or ſoftneſs of Sounds: As in knocking, harder or ſofter; Winding of a Horn, ſtronger or weaker; Ringing of an Hand bell, harder or ſofter, &c. And the ſtrength of this Percuſſion conſiſteth, as much or more, in the hardneſs of the Body percuſſed, as in the force of the Body percuſſing: For if you ſtrike againſt a Cloth, it will give a leſs ſound; if againſt Wood, a greater; if againſt a Metal, yet a greater; and in Metals, if you ſtrike againſt Gold, (which is the more pliant) it giveth the flatter ſound; if againſt Silver or Braſs, the more ringing ſound. As for Air, where it is ſtrongly pent, it matcheth a hard Body. And therefore we ſee in diſcharging of a piece, what a great noiſe it maketh. We ſee alſo, that the Charge with Bullet, or with Papet wet, and hard ſtopped; or with Powder alone rammed in hard, maketh no great difference in the loudneſs of the report. 164.

The ſharpneſs or quickneſs of the Percuſſion, is a great cauſe of the loudneſs, as well as the ſtrength: As in a Whip or Wand, if you ſtrike the Air with it, the ſharper and quicker you ſtrike it, the louder ſound it giveth. And in playing upon the Lute or Virginals, the quick ſtroke or touch is a great life to the Sound. The cauſe is, for that the quick ſtriking cutteth the Air ſpeedily, whereas the ſoft ſtriking, doth rather beat than cut. 165.

THe *Communication of Sounds* (as in Bellies of *Lutes*, empty Veſſels, &c.) hath been touched obiter, in the *Majoration of Sounds*: But it is fit alſo to make a Title of it apart. Experiments in Conſort, touching the *Communication of Sounds.*

The Experiment, for greateſt Demonſtration of Communication of Sounds, is the Chiming of Bells; where, if you ſtrike with a Hammar upon the upper part, and then upon the midſt, and then upon the lower, you ſhall finde the ſound to be more Trebble, and more Baſe, according unto the Concave on the inſide, though the Percuſſion be onely on the outſide. 166.

When the Sound is created between the Blaſt of the Mouth, and the Air of the Pipe, it hath nevertheleſs ſome communication with the matter of the ſides of the Pipe, and the ſpirits in them contained: For in a Pipe or Trumpet of Wood and Braſs, the ſound will be diverſe; ſo if the Pipe be covered 167.

with Cloth or Silk, it will give a diverſe Sound from that it would do of it ſelf; ſo if the Pipe be a little wet on the inſide, it will make a differing Sound, from the ſame Pipe dry.

168. That Sound made within Water, doth communicate better with a hard Body thorow Water, than made in Air, it doth with Air. *Vide Experimentum*, 134.

Experiments in Conſort, touching *Equality and Inequality of Sounds.*

WE have ſpoken before (in the Inquiſition touching *Muſick*) of *Muſical Sounds*, whereunto there may be a Concord or Diſcord in two Parts; which *Sounds* we call *Tones*, and likewiſe of *Immuſical Sounds*; and have given the cauſe, that the Tone proceedeth of Equality, and the other of Inequality. And we have alſo expreſſed there, what are the Equal Bodies that give Tones, and what are the Unequal that give none. But now we ſhall ſpeak of ſuch Inequality of Sounds, as proceedeth not from the Nature of the Bodies themſelves, but is accidental, Either from the Roughneſs or Obliquity of the Paſſage, or from the Doubling of the Percutient, or from the Trepidation of the Motion.

169. A Bell if it have a Rift in it, whereby the ſound hath not a clear paſſage, giveth a hoarſe and jarring ſound; ſo the Voice of Man, when by cold taken, the Weſil groweth rugged, and (as we call it) furred, becometh hoarſe. And in theſe two inſtances, the Sounds are ingrate, becauſe they are meerly unequal; but if they be unequal in equality, then the Sound is Grateful, but Purling.

170. All *Inſtruments* that have either Returns, as Trumpets; or Flexions, as Cornets; or are drawn up, and put from, as Sackbuts, have a Purling Sound; But the Recorder or Flute that have none of theſe Inequalities, give a clear Sound. Nevertheleſs, the Recorder it ſelf or Pipe, moiſtened a little in the inſide, ſoundeth more ſolemnly, and with a little Purling or Hiſſing. Again, a Wreathed String, ſuch as are in the Baſe Strings of Bandoraes, giveth alſo a Purling Sound.

171. Lut a Lute-ſtring, if it be meerly unequal in his parts, giveth a harſh and untuneable Sound, which ſtrings we call falſe, being bigger in one place, than in another; and therefore Wire-ſtrings are never falſe. We ſee alſo, that when we try a falſe Lute-ſtring, we uſe to extend it hard between the Fingers, and to fillip it; and if it giveth a double ſpecies, it is true; but if it giveth a trebble or more, it is falſe.

172. Waters, in the noiſe they make as they run, repreſent to the Ear a trembling noiſe; and in Regals (where they have a Pipe, they call the *Nightingale-Pipe*, which containeth Water) the Sound hath a continual trembling. And Children have alſo little things they call Cocks, which have water in them; and when they blow, or whiſtle in them, they yield a trembling noiſe; which Trembling of Water, hath an affinity with the Letter L. All which Inequalities of Trepidation, are rather pleaſant, than otherwiſe.

173. All Baſe Notes, or very Trebble Notes, give an Aſper Sound; for that the Baſe ſtriketh more Air, than it can well ſtrike equally; and the Trebble cutteth the Air ſo ſharp, as it returneth too ſwift, to make the Sound equal; and therefore a Mean or Tenor is the ſweeteſt part.

174. We know nothing, that can at pleaſure make a *Muſical* or *Immuſical Sound*, by voluntary Motion, but the Voice of Man and Birds. The cauſe is (no doubt) in the Weſil or Wind-Pipe, (which we call *Aſperia Arteria*,) which

which being well extended, gathered equality; as a Bladder that is wrinckled, if it be extended, becometh ſmooth. The extenſion is always, more in Tones, than in Speech; therefore the inward voice or whiſper, can never give a Tone. And in ſinging, there is (manifeſtly) a greater working and labor of the Throat, than in ſpeaking; as appeareth in the thruſting out, or drawing in of the Chin, when we ſing.

175. The *Humming of Bees* is an unequal buzzing, and is conceived by ſome of the Ancients, not to come forth at their Mouth, but to be an inward Sound; but (it may be) it is neither, but from the motion of their Wings; for it is not heard, but when they ſtir.

176. All Metals quenched in Water, give a ſibillation or hiſſing ſound (which hath an affinity with the Letter Z.) notwithſtanding the Sound be created between the Water or Vapor, and the Air. Seething alſo, if there be but ſmall ſtore of Water in a Veſſel, giveth a hiſſing ſound; but boyling in a full Veſſel, giveth a bubbling ſound, drawing ſomewhat near to the Cocks uſed by Children.

177. Tryal would be made, whether the *Inequality*, or interchange of the *Medium*, will not produce an Inequality of Sound; as if three Bells were made one within another, and Air betwixt each; and then the outermoſt Bell were chimed with a Hammer, how the Sound would differ from a ſimple Bell. So likewiſe take a Plate of Braſs, and a Plank of Wood, and joyn them cloſe together, and knock upon one of them, and ſee if they do not give an unequal Sound. So make two or three Partitions of Wood in a Hogſhead, with holes or knots in them; and mark the difference of their ſound, from the ſound of an Hogſhead, without ſuch partitions.

178. Experiments in Conſort, touching the *more Trebble, and the more Baſe Tones or Muſical Sounds.*

IT is evident, that the Percuſſion of the greater quantity of Air, cauſeth the baſer Sound; and the leſs quantity, the more trebble Sound. The Percuſſion of the greater quantity of Air, is produced by the greatneſs of the Body percuſſing; by the Latitude of the Concave, by which the Sound paſſeth, and by the Longitude of the ſame Concave. Therefore we ſee, that a Baſe-ſtring is greater than a Trebble; a Baſe-pipe hath a greater bore than a Trebble: And in Pipes, and the like, the lower the Note holes be, and the further off from the Mouth of the Pipe, the more Baſe ſound they yield; and the nearer the Mouth, the more Trebble. Nay more, if you ſtrike an entire Body, as an Andiron of Braſs, at the top it maketh a more Trebble ſound, and at the bottom a Baſer.

179. It is alſo evident, that the ſharper or quicker Percuſſion of Air, cauſeth the more Trebble ſound; and the ſlower or heavier, the more Baſe ſound. So we ſee in Strings, the more they are wound up and ſtrained (and thereby give a more quick ſtart back) the more Trebble is the ſound; and the ſlacker they are, or leſs wound up, the Baſer is the ſound. And therefore a bigger String more ſtrained, and a leſſer String leſs ſtrained, may fall into the ſame Tone.

180. *Children, Women, Eunuchs*, have more ſmall and ſhrill Voices than Men. The reaſon is, not for that Men have greater heat, which may make the voice ſtronger, (for the ſtrength of a Voice or Sound, doth make a difference in the loudneſs or ſoftneſs, but not in the Tone) but from the dilatation of the Organ, which (it is true) is likewiſe cauſed by heat; but the cauſe of changing the voice at the years of puberty, is moſt obſcure. It ſeemeth to be for that, when much of the moiſture of the Body, which did before irregate the

the Parts, is drawn down to the Spermatical Veſſels, it leaveth the Body more hot than it was; whence cometh the dilatation of the Pipes: For we ſee plainly all effects of Heat do then come on; as Piloſity, more roughneſs of the skin, hardneſs of the fleſh, &c.

181. The induſtry of the *Muſitian*, hath produced two other means of *Straining*, or *Intenſion of Strings*, beſides their *Winding up*. The one is the *Stopping* of the *String* with the *Finger*; as in the Necks of Lutes, Viols, &c. The other is the *Shortneſs* of the *String*; as in Harps, Virginals, &c. Both theſe have one and the ſame reaſon, for they cauſe the *String* to give a quicker ſtart.

182. In the ſtraining of a String, the further it is ſtrained, the leſs ſuperſtraining goeth to a Note: For it requireth good winding of a String, before it will make any Note at all. And in the ſtops of Lutes, &c. the higher they go, the leſs diſtance is between the Frets.

183. If you fill a *Drinking Glaſs* with Water, (eſpecially one ſharp below, and wide above) and fillip upon the Brim, or outſide; and after, empty part of the Water, and ſo more and more, and ſtill try the Tone by fillipping; you ſhall finde the Tone fall, and be more Baſe as the Glaſs is more empty.

Experiments in Conſort, touching the Proportion of Trebble and Baſe Tones.

THe juſt and meaſured Proportion of the Air percuſſed, towards the Baſeneſs or Trebbleneſs of Tones, is one of the greateſt ſecrets in the Contemplation of Sounds. For it diſcovereth the true Coincidence of Tones into Diapaſons, which is the return of the ſame Sound. And ſo of the Concords and Diſcords, between the Uniſon and Diapaſon; which we have touched before in the *Experiments of Muſick*, but think fit to reſume it here as a principal part of our Inquiry, touching the *Nature of Sounds*. It may be found out in the Proportion of the Winding of Strings, in the Proportion of the Diſtance of Frets, and in the Proportion of the Concave of Pipes, &c. But moſt commodiouſly in the laſt of theſe.

184. Try therefore the Winding of a String once about, as ſoon as it is brought to that extenſion as will give a Tone, and then of twice about, and thrice about, &c. And mark the ſcale or difference of the Rice of the Tone, whereby you ſhall diſcover in one, two effects; both the proportion of the Sound towards the Dimenſion of the Winding, and the proportion likewiſe of the Sound towards the String, as it is more or leſs ſtrained. But note that to meaſure this, the way will be to take the length in a right line of the String, upon any Winding about of the Peg.

185. As for the Stops, you are to take the number of Frets, and principally the length of the Line, from the firſt ſtop of the String, unto ſuch a ſtop as ſhall produce a *Diapaſon* to the former ſtop, upon the ſame String.

186. But it will beſt (as it is ſaid) appear in the *Bores of Wind-Inſtruments*; and therefore cauſe ſome half dozen Pipes to be made in length, and all things elſe a like, with a ſingle double, and ſo one to a ſextuple Bore; and ſo mark what fall of Tone every one giveth. But ſtill in theſe three laſt inſtances you muſt diligently obſerve, what length of String, or diſtance of Stop, or concave of Air, maketh what riſe of Sound. As in the laſt of theſe (which, as we ſaid, is that which giveth the apteſt demonſtration) you muſt ſet down what increaſe of Concave goeth to the making of a Note higher, and what of two Notes, and what of three Notes, and ſo up to the Diapaſon: For then the great ſecret of Numbers and Proportions will appear. It is not unlikely,

unlikely, that those that make Recorders, &c. know this already; for that they make them in Sets. And likewise Bell-Founders in fitting the tune of their Bells: So that enquiry may save tryal. Surely, it hath been observed by one of the Ancients, that an empty Barrel knocked upon with the finger, giveth a Diapason to the Sound of the like Barrel full: But how that should be, I do not well understand, for that the knocking of a Barrel full or empty, doth scarce give any Tone.

187. There is required some sensible difference in the Proportion of creating a Note towards the Sound it self, which is the Passive; and that it be not too near, but at a distance: For in a Recorder, the three uppermost holes yield one Tone, which is a Note lower than the Tone of the first three. And the like (no doubt) is required in the winding or stopping of Strings.

Experiments in Consort, touching *Exterior and Interior Sounds.*

THere is another difference of Sounds, which we will call *Exterior* and *Interior*. It is not Soft nor Loud; nor it is not Base, nor Trebble; nor it is not *Musical*, nor *Immusical*. Though it be true, that there can be no Tone in an *Interior Sound*; but on the other side, in an *Exterior Sound*, there may be both *Musical* and *Immusical*. We shall therefore enumerate them, rather than precisely distinguish them; though to make some adumbration of (that we mean) the Interior, is rather an Impulsion or Contusion of the Air, than an *Elysion* or *Section* of the same; so as the Percussion of the one towards the other, differeth as a Blow differeth from a Cut.

188. In Speech of Man, the Whispering, (which they call *Susurrus* in Latin,) whether it be louder or softer, is an Interior Sound; but the Speaking out, is an Exterior Sound: And therefore you can never make a Tone, nor sing in Whispering; but in Speech you may. So Breathing, or Blowing by the Mouth, Bellows, or Wind (though loud) is an Interior Sound; but the blowing thorow a Pipe, or Concave (though soft) is an Exterior. So likewise, the greatest Winds, if they have no coarctation, or blow not hollow, give any Interior Sound; the whistling or hollow Wind, yieldeth a singing, or Exterior Sound; the former being pent by some other Body, the latter being pent in by his own Density: And therefore we see, That when the Wind bloweth hollow, it is a sign of Rain; the flame, as it moveth within it self, or is blown by a Bellows, giveth a murmur or Interior Sound.

189. There is no hard Body, but struck against another hard Body, will yield an Exterior Sound, greater or lesser; insomuch, as if the Percussion be oversoft, it may induce a nullity of sound, but never an Interior Sound; as when one treadeth so softly, that he is not heard.

190. Where the Air is the Percutient, pent or not pent, against a hard Body, it never giveth an Exterior Sound; as if you blow strongly with a Bellows against a Wall.

191. *Sounds* (both Exterior and Interior) may be made as well by Suction, as by emission of the Breath; as in Whistling, or Breathing.

192. Experiments in Consort, touching *Articulations of Sounds.*

IT is evident, and it is one of the strangest secrets in Sounds; that the whole Sound is not in the whole Air onely, but the whole Sound is also in every small part of the Air. So that all the curious diversity of Articulate

culate ſounds of the voice of Man or Birds, will enter into a ſmall crany, inconfuſed.

193. The unequal agitation of the *Winds*, and the like, though they be material to the carriage of the Sounds, further or leſs way; yet they do not confound the Articulation of them at all, within that diſtance that they can be heard, though it may be, they make them to be heard leſs way, than in a ſtill, as hath been partly touched.

194. Over-great diſtance confoundeth the Articulation of Sounds, as we ſee, that you may hear the ſound of a Preachers voice, or the like, when you cannot diſtinguiſh what he ſaith. And one Articulate ſound will confound another, as when many ſpeak at once.

195. In the Experiment of ſpeaking under VVater, when the voice is reduced to ſuch an extream exhility, yet the Articulate ſounds (which are the words) are not confounded, as hath been ſaid.

196. I conceive that an extream ſmall, or an extream great ſound, cannot be Articulate, but that the Articulation requireth a mediocrity of ſound: For that the extream ſmall ſound confoundeth the Articulation by contracting, and the great ſound by diſperſing; and although (as was formerly ſaid) a Sound Articulate, already created, will be contracted into a ſmall crany; yet the firſt Articulation requireth more dimenſion.

197. It hath been obſerved, that in a Room, or in a Chappel, Vaulted below, and Vaulted likewiſe in the Roof, a Preacher cannot be heard ſo well, as in the like places not ſo Vaulted. The cauſe is, for that the ſubſequent words come on, before the precedent words vaniſh; and therefore the Articulate Sounds are more confuſed, though the groſs of the Sound be greater.

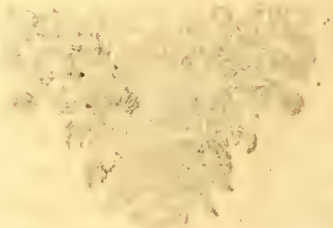
198. The motions of the *Tongue, Lips, Throat, Palate, &c.* which go to the making of the ſeveral *Alphabetical Letters* are worthy inquiry, and pertinent to the preſent Inquiſition of Sounds: But becauſe they are ſubtil and long to deſcribe, we will refer them over, and place them amongſt the *Experiments of Speech*. The *Hebrews* have been diligent in it, and have aſſigned which Letters are *Labial*, which *Dental*, which *Guttural, &c.* As for the *Latins* and *Grecians*, they have diſtinguiſhed between *Semi-vowels* and *Mutes*; and in *Mutes*, between *Mutæ Tenues*, *Mediæ* and *Aſpiratæ*, not amiſs, but yet not diligently enough. For the ſpecial ſtrokes and motions that create thoſe Sounds, they have little enquired; as that the Letters, B. P. F. M. are not expreſſed, but with the contracting, or ſhutting of the Mouth; that the Letters N. and B. cannot be pronounced, but that the Letter N. will turn into M. as *Hecatonba* will be *Hecatomba*. That M. and T. cannot be pronounced together, but P. will come between; as *Emtus*, is pronounced *Emptus*, and a number of the like: So that if you enquire to the full, you will finde, that to the making of the whole Alphabet, there will be fewer ſimple Motions required, than there are Letters.

199. The Lungs are the moſt ſpongy part of the Body, and therefore ableſt to contract and dilate it ſelf; and where it contracteth it ſelf, it expelleth the Air, which thorow the *Artire*, *Throat*, and *Mouth*, maketh the Voice: But yet *Arciculation* is not made, but with the help of the *Tongue*, *Pallate*, and the reſt of thoſe they call *Inſtruments of Voice*.

There

200.

There is found a Similitude between the Sound that is made by *Inanimate Bodies*, or by *Animate Bodies*, that have no Voice Articulate; and divers Letters of Articulate Voices; and commonly Men have given such names to those Sounds as do allude unto the Articulate Letters. As *Trembling of Water* hath resemblance with the Letter L. *Quenching of Hot Metals* with the Letter Z. *Snarling of Dogs* with the Letter R. The *Noise of Scritch-Owls* with the Letters Sh. *Voice of Cats* with the Dipthong Eu. *Voice of Chucko's* with the Dipthong Ou. *Sounds of Strings* with the Letters Ng. So that if a Man (for curiosity or strangeness sake) would make a Puppet, or other dead Body, to pronounce a word: Let him consider on the one part, the Motion of the *Instruments of Voice*; and on the other part, the like Sounds made in *Inanimate Bodies*; and what Conformity there is, that causeth the Similitude of *Sounds*; and by that he may minister light to that effect.



NATURAL HISTORY.

Century III.

ALL *Sounds* (whatsoever) move round, that is to say, On all sides, Upwards, Downwards, Forewards, and Backwards: This appeareth in all Instances. 201. Experiments in Consort, touching the *Motions of Sounds, in what Lines they are Circular, Oblick, Straight, Vpwards, Downwards, Forwards, Backwards.*

Sounds do not require to be conveighed to the *Sense* in a right Line, as *Visibles* do, but may be arched, though it be true they move strongest in a right Line; which nevertheless is not caused by the rightness of the Line, but by the shortness of the distance. *Linea recta brevissima.* And therefore, we see if a Wall be between, and you speak on the one side, you hear it on the other; which is not because the sound passeth thorow the Wall, but arched over the Wall. 202.

If the Sound be stopped and repercussed, it cometh about on the other side, in an oblick Line: So, if in a Coach, one side of the Boot be down, and the other up, and a Begger beg on the close side, you would think that he were on the open side. So likewise, if a Bell or Clock, be (for example) on the North-side of a Chamber, and the Window of that Chamber be upon the South; he that is in the Chamber, will think the sound came from the South. 203.

Sounds, though they spred round, so that (there is an orb, or spherical *Area* of the *Sound*) yet they move strongest, and go furthest in the Fore-Lines, from the first Local Impulsion of the Air. And therefore in Preaching, you shall hear the Preachers voice better before the Pulpit than behinde it, or on the sides, though it stand open. So a *Harquebuz* or *Ordnance* will be further heard forwards, from the mouth of the Piece, than backwards, or on the sides. 204.

It may be doubted, that Sounds do move better downwards, than upwards. *Pulpits* are placed high above the people: And when the *Ancient* 205.

Generals ſpake to their Armies, they had ever a Mount of Turff caſt up, where upon they ſtood. But this may be imputed to the ſtops and obſtacles which the voice meeteth with, when one ſpeaketh upon the level. But there ſeemeth to be more in it; for it may be, that Spiritual Species, both of things viſible, and Sounds, do move better downwards than upwards. It is a ſtrange thing, that to Men ſtanding below on the ground, thoſe that be on the top of *Pauls*, ſeem much leſs than they are, and cannot be known: But to Men above thoſe below, ſeem nothing ſo much leſſened, and may be known; yet it is true, That all things to them above, ſeem alſo ſomewhat contracted and better collected into figure; as Knots in Gardens ſhew beſt from an upper Window or Tarras.

206. But to make an exact tryal of it, let a Man ſtand in a Chamber, not much above the Ground, and ſpeak out at the Window thorow a Trunck, to one ſtanding on the Ground as ſoftly as he can, the other laying his Ear cloſe to the Trunck: Then *Via verſa*, let the other ſpeak below keeping the ſame proportion of ſoftneſs; and let him in the Chamber lay his Ear to the Trunck. And this may be the apteſt means to make a Judgment, whether Sounds deſcend or aſcend better.

207. Experiments in Conſort, touching the *Laſting and Periſhing of Sounds; and touching the time they require to the Generation or Delation.*

AFter that *Sound* is created (which is in a moment) we finde it continueth ſome ſmall time, melting by little and little. In this there is a wonderful error amongſt Men, who take this to be a continuance of the firſt Sound; whereas (in truth) it is a Renovation, and not a Continuance: For the Body percuſſed, hath by reaſon of the Percuſſion, a Tripidation wrought in the minute parts, and ſo reneweth the Percuſſion of the Air. This appeareth manifeſtly, becauſe that the Melting ſound of a Bell, or of a ſtring ſtrucken, which is thought to be a Continuance, ceaſeth as ſoon as the Bell or ſtring are touched. As in a Virginal, as ſoon as ever the Jack falleth, and toucheth the ſtring, the ſound ceaſeth; and in a Bell, after you have chimed upon it, if you touch the Bell, the ſound ceaſeth. And in this you muſt diſtinguiſh, that there are two Trepidations, The one Manifeſt and Local; as of the Bell, when it is Penſile; the other Secret, of the Minute parts, ſuch as is deſcribed in the ninth Inſtance. But it is true, that the Local helpeth the Secret greatly. We ſee likewiſe, that in Pipes, and other Wind Inſtruments, the ſound laſteth no longer than the breath bloweth. It is true, that in Organs there is a confuſed murmur for a while, after you have played, but that is but while the Bellows are in falling.

208. It is certain, that in the noiſe of great Ordnance, where many are ſhot off together, the ſound will be carried (at the leaſt) twenty miles upon the Land, and much further upon the Water, but then it will come to the Ear; not in the inſtant of the ſhooting off, but it will come an hour, or more later: This muſt needs be a Continuance of the firſt Sound; for there is no Trepidation which ſhould renew it. And the touching of the Ordnance would not extinguiſh the ſound the ſooner: So that in great Sounds, the Continuance is more than Momentany.

209. To try exactly the time wherein Sound is delated, Let a Man ſtand in a Steeple, and have with him a Taper, and let ſome Veil be put before the Taper, and let another Man ſtand in the Field a mile off; then let him in the Steeple ſtrike the Bell, and in the ſame inſtant withdraw the Veil, and ſo let him in the Field tell by his Pulſe, what diſtance of time there is between the Light ſeen, and the Sound heard: For it is certain, That the Delation of

Light

Light is in an instant. This may be tried in far greater distances, allowing greater Lights and Sounds.

210. It is generally known and observed, that Light and the object of Sight, move swifter than Sound; for we see the flash of a piece is seen sooner, than the noise is heard. And in hewing Wood, if one some distance off, he shall see the Arm lifted up for a second stroke, before he hear the noise of the first; and the greater the distance, the greater is the prevention: As we see in *Thunder*, which is far off, where the *Lightning* precedeth the crack a good space.

211. Colours, when they represent themselves to the Eye, fade not nor melt not by degrees, but appear still in the same strength; but Sounds melt, and vanish, by little and little. The cause is, for that Colours participate nothing with the motion of the Air, but Sounds do. And it is a plain argument that Sound participateth of some Local Motion of the Air, (as a cause *Sine quâ non*) in that it perisheth so suddenly: For in every Section, or Impulsion of the Air, the Air doth suddenly restore and reunite it self, which the Water also doth, but nothing so swiftly.

Experiments in Consort, touching the *Passage and Interceptions of Sounds.*

212. IN the Tryals of the Passage, or not Passage of Sounds, you must take heed you mistake not the passing by the sides of a Body, for the passing thorow a Body; and therefore you must make the Intercepting Body very close; for Sound will pass thorow a small chinck.

Where Sound passeth thorow a hard, or close Body (as thorow Water, thorow a Wall, thorow Metal, as in Hawks Bells stopped, &c.) the hard or close Body, must be but thin and small; for else it deadeth and extinguisheth the Sound utterly. And therefore, in the Experiment of Speaking in Air under Water, the voice must not be very deep within the Water, for then the Sound pierceth not. So if you speak on the further side of a close Wall, if the Wall be very thick, you shall not be heard; and if there were an Hogshead empty, whereof the sides were some two foot thick, and the Bunghole stopped. I conceive, the resounding sound by the Communication of the outward Air with the Air within, would be little or none, but onely you shall hear the noise of the outward knock, as if the Vessel were full.

213. It is certain, that in the passage of Sounds thorow hard Bodies, the Spirit or Pneumatical part of the hard Body it self doth co-operate; but much better, when the sides of that hard Body are struck, than when the percussion is onely within, without touch of the sides. Take therefore a Hawks-Bell, the holes stopped up, and hang it by a thred within a Bottle-Glass, and stop the Mouth of the Glass very close with Wax, and then shake the Glass, and see whether the Bell give any sound at all, or how weak? But note, that you must instead of Thred take a Wire, or else let the Glass have a great Belly, lest when you shake the Bell, it dash upon the sides of the Glass.

214. It is plain that a very long and down right arch for the Sound to pass, will extinguish the Sound quite, so that that Sound, which would be heard over a Wall, will not be heard over a Church; nor that Sound, which will be heard, if you stand some distance from the VVall, will be heard if you stand close under the VVall.

215. Soft and Foraminous Bodies in the first creation of the Sound, will dead it; for the striking against Cloth or Fur, will make little sound, as hath been said: But in the passage of the sound, they will admit it better than harder Bodies, as we see, that Curtains and Hangings will not stay the sound much; but Glass windows, if they be very close, will check a sound more, than the like thickness of Cloth. VVe see also in the rumbling of the Belly, how easily the Sound passeth thorow the Guts and Skin.

216. It is worthy the inquiry, whether great Sounds (as of Ordnance or Bells) become not more Weak and Exile, when they pass thorow small Cranies. For the Subtilties of Articulate Sounds, (it may be) may pass thorow small Cranies, not confused; but the magnitude of the Sound (perhaps) not so well.

217. Experiments in Consort, touching the *Medium of Sounds.*

THe *Mediums of* Sounds, are Air, soft and porous Bodies; also Water, and hard Bodies refuse not altogether to be *Mediums of Sounds.* But all of them are dull and unapt differents, except the Air.

218 In Air, the thinner or drier Air, carrieth not the Sound so well, as the more dense; as appeareth in Night Sounds, and Evening Sounds, and Sounds in moist Weather, and Southern Winds. The reason is already mentioned in the Title of *Majoration of Sounds*; being, for that thin Air is better pierced, but thick Air preserveth the Sound better from waste: Let further Tryal be made by hollowing in Mists, and gentle Showers; for (it may be) that will somewhat dead the Sound.

219. How far forth Flame may be a *Medium of Sounds*, (especially of such Sounds as are created by Air, and not betwixt hard Bodies) let it be tried in speaking, where a Bonefire is between; but then you must allow for some disturbance, the noise that the Flame it self maketh.

220. Whether any other Liquors being made *Mediums*, cause a diversity of Sound from Water, it may be tryed: As by the knapping of the Tongs, or striking the bottom of a Vessel filled either with Milk or with Oyl; which though they be more light, yet are they more unequal Bodies than Air.

Of the Natures *of the* Mediums, *we have now spoken; as for the* Disposition *of the said* Mediums, *it doth consist in the Penning, or not Penning of the* Air; *of which, we have spoken before in the Title of* Delation of Sounds. *It consisteth also in the* Figure *of the* Concave, *through which it passeth. Of which, we will speak next.*

Experiments in Consort, *what the Figures of the Pipes or Concaves, or the Bodies different, conduce to the Sounds.*

HOw the *Figures of Pipes* or *Concaves*, through which *Sounds* pass, or of other *Bodies* different; conduce to the variety and alteration of the *Sounds*, either in respect of the greater quantity, or less quantity of Air, which the *Concaves* receive; or in respect of the carrying of Sounds longer or shorter way; or in respect of many other Circumstances, they have been touched, as falling into other Titles. But those *Figures* which we now are to speak of, we intend to be, as they concern the Lines, through which Sound passeth: As *Straight, Crooked, Angular, Circular, &c.*

221. The Figure of a Bell partaketh of the *Pyramis*, but yet coming off, and dilating more suddenly. The *Figure* of a *Hunters Horn*, and *Cornet*, is oblick, yet they have likewise straight Horns; which if they be of the same bore with the oblick, differ little in Sound, save that the straight require somewhat a stronger blast. The *Figure* of *Recorders*, and *Flutes*, and *Pipes*, are straight; but the *Recorder* hath a less bore, and a greater, above and below. The *Trumpet* hath the *Figure* of the *Letter S.* which maketh that Purling Sound, &c. Generally, the straight Line hath the cleanest and roundest Sound, and the crooked the more Hoarse, and Jarring.

222. Of a Sinuous Pipe that may have some four Flexions, tryal would be made. Likewise of a Pipe made like a Cross, open in the midst; and so likewise

likewise of an *Angular Pipe*; and see what will be the effects of these several Sounds. And so again of a *Circular Pipe*: As if you take a Pipe perfect round, and make a hole whereinto you shall blow, and another hole not far from that; but with a traverse or stop between them: So that your breath may go the Round of the Circle, and come forth at the second hole. You may try likewise Percussions of solid Bodies of several Figures: As *Globes, Flats, Cubes, Crosses, Triangles, &c.* And their Combinations; as *Flat* against *Flat*, and *Convex* against *Convex*, and *Convex* against *Flat, &c.* And mark well the diversities of the Sounds. Try also the difference in sound of several Crassitudes of hard Bodies percussed, and take knowledge of the diversities of the sounds. I my self have tried, That a *Bell of Gold* yieldeth an excellent sound, not inferior to that of *Silver* or *Brass*, but rather better. Yet we see that a piece of money of *Gold*, soundeth far more flat than a piece of money of *Silver*.

223. The Harp hath the concave, not along the strings, but across the strings; and no *Instrument* hath the sound so melting and prolonged, as the *Irish Harp*. So as I suppose, that if a *Virginal* were made with a double Concave; the one all the length as the *Virginal* hath, the other at the end of the *strings*, as the *Harp* hath; it must needs make the sound perfecter, and not so shallow, and jarring. You may try it without any Sound-board along, but onely Harp-wise, at one end of the strings; or lastly, with a double concave, at each end of the strings one.

224. Experiments in Consort, touching the *Mixture of Sounds*.

THere is an apparent diversity between the *Species Visible* and *Audible*, in this. That the *Visible* doth not mingle in the *Medium*, but the *Audible* doth. For if we look abroad, we see Heaven, a number of Stars, Trees, Hills, Men, Beasts, at once; and the Species of the one, doth not confound the other: But if so many Sounds come from several parts, one of them would utterly confound the other. So we see, That Voices or Consorts of *Musick* do make a harmony by mixture, which Colours do not. It is true nevertheless, that a great light drowneth a smaller, that it cannot be seen; as the Sun that of a Gloworm, as well as a great sound drowneth a lesser. And I suppose likewise, that if there were two Lanthorns of Glass, the one a Crimsin, and the other an Azure, and a Candle within either of them, those coloured lights, would mingle and cast upon a White Paper, a Purple colour. And even in colours, they yield a faint and weak mixture; for White Walls make rooms more lightsome, than Black, &c. But the cause of the Confusion in Sounds, and the Inconfusion in Species Visible, is, For that the Sight worketh in right Lines, and maketh several Cones; and so there can be no Coincidence in the Eye, or Visual Point: But Sounds that move in oblick and arcuate Lines, must needs encounter, and disturb the one the other.

225. The sweetest and best Harmony is, when every Part or Instrument is not heard by it self, but a conflation of them all, which requireth to stand some distance off. Even as it is in the mixture of perfumes, or the taking of the smells of several Flowers in the Air.

226. The disposition of the Air, in other qualities, except it be joyned with Sound, hath no great operation upon Sounds: For whether the Air be lightsome or dark, hot or cold; quiet or stirring, (except it be with noise) sweet-smelling, or stinking, or the like; it importeth not much. Some petty alteration or difference it may make.

227. But Sounds do disturb and alter the one the other: Sometimes the one drowning the other, and making it not heard; sometimes the one jarring and discording with the other, and making a confusion; sometimes the one mingling and compounding with the other, and making an harmony.

228. Two Voices of like loudness, will not be heard twice as far, as one of them alone; and two Candles of like light, will not make things seem twice as far off, as one. The cause is profound, but it seemeth, that the Impressions from the objects of the Senses, do mingle respectively, every one with his kinde; but not in proportion, as is before demonstrated: And the reason may be, because the first impression, which is from Privative to Active, (as from Silence to Noise, or from Darkness to Light,) is a greater degree, than from less noise, to more noise, or from less light, to more light. And the reason of that again may be, For that the Air, after it hath received a charge, doth not receive a surcharge, or greater charge, with like appetite, as it doth the first charge. As for the increase of Vertue generally, what proportion it beareth to the increase of the Matter, it is a large Field, and to be handled by it self.

229. Experiments in Consort, touching *Meliration of Sounds.*

ALL Reflexions Concurrent, do make Sounds greater; but if the Body that createth, either the original Sound, or the Reflexion, be clean and smooth, it maketh them sweeter. Tryal may be made of a *Lute* or *Vial*, with the Belly of polished Brass in stead of Wood. We see, that even in the open Air, the *Wire-string* is sweeter than the *string of Guts*. And we see, that for *Reflexion*, *Water* excelleth; as in *Musick* near the Water, or in *Eccho's*.

230. It hath been tryed, that a *Pipe*, a little moistned on the inside, but yet so as there be no drops left, maketh a more solemn sound, than if the Pipe were dry; but yet with a sweet degree of *Sibilation* or *Purling*, as we touched it before in the Title of *Equality*. The cause is, for that all things porous, being superficially wet, and (as it were) between dry and wet, become a little more even and smooth; but the Purling (which must needs proceed of Inequality) I take to be bred between the smoothness of the inward Surface of the Pipe which is wet, and the rest of the Wood of the Pipe, unto which the wet cometh not, but it remaineth dry.

231. In Frosty weather, *Musick* within doors soundeth better; which may be, by reason not of the disposition of the Air, but of the Wood or String of the Instrument, which is made more crisp, and so more porous and hollow; and we see that *Old Lutes* sound better than *New*, for the same reason: And so do *Lute-strings* that have been kept long.

232. Sound is likewise meliorated by the mingling of open Air with pent Air: Therefore tryal may be made of a *Lute* or *Vial* with a double Belly, making another Belly with a knot over the string; yet so, as there be room enough for the strings, and room enough to play below that Belly. Tryal may be also made of an *Irish Harp*, with a concave on both sides, whereas it useth to have it but on one side. The doubt may be, lest it should make too much resounding, whereby one Note would overtake another.

233. If you sing in the hole of a *Drum*, it maketh the singing more sweet. And so I conceive it would, if it were a Song in Parts sung into several *Drums*; and for handsomness and strangeness sake, it would not be amiss to have a Curtain between the place where the *Drums* are, and the hearers.

234. When a sound is created in the *Wind-Instrument*, between the Breath and Air, yet if the sound be communicate with a more equal Body of the Pipe,

it

it meliorateth the ſound. For (no doubt) there would be a differing ſound in a Trumpet or Pipe of Wood, and again, in a Trumpet or Pipe of Braſs. It were good to try *Recorders* and *Hunters Horns* of *Braſs*, what the ſound would be.

Sounds are meliorated by the Intenſion of the Senſe, where the common Senſe is collected moſt to the particular Senſe of Hearing, and the Sight ſuſpended: And therefore Sounds are ſweeter, as well as greater, in the Night than in the Day; and I ſuppoſe, they are ſweeter to blinde men, than to others: And it is manifeſt, that between ſleeping and waking, (when all the Senſes are bound and ſuſpended) *Muſick* is far ſweeter than when one is fully waking. 235

IT is a thing ſtrange in Nature, when it is attentively conſidered, How Children and ſome Birds learn to imitate Speech. They take no mark at all of the Motion of the Mouth of him that ſpeaketh, for Birds are as well taught in the dark, as by light. The ſounds of Speech are very curious and exquiſite; ſo one would think it were a Leſſon hard to learn. It is true, that it is done with time, and by little and little, and with many eſſays and proffers: But all this diſchargeth not the wonder. It would make a Man think (though this, which we ſhall ſay, may ſeem exceeding ſtrange) that there is ſome tranſmiſſion of Spirits, and that the Spirit of the Teacher put in motion, ſhould work with the Spirits of the Learner, a prediſpoſition to offer to imitate, and ſo to perfect the imitation by degrees. But touching Operations by Tranſmiſſions of Spirits (which is one of the higheſt ſecrets in Nature) we ſhall ſpeak in due place, chiefly when we come to inquire of Imagination. But as for Imitation, it is certain, That there is in Men, and other Creatures, a prediſpoſition to imitate. We ſee how ready Apes and Monkies are to imitate all motions of Man: And in the catching of Dottrels, we ſee how the fooliſh Bird playeth the Ape in geſtures: And no Man (in effect) doth accompany with others, but he learneth (ere he is aware) ſome Geſture, or Voice, or Faſhion of the other. 236. Experiments in Conſort, touching the *Imitation of Sounds*.

In Imitation of *Sounds*, that Man ſhould be the Teacher, is no part of the matter: For Birds will learn one of another, and there is no reward by feeding, or the like, given them for the imitation: And beſides, you ſhall have Parrets that will not onely imitate Voices, but Laughing, Knocking, Squeaking of a Door upon the Hinges, or of a Cart-wheel, and (in effect) any other noiſe they hear. 237.

No Beaſt can imitate the Speech of Man, but Birds onely: For the Ape it ſelf, that is ſo ready to imitate otherwiſe, attaineth not any degree of imitation of Speech. It is true, that I have known a Dog, that if one howled in his ear, he would fall a howling a great while. What ſhould be the aptneſs of Birds, in compariſon of Beaſts, to imitate the Speech of Man, may be further inquired. We ſee that Beaſts have thoſe parts, which they count the *Inſtruments* of *Speech*, (as *Lips*, *Teeth*, *&c.*) liker unto Man than Birds. As for the *Neck*, by which the *Throat* paſſeth, we ſee many Beaſts have it for the length, as much as Birds. What better gorge or attire Birds have, may be further inquired. The Birds that are known to be ſpeakers, are *Parrets*, *Pyes*, *Jays*, *Daws*, and *Ravens*: Of which, *Parrets* have an adunck Bill, but the reſt not. 238.

But I conceive, that the aptneſs of Birds is not ſo much in the conformity of the Organs of Speech, as in their Attention. For Speech muſt come by Hearing and Learning; and Birds give more heed, and mark Sounds more 239.

more than Beasts; because naturally they are more delighted with them, and practise them more, as appeareth in their Singing. We see also, that those that teach Birds to sing, do keep them waking, to increase their attention. We see also, that Cock-Birds, amongst Singing-Birds, are ever the better singers, which may be, because they are more lively, and listen more.

240. *Labor* and *Intention* to imitate *Voices*, doth conduce much to *Imitation*: And therefore we see, that there be certain *Pantomimi*, that will represent the Voices of *Players* of *Interludes*, so to life, as if you see them not, you would think they were those *Players* themselves, and so the Voices of other men that they hear.

241. There have been some that could counterfeit the distance of Voices, (which is a secondary object of Hearing) in such sort; as when they stand fast by you, you would think the Speech came from afar off, in a fearful manner. How this is done, may be further enquired; but I see no great use of it, but for Imposture, in counterfeiting ghosts or spirits.

Experiments in Consort, touching the *Reflexion of Sounds*.

THere be three kindes of *Reflexions of Sounds*; a *Reflexion Concurrent*, a *Reflexion Iterant*, which we call *Eccho*, and a *Super-reflexion*, or an *Eccho* of an *Eccho*, whereof the first hath been handled in the Title of *Magnitude of Sounds*. The latter two we will now speak of.

242. The *Reflexion of Species Visible* by *Mirrors*, you may command, because passing it Right Lines, they may be guided to any point: But the *Reflexion of Sounds*, is hard to master; because the sound filling great spaces in arched Lines, cannot be so guided. And therefore, we see there hath not been practised any means to make Artificial Eccho's. And no Eccho already known, returneth in a very narrow room.

243. The Natural Eccho's are made upon Walls, Woods, Rocks, Hills, and Banks: As for Waters being near, they make a Concurrent Eccho; but being further off, (as upon a large River) they make an Interant Eccho: For there is no difference between the Concurrent Eccho, and the Iterant, but the quickness or slowness of the return. But there is no doubt, but Water doth help the Delation of Eccho, as well as it helpeth the Delation of Original Sounds.

244. It is certain (as hath been formerly touched,) that if you speak thorow a Trunck, stopped at the further end, you shall finde a blast return upon your mouth, but no sound at all. The cause is, for that the closeness, which preserveth the original, is not able to preserve the reflected sound; besides that, Eccho's are seldom created, but by loud Sounds. And therefore there is less hope of Artificial Eccho's in Air, pent in a narrow concave. Nevertheless it hath been tryed, that one leaning over a Well of Twenty five fathom deep, and speaking, though but softly, (yet not so soft as a whisper) the Water returned a good audible Eccho. It would be tryed, whether speaking in Caves, where there is no issue, save where you speak, will not yield Eccho's as Wells do.

245. The Eccho cometh as the Original Sound doth in a round orb of Air: It were good to try the creating of the Eccho, where the Body repercussing maketh an Angle: As against the Return of a Wall, &c. Also we see that in *Mirrors*, there is the like Angle of Incidence, from the Object to the Glass, and from the Glass to the Eye. And if you strike a Ball side-long, not full upon the Surface, the rebound will be as much the contrary way; whether

ther there be any ſuch reſilience in Eccho's (that is, Whether a Man ſhall hear better, if he ſtand aſide the Body repercuſſing, than if he ſtand where he ſpeaketh, or any where in a right Line between) may be tried; Tryal likewiſe would be made, by ſtanding nearer the place of repercuſſing, than he that ſpeaketh; and again, by ſtanding further off, than he that ſpeaketh, and ſo knowledge would be taken, whether Eccho's, as well as Original Sounds, be not ſtrongeſt near hand.

246. There be many places, where you ſhall hear a number of Eccho's one after another; and it is, when there is variety of *Hills* or *Woods*, ſome nearer, ſome further off: So that the return from the further, being laſt created, will be likewiſe laſt heard.

247. As the Voice goeth round, as well towards the back, as towards the front of him that ſpeaketh; ſo likewiſe doth the Eccho, for you have many Back-eccho's to the place where you ſtand.

248. To make an Eccho that will report three, or four, or five words diſtinctly, it is requiſite, that the Body repercuſſing be a good diſtance off: For if it be near, and yet not ſo near, as to make a Concurrent Eccho, it choppeth with you upon the ſudden. It is requiſite likewiſe, that the Air be not much pent: For Air, at great diſtance, pent, worketh the ſame effect with Air at large, in a ſmall diſtance. And therefore in the Tryal of Speaking in the Well, though the Well was deep, the Voice came back ſuddenly, and would bear the report but of two words.

249. From Eccho's upon Eccho's, there is a rare inſtance thereof in a place, which I will now exactly deſcribe. It is ſome Three or four Miles from *Paris*, near a Town called *Pont-Carenton*; and ſome Bird-bolt ſhot or more from the River of *Sean*. The Room is a Chappel, or ſmall Church; the Walls all ſtanding, both at the ſides, and at the ends; two rows of Pillars after the manner of Iſles of Churches, alſo ſtanding; the Roof all open, not ſo much as any Embowment near any of the Walls left. There was againſt every Pillar, a ſtack of Billets above a Mans height, which the Watermen, that bring Wood down the *Sean*, in Stacks, and not in Boats, laid there (as it ſeemeth) for their eaſe. Speaking at the one end, I did hear it return the Voice Thirteen ſeveral times; and I have heard of others, that it would return Sixteen times; for I was there about three of the Clock in the Afternoon; and it is beſt, (as all other Eccho's are) in the Evening. It is manifeſt, that it is not Eccho's from ſeveral places, but a toſſing of the Voice, as a Ball too and fro; like to Reflexions in Looking-Glaſſes; where if you place one Glaſs before, and another behinde, you ſhall ſee the Glaſs behinde with the Image, within the Glaſs before; and again, the Glaſs before in that: And divers ſuch Super-Reflexions, till the *Species ſpeciei* at laſt die: For it is every return weaker, and more ſhady. In like manner, the Voice in that Chappel, createth *Speciem ſpeciei*, and maketh ſucceeding Super-Reflexions; for it melteth by degrees, and every Reflexion is weaker than the former: So that, if you ſpeak three words, it will (perhaps) ſome three times report you the whole three words; and then the two latter words for ſometimes, and then the laſt word alone for ſometimes, ſtill fading and growing weaker. And whereas in Eccho's of one return, it is much to hear Four or five words. In this Eccho of ſo many Returns, upon the matter, you hear above Twenty words for three.

The

250. The like Eccho upon Eccho, but onely with two reports, hath been observed to be, if you stand between a House and a Hill, and lure towards the Hill; for the House will give a Back Eccho: One taking it from the other, and the latter the weaker.

251. There are certain *Letters*, that an Eccho will hardly express: As S for one, especially being principal in a word. I remember well, that when I went to the Eccho at *Pont-Carenton*, there was an old *Parisian* that took it to be the Work of Spirits, and of good Spirits. For (said he) call *Satan*, and the Eccho will not deliver back the *Devils* name: But will say, *Va'en*, which is as much in *French*, as *Apage*, or *Avoid*. And thereby I did hap to finde, that an Eccho would not return S, being but a Hissing and an Interior Sound.

252. Eccho's are some more sudden, and chap again as soon as the Voice is delivered, as hath been partly said; others are more deliberate, that is, give more space between the Voice and the Eccho, which is caused by the Local nearness or distance: Some will report a longer train of words, and some a shorter: Some more loud (full as loud as the Original, and sometimes more loud) and some weaker and fainter.

253. Where Eccho's come from several parts, at the same distance they must needs make (as it were) a Quire of Eccho's, and so make the Report greater, and even a continued Eccho; which you shall finde in some Hills that stand encompassed, Theatre-like.

254. It doth not yet appear, that there is *Refraction in Sounds*, as well as in *Species Visible*. For I do not think, that if a Sound should pass through divers *Mediums*, as *Air*, *Cloth*, *Wood*, it would deliver the Sound in a differing place, from that unto which it is deferred; which is the proper effect of Refraction. But *Majoration*, which is also the Work of *Refraction*, appeareth plainly in Sounds, (as hath been handled at full) but it is not by diversity of *Mediums*.

Experiments in Consort, touching the Consent and Dissent between Visibles and Audibles.

WE have *Obiter*, for Demonstrations sake, used in divers *Instances*, the *Examples* of the *Sight*, and *Things Visible*, to illustrate the *Nature of Sounds*. But we think good now to prosecute that Comparison more fully.

Consent of Visibles and Audibles.

255. BOth of them spred themselves in Round, and fill a whole Flore or Orb unto certain Limits; and are carried a great way, and do languish and lessen by degrees, according to the Distance of the Objects from the Sensories.

256. Both of them have the whole Species in every small portion of the *Air* or *Medium*, so as the Species do pass through small Cranies, without confusion: As we see ordinarily in Levels, as to the Eye; and in Cranies, or Chinks, as to the Sound.

257. Both of them are of a sudden and easie Generation and Delation, and likewise perish swiftly and suddenly; as if you remove the Light, or touch the Bodies that give the Sound.

Both

Both of them do receive and carry exquisite, and accurate differences; as of Colours, Figures, Motions, Distances, in *Visibles*; and of Articulate Voices, Tones, Songs, and Quaverings, in *Audibles*. 258

Both of them in their Vertue and Working, do not appear to emit any Corporal Substance into their *Mediums*, or the Orb of their Vertue; neither again to rise or stir any evident Local Motion in their *Mediums* as they pass, but onely to carry certain Spiritual Species. The perfect knowledge of the cause whereof, being hitherto scarcely attained, we shall search and handle in due place. 259.

Both of them seem not to generate or produce any other effect in Nature, but such as appertaineth to their proper Objects and Senses, and are otherwise barren. 260.

But both of them in their own proper action, do work three manifest effects. The first, in that the stronger pieces drowneth the lesser: As the light of the Sun, the light of a Gloworm, the report of an Ordnance, the Voice. The second, in that an Object of surcharge or excess, destroyeth the Sense: As the light of the Sun the eye, a violent sound (near the Ear) the Hearing. The third, in that both of them will be reverberate: As in Mirrors, and in Eccho's. 261.

Neither of them doth destroy or hinder the Species of the other, although they encounter in the same *Medium*: As Light or Colour hinder not sound, nor *è contrà*. 262.

Both of them affect the Sense in Living Creatures, and yield Objects of Pleasure and Dislike; yet nevertheless, the Objects of them do also (if it be well observed) affect and work upon dead things; namely such, as have some conformity with the Organs of the two Senses: As *Visibles* work upon a *Looking-glass*, which is like the Pupil of the Eye; and *Audibles* upon the places of *Eccho*, which resemble, in some sort, the cavern and structure of the Ear. 263.

Both of them do diversly work, as they have their *Medium* diversly disposed. So a *Trembling Medium* (as smoak) maketh the object seem to tremble; and *Rising* or *Falling Medium* (as Winds) maketh the Sounds to rise or fall. 264.

To both, the *Medium*, which is the most propitious and conducible, is Air; For Glass or Water, &c. are not compairable. 265.

In both of them, where the object is fine and accurate, it conduceth much to have the Sense intentive, and erect; insomuch, as you contract your eye, when you would see sharply, and erect your ear, when you would hear attentively; which in Beasts that have ears moveable, is most manifest. 266.

The Beams of Light, when they are multiplied and conglomerate, generate heat; which is a different action, from the action of Sight: And the Multiplication and Conglomeration of Sounds, doth generate an extream Rarefaction of the Air; which is an action materiate, differing from the action of Sound. If it be true (which is anciently reported) that Birds, with great shouts, have faln down. 267.

Dissent

Diſſent of Viſibles and Audibles.

268. THe *Species of Viſibles*, ſeem to be *Emiſſions of Beams* from the *Object* ſeen, almoſt like Odors, ſave that they are more incorporeal; but the *Species of Audibles*, ſeem to participate more with *Local Motion*, like *Percuſſions* or *Impreſſions* made upon the *Air*. So that whereas all Bodies do ſeem to work in two manners, Either by the *Communication* of their *Natures*, or by the *Impreſſions* and *Signatures* of their *Motions*. The Diffuſion of *Species Viſible*, ſeemeth to participate more of the former *Operation*, and the *Species Audible* of the latter.

269. The Species of Audibles ſeem to be carried more manifeſtly thorow the Air, than the Species of Viſibles: For (I conceive) that a contrary ſtrong Wind will not much hinder the ſight of Viſibles, as it will do the hearing of Sounds.

270. There is one difference above all others, between Viſibles and Audibles, that is the moſt remarkable; as that whereupon many ſmaller differences do depend; Namely, that Viſibles (except Lights) are carried in Right Lines, and Audibles in Arcuate Lines. Hence it cometh to paſs, that Viſibles do not intermingle and confound one another, as hath been ſaid before, but Sounds do. Hence it cometh, that the ſolidity of Bodies doth not much hinder the ſight, ſo that the Bodies be clear, and the Pores in a Right Line, as in Glaſs, Cryſtal, Diamonds, Water, &c. But a thin Scarf or Handkerchief, though they be Bodies nothing ſo ſolid, hinder the ſight: Whereas (contrariwiſe) theſe Porous Bodies do not much hinder the Hearing, but ſolid Bodies do almoſt ſtop it, or at leaſt attenuate it. Hence alſo it cometh, that to the Reflexion of Viſibles, ſmall Glaſſes ſuffice, but to the Reverberation of Audibles, are required greater ſpaces, as hath likewiſe been ſaid before.

271. Viſibles are ſeen further off, than Sounds are heard; allowing nevertheleſs the rate of their bigneſs: For otherwiſe, a great Sound will be heard further off, than a ſmall Body ſeen.

272. Viſibles require (generally) ſome diſtance between the object, and the Eye to be better ſeen; whereas in Audibles, the nearer the approach of the Sound is to the Senſe the better; but in this, there may be a double error. The one, becauſe to Seeing there is required Light, and any thing that toucheth the Pupil of the Eye (all over) excludeth the Light. For I have heard of a perſon very credible, (who himſelf was cured of a Cataract in one of his Eyes) that while the Silver-needle did work upon the ſight of his Eye, to remove the Film of the Cataract, he never ſaw any thing more clear or perfect, than that white Needle: Which (no doubt) was, becauſe the Needle was leſſer than the Pupil of the Eye, and ſo took not the light from it. The other error may be, For that the object of Sight doth ſtrike upon the Pupil of the Eye, directly without any interception; whereas the Cave of the Ear doth hold off the Sound a little from the Organ: And ſo nevertheleſs there is ſome diſtance required in both.

273. Viſibles are ſwifter carried to the Senſe, than Audibles; as appeareth in Thunder and Lightning; Flame, and Report of a Piece; Motion of the Air, in hewing of Wood. All which have been ſet down heretofore, but are proper for this Title.

I con-

I conceive also, that the *Species of Audibles*, do hang longer in the Air than those of *Visibles*: For although even those of Visibles do hang some time, as we see in *Rings* turned, that shew like spheres. In *Lute-strings* fillipped, a *Fire-brand* carried a long, which leaveth a train of light behinde it, and in the Twi light, and the like: Yet I conceive that *Sounds*, stay longer because they are carried up and down with the Wind; and because of the distance of the time in *Ordnance* discharged, and heard twenty miles off 274.

In *Visibles* there are not found Objects so odious and ingrate to the *Sense*, as in *Audibles*. For foul *Sights* do rather displease, in that they excite the memory of foul things, than in the immediate Objects. And therefore in *Pictures*, those foul Sights do not much offend; but in *Audibles*, the grating of a Saw when it is sharpned, doth offend so much, as it setteth the Teeth on edge; and any of the harsh *Discords in Musicks*, the Ear doth straightways refuse. 275.

In *Visibles*, after great light, if you come suddenly into the dark, or contrariwise out of the dark into a glaring Light. The eye is dazled for a time, and the *Sight* confused; but whether any such effect be after great *Sounds*, or after a deeper silence may be better enquired. It is an old Tradition, that those that dwell near the Cataracts of *Nilus*, are strucken deaf: But we finde no such effect in Cannoniers, nor Millers, nor those that dwell upon Bridges. 276.

It seemeth, that the *Impression of Colour* is so weak, as it worketh not, but by a Cone of direct Beams, or right Lines, whereof the Basis is in the Object and the Vertical point in the Eye: So as there is a corradiation and conjunction of Beams; and those Beams so sent forth, yet are not of any force to beget the like borrowed or second Beams, except it be by *Reflexion*, whereof we speak not. For the Beams pass and give little tincture to that Air which is adjacent; which if they did, we should see Colours out of a right line. But as this in Colours, so otherwise it is in the *Body of Light*. For when there is a skreen between the Candle and the Eye, yet the light passeth to the Paper whereon one writeth, so that the light is seen where the body of the flame is not seen; and where any Colour (if it were placed where the body of the flame is) would not be seen. I judge that *Sound* is of this latter nature: For when two are placed on both sides of a Wall, and the voice is heard, I judge it is not onely the *original sound*, which passeth in an *Arched line*; but the *sound*, which passeth above the Wall in a *Right line*, begetteth the like Motion round about it, as the first did, though more weak. 277.

ALl *Concords and Discords of Musick* (no doubt) *Sympathies* and *Antipathies of Sounds*, and so (likewise) in that *Musick*, which we call *Broken Musick*, or *Consort Musick*; some *Consorts of Instruments* are sweeter than others, (a thing not sufficiently yet observed;) as the *Irish-Harp* and *Base-Vial* agree well; the *Recorder* and *Stringed Musick* agree well; *Organs* and the *Voice* agree well, &c. But the *Virginals* and the *Lute*, or the *Welsh-Harp* and *Irish-Harp*, or the *Voice* and *Pipes* alone, agree not so well; but for the *Melioration* of *Musick*, there is yet much left (in this Point of *Exquisite Consorts*) to try and enquire. 278. Experiments in Consort, touching the *Sympathy or Antipathy of Sounds, one with another.*

There is a common observation, That if a *Lute* or *Vial* be laid upon the back with a small straw upon one side of the *strings*, and another *Lute* or *Vial* be laid by it; and in the other *Lute* or *Vial* the *Vnison* to that *string* be strucken, it will make the *string* move; which will appear both to the Eye, and by the straws falling off. The like will be if the *Diapason* or *Eight* to that *string* be strucken, either in the same *Lute* or *Vial*, or in others lying by: But in none of these there is any report of Sound that can be discerned, but onely Motion. 279.

280. It was deviſed, That a Vial ſhould have a Lay of Wire-ſtrings below, as cloſe to the Belly as a *Lute*, and then the Strings of Guts mounted upon a Bridge, as in ordinary *Vials*; to the end, that by this means, the upper Strings ſtrucken, ſhould make the lower reſound by Sympathy, and ſo make the Muſick the better; which, if it be to purpoſe, than Sympathy worketh as well by report of Sound, as by Motion. But this device, I conceive, to be of no uſe, becauſe the upper Strings which are ſtopped in great variety, cannot maintain a *Diapaſon* or a *Vniſon* with the lower, which are never ſtopped. But if it ſhould be of uſe at all, it muſt be in Inſtruments which have no ſtops, as *Virginals* and *Harps*; wherein tryal may be made of two rows of Strings, diſtant the one from the other.

281. The Experiment of Sympathy may be transferred (perhaps) from Inſtruments of Strings, to other Inſtruments of Sound. As to try, if there were in one Steeple two Bells of Uniſon, whether the ſtriking of the one would move the other, more than if it were another accord: And ſo in *Pipes*, if they be of equal bore and ſound,) whether a little Straw or Feather would move in the one *Pipe*, when the other is blown at an *Vniſon*.

282. It ſeemeth both in *Ear* and *Eye*, the Inſtrument of *Senſe* hath a Sympathy or Similitude with that which giveth the Reflexion (as hath been touched before.) For as the ſight of the Eye is like a Chryſtal, or Glaſs, or Water; ſo is the Ear a ſinuous Cave with a hard Bone, to ſtop and reverberate the Sound: Which is like to the places that report Eccho's.

283. Experiments in Conſort, touching the *Hindring or Helping of the Hearing.*

WHen a Man yawneth, he cannot hear ſo well. The cauſe is, for that the Membrane of the Ear is extended; and ſo rather caſteth off the Sound, than draweth it to.

284. We hear better when we hold our Breath, than contrary, inſomuch, as in all liſtening to attain a Sound a far off, Men hold their Breath. The cauſe is, for that in all Expiration, the motion is outwards, and therefore rather driveth away the voice than draweth it: And beſides, we ſee that in all labor to do things with any ſtrength, we hold the Breath; and liſtening after any Sound that is heard with difficulty, is a kinde of labor.

285. Let it be tryed, for the help of the Hearing, (and I conceive it likely to ſucceed) to make an Inſtrument like a Tunnel; the narrow part whereof may be of the bigneſs of the hold of the Ear; and the broader end much larger; like a Bell at the skirts, and the length half a foot or more. And let the narrow end of it be ſet cloſe to the Ear. And mark whether any Sound abroad in the open Air, will not be heard diſtinctly, from further diſtance, than without that Inſtrument; being (as it were) an *Ear ſpectacle*. And I have heard there is in *Spain*, an Inſtrument in uſe to be ſet to the Ear, that helpeth ſomewhat thoſe that are Thick of Hearing.

286. If the Mouth be ſhut cloſe, nevertheleſs there is yielded by the Roof of the Mouth, a Murmur; ſuch as is uſed by Dumb men: But if the Noſtrils be likewiſe ſtopped, no ſuch Murmur can be made, except it be in the bottom of the Pallate towards the Throat. Whereby it appeareth manifeſtly, that a Sound in the Mouth, except ſuch as aforeſaid, if the Mouth be ſtopped, paſſeth from the Pallate through the Noſtrils.

287. Experiments in Conſort, touching the *Spiritual and Fine Nature of Sounds.*

THe *Repercuſſion of Sounds*, (which we call Eccho) is a great Argument of the *Spiritual Eſſence* of *Sounds*. For if it were Corporeal, the Repercuſſing ſhould be created in the ſame manner, and by like Inſtruments, with the

the original Sound: But we ſee what a number of exquiſite Inſtruments muſt concur in ſpeaking of words, whereof there is no ſuch matter in the returning of them, but onely a plain ſtop, and repercuſſion.

The exquiſite Differences of Articulate Sounds, carried along in the Air, ſhew that they cannot be Signatures or Impreſſions in the Air, as hath been well refuted by the Ancients. For it is true, that Seals make excellent Impreſſions; and ſo it may be thought of Sounds in their firſt generation: But then the Delation and Continuance of them, without any new ſealing, ſhew apparently they cannot be Impreſſions. 288.

All Sounds are ſuddenly made, and do ſuddenly periſh; but neither that, nor the exquiſite Differences of them, is matter of ſo great admiration: For the Quaverings, and Warblings of Lutes, and Pipes are as ſwift; and the Tongue (which is no very fine Inſtrument) doth in ſpeech, make no fewer motions, than there be letters in all the words which are uttered. But that Sounds ſhould not onely be ſo ſpeedily generated, but carried ſo far every way, in ſuch a momentany time, deſerveth more admiration. As for example, If a man ſtand in the middle of a Field, and ſpeak aloud, he ſhall be heard a Furlong in round, and that ſhall be in articulate Sounds, and thoſe ſhall be entire in every little portion of the Air; and this ſhall be done in the ſpace of leſs than a minute. 289.

The ſudden Generation and Periſhing of Sounds, muſt be one of theſe two ways: Either, that the Air ſuffereth ſome force by Sound, and then reſtoreth it ſelf as Water doth; which being divided, maketh many circles, till it reſtore it ſelf to the Natural conſiſtence; or otherwiſe, that the Air doth willingly imbibe the Sound as grateful, but cannot maintain it; for that the Air hath (as it ſhould ſeem) a ſecret and hidden Appetite of receiving the Sound at the firſt; but then other groſs and more materiate qualities of the Air ſtraight ways ſuffocate it, like unto Flame which is generated with alacrity, but ſtraight quenched by the enmity of the Air, or other Ambient Bodies. 290.

There be theſe differences (in general) by which *Sounds* are divided:

1. *Muſical, Immuſical.*
2. *Trebble, Baſe.*
3. *Flat, Sharp.*
4. *Soft, Loud.*
5. *Exterior, Interior.*
6. *Clean, Harſh,* or *Purling.*
7. *Articulate, Inarticulate.*

We have labored (as may appear) in this *Inquiſition of Sounds* diligently; both becauſe *Sound* is one of the moſt hidden portions of *Nature*, (as we ſaid in the beginning) and becauſe it is a *Vertue* which may be called *Incorporeal* and *Immateriate*, whereof there be in *Nature* but few. Beſides, we were willing (now in theſe our firſt *Centuries*) to make a pattern or preſident of an *Exact Inquiſition*; and we ſhall do the like hereafter in ſome other ſubjects which require it. For we deſire that Men ſhould learn and perceive how ſevere a thing the true *Inquiſition of Nature* is; and ſhould accuſtom themſelves by the light of particulars, to enlarge their mindes to the amplitude of the World; and not to reduce the World to the narrowneſs of their Mindes.

291. Experiment Solitary, touching the *Orient Colours in Dissolution of Metals.*

METals give orient and fine Colours in Dissolution; as Gold giveth an excellent Yellow, Quick-silver an excellent Green, Tin giveth an excellent Azure. Likewise in their Putrefactions, or Rusts; as Vermilion, Verdegrease, Bise, Cirrus, &c. And likewise in their Vitrifications. The cause is, for that by their strength of Body, they are able to endure the Fire, or Strong-waters, and to be put into an equal posture, and again, to retain part of their principal Spirit: Which two things (equal posture, and quick Spirits) are required chiefly, to make Colours lightsome.

292. Experiment Solitary, touching *Prolongation of Life.*

IT conduceth unto long Life, and to the more placide Motion of the Spirits, which thereby do less prey and consume the Juyce of the Body: either that *Mens actions be free and voluntary*, that nothing be done *invitâ minerva*, but *secundum genium*; or, on the other side, that the *Actions of Men be full of Regulation, and commands within themselves:* For then the victory and performing of the command, giveth a good disposition to the Spirits, especially if there be a proceeding from degree to degree, for then the sense of victory is the greater. An example of the former of these, is in a Countrey life; and of the latter, in *Monks* and *Philosophers*, and such as do continually enjoyn themselves.

293. Experiment Solitary, touching *Appetite of Vnion in Bodies.*

IT is certain, that in all Bodies, there is an *Appetite of Vnion*, and Evitation of Solution of Continuity: And of this Appetite there be many degrees, but the most remarkable, and fit to be distinguished, are three. The first in Liquors, the second in hard Bodies, and the third in Bodies cleaving or tenacious. In Liquors this Appetite is weak; we see in Liquors, the Threding of them in Stillicides (as hath been said) the falling of them in round drops (which is the form of Union) and the staying of them for a little time in Bubbles and Froth. In the second degree or kinde, this Appetite is strong; as in Iron, in Stone, in Wood, &c. In the third, this Appetite is in a *Medium* between the other two: For such Bodies do partly follow the touch of another Body, and partly stick and continue to themselves; and therefore they rope and draw themselves in threds, as we see in *Pitch, Glew, Birdlime, &c.* But note, that all solid Bodies are cleaving more or less; and that they love better the touch of somewhat that is tangible, than of Air. For Water in small quantity cleaveth to any thing that is solid, and so would Metal too, if the weight drew it not off. And therefore Gold Foliate, or any Metal Foliate, cleaveth: But those Bodies which are noted to be clammy, and cleaving, are such as have a more indifferent Appetite (at once) to follow another Body, and to hold to themselves. And therefore they are commonly *Bodies* ill mixed, and which take more pleasure in a *Foreign Body*, that in preserving there own consistence, and which have little predominance in *Drought* or *Moisture.*

294. Experiment Solitary, touching the *like Operations of Heat and Time.*

Time and *Heat* are fellows in many effects. *Heat* drieth *Bodies* that do easily expire; as Parchment, Leaves, Roots, Clay, &c. And so doth *Time* or *Age* arefie; as in the same *Bodies, &c. Heat* dissolveth and melteth *Bodies* that keep in their *Spirits*, as in divers *Liquefactions*; and so doth Time, in some *Bodies* of a softer consistence: As is manifest in Honey, which by *Age* waxeth more liquid, and the like in Sugar; and so in old Oyl, which is ever more clear and more hot in medicinable use. *Heat* causeth the Spirits to search some issue out of the *Body*, as in the *Volatility*

of

of Metals; and ſo doth Time, as in the Ruſt of Metals. But generally Heat doth that in ſmall time, which Age doth in long.

295. Experiment Solitary, touching the *Differing Operations of Fire, and Time.*

SOme things which paſs the Fire, are ſofteſt at firſt, and by Time grow hard, as the Crum of Bread. Some are harder when they come from the Fire, and afterwards give again, and grow ſoft as the Cruſt of Bread, Bisket, Sweet-Meats, Salt, &c. The cauſe is, for that in thoſe things which wax hard with Time, the work of the Fire is a kinde of melting; and in thoſe that wax ſoft with Time, (contrariwiſe) the work of the Fire is a kinde of Baking; and whatſoever the Fire baketh, Time doth in ſome degree diſſolve.

296. Experiment Solitary, touching *Motions by Imitation.*

MOtions paſs from one Man to another, not ſo much by exciting Imagination as by Invitation, eſpecially if there be an Aptneſs or Inclination before. Therefore Gaping, or Yawning, and Stretching, do paſs from Man to Man; for that that cauſeth Gaping or Stretching is, when the Spirits are a little Heavy, by any Vapor, or the like. For then they ſtrive (as it were) to wring out, and expel that which loadeth them. So Men drowzy and deſirous to ſleep; or before the fit of an Ague, do uſe to yawn and ſtretch, and do likewiſe yield a Voice or Sound, which is an Interjection of Expulſion: So that if another be apt and prepared to do the like, he followeth by the ſight of another. So the Laughing of another maketh to laugh.

297. Experiment Solitary, touching *Infectious diſeaſes.*

THere be ſome known Diſeaſes that are Infectious, and others that are not. Thoſe that are infectious, are firſt, Such as are chiefly in the Spirits, and not ſo much in the Humors, and therefore paſs eaſily from Body to Body; ſuch are Peſtilences Lippitudes, and ſuch like. Secondly, ſuch as taint the breath, which we ſee paſſeth manifeſtly from Man to Man, and not inviſible as the affects of the Spirits do; ſuch are Conſumptions of the Lungs, &c. Thirdly, Such as come forth to the skin, and therefore taint the Air, or the Body adjacent; eſpecially, if they conſiſt in an unctuous ſubſtance, not apt to diſſipate; ſuch are Scabs, and Leproſie. Fourthly, ſuch as are meerly in the Humors, and not in the Spirits, Breath, or Exhalations: And therefore they never infect, but by touch onely; and ſuch a touch alſo, as cometh within the *Epidermis*, as the venome of the *French Pox*, and the biting of a *Mad-Dog*.

298. Experiment Solitary, touching the *Incorporation of Powders and Liquors.*

MOſt Powders grow more cloſe and coherent by mixture of Water, than by mixture of Oyl, though Oyl be the thicker Body; as *Meal, &c.* The reaſon is the Congruity of Bodies, which if it be more, maketh a perfecter imbibition, and incorporation; which in moſt Powders is more between them and Water, than between them and Oyl: But Painters colours ground, and aſhes, do better incorporate with Oyl.

299. Experiment Solitary, touching *Exerciſe of the Body.*

MUch Motion and Exerciſe is good for ſome Bodies, and ſitting and leſs motion, for others. If the Body be hot, and void of ſuperfluous Moiſtures, too much Motion hurteth; and it is an error in *Phyſitians*, to call too much upon Exerciſe. Likewiſe, Men ought to beware, that they uſe not Exerciſe, and a ſpare diet, both; but if much Exerciſe, then a plentiful diet; and if ſparing diet, then little Exerciſe. The Benefits that come of Exerciſe are. Firſt, that it ſendeth nouriſhment into the parts more forcibly.

Secondly, That it helpeth to excern by Sweat, and so maketh the parts assimilate the more perfectly. Thirdly, that it maketh the substance of the Body more solid and compact; and so less apt to be consumed and depredated by the Spirits. The Evils that come of Exercise, are, First, That it maketh the Spirits more hot and predatory. Secondly, That it doth absorbe likewise, and attenuate too much the moisture of the Body. Thirdly, That it maketh too great Concussion, (especially, if it be violent) of the inward parts, which delight more in rest. But generally Exercise, if it be much, is no friend to prolongation of life; which is one cause, Why Women live longer then Men, because they stir less.

300. Experiment Solitary, touching *Meats that induce Satiate.*

SOme Food we may use long, and much, without glutting; as Bread, Flesh that is not Fat, or Rank, &c. Some other (though pleasant) glutteth sooner, as Sweet-Meats, Fat-Meats, &c. The cause is, for that Appetite consisteth in the emptiness of the Mouth, of the Stomach, or possessing it with somewhat that is astringent; and therefore, cold and dry: But things that are sweet and fat, are more filling, and do swim and hang more about the Mouth of the Stomach, and go not down so speedily; and again turn sooner to Choler, which is hot, and ever abateth the appetite. We see also, that another cause of Satiety, is an Over-custom; and of Appetite, is Novelty. And therefore Meats, if the same be continually taken, induce Loathing. To give the reason of the distaste of Satiety, and of the pleasure in Novelty, and to distinguish not onely in Meats and Drinks, but also in Motions, Loves, Company, Delight, Studies, what they be that Custom maketh more grateful; and what more tedious, were a large Field. But for Meats, the cause is Attraction, which is quicker, and more excited towards that which is new, than towards that whereof there remaineth a relish by former use. And (generally) it is a rule, That whatsoever is somewhat ingrate at first, is made grateful by Custom; but whatsoever is too pleasing at first, groweth quickly to Satiate.

NATURAL HISTORY.

Century IV.

Acceleration of Time, in *Works of Nature*, may well be esteemed *Inter Magnalia Naturæ*. And even in *Divine Miracles Accelerating of the Time*, is next to the Creating of the Matter. We will now therefore proceed to the enquiry of it; and for *Acceleration of Germination*, we will refer it over unto the place, where we shall handle the *Subject of Plants*, generally; and will now begin with other *Accelerations*.

Experiments in Consort, touching the *Clarification of Liquors, and the Accelarating thereof.*

Liquors are (many of them) at the first, thick and troubled; As *Must*, *Wort*, *Juyce of Fruits*, *or Herbs* expressed, &c. And by *Time*, they settle and clarifie. But to make them clear, before the *Time*, is a great work; for it is a *Spur to Nature*, and putteth her out of her pace: And besides, it is of good use for making Drinks, and Sauces, Potable, and Serviceable, speedily. But to know the Means of Accelerating Clarification, we must first know the causes of Clarification. The first cause is, by the Separation of the grosser parts of the Liquor, from the finer. The second, by the equal distribution of the Spirits of the Liquor, with the tangible parts; for that ever representeth Bodies clear and untroubled. The third, by the refining the Spirit it self, which thereby giveth to the Liquor more splendor, and more lustre. 301.

First, For Separation: It is wrought by weight; as in the ordinary residence or settlement of Liquors. By Heat, by Motion, by Precipitation, or Sublimation, (that is, a calling of the several parts, either up or down, which is a kinde of Attraction,) by Adhesion; as when a Body, more viscous, is mingled and agitated with the Liquor; which viscous Body (afterwards severed) 302.

vered) draweth with it the groſſer parts of the Liquor: And laſtly, by Percolation or Paſſage.

303. Secondly, For the even Diſtribution of the Spirits, it is wrought by gentle heat, and by Agitation of Motion; (for of Time we ſpeak not, becauſe it is that we would anticipate and repreſent:) And it is wrought alſo, by mixture of ſome other Body, which hath a vertue to open the Liquor, and to make the Spirits the better paſs thorow.

304. Thirdly, For the refining of the Spirit, it is wrought likewiſe by Heat, by motion, and by mixture of ſome Body which hath vertue to attenuate. So therefore (having ſhewed the cauſes) for the accelerating of Clarification in general, and the enducing of it; take theſe Inſtances and Tryals.

305. It is in common practice, to draw Wine or Beer, from the Lees, (which we call *Racking*) whereby it will clarifie much the ſooner: For the Lees, though they keep the drink in heart, and make it laſting; yet withal they caſt up ſome ſpiſſitude; and this Inſtance is to be referred to Separation.

306. On the otherſide, it were good to try, what, the adding to the Liquor, more Lees than his own, will work; for though the Lees do make the Liquor turbide, yet they refine the Spirits. Take therefore a Veſſel of new Beer, and take another Veſſel of new Beer, and rack the one Veſſel from the Lees, and pour the Lees of the racked Veſſel into the unracked Veſſel, and ſee the effect. This Inſtance is referred to the Refining of the Spirits.

307. Take new Beer, and put in ſome quantity of ſtale Beer into it, and ſee whether it will not accelerate the Clarification, by opening the Body of the Beer, and cutting the groſſer parts, whereby they may fall down into Lees. And this Inſtance again is referred to *Separation.*

308. The longer *Molt* or *Herbs*, or the like, are infuſed in *Liquor*, the more thick and troubled the *Liquor* is; but the longer they be decocted in the *Liquor*, the clearer it is. The reaſon is plain, becauſe in Infuſion, the longer it is, the greater is the part of the groſs Body that goeth into the Liquor: But in Decoction, though more goeth forth, yet it either purgeth at the top, or ſettleth at the bottom. And therefore the moſt exact way to clarifie is, firſt, to Infuſe, and then to take off the Liquor and decoct it; as they do in Beer, which hath Molt firſt infuſed in the Liquor, and is afterwards boiled with the Hop. This alſo is referred to *Separation.*

309. Take hot Embers, and put them about a Bottle filled with new Beer, almoſt to the very neck; let the Bottle be well ſtopped, leſt it flie out: And continue it, renewing the Embers every day by the ſpace of ten days, and then compare it with another Bottle of the ſame Beer ſet by. Take alſo Lime, both quenched and unquenched, and ſet the Bottles in them *ut ſuprà.* This Inſtance is referred, both to the even Diſtribution, and alſo to the Refining of the *Spirits by Heat.*

310. Take Bottles and ſwing them, or carry them in a Wheel-Barrow upon rough Ground, twice in a day: But then you may not fill the Bottles full, but leave ſome Air; for if the Liquor come cloſe to the ſtopple, it cannot play nor flower: And when you have ſhaken them well either way, pour the Drink in another Bottle, ſtopped cloſe after the uſual manner; for if it ſtay with much Air in it, the Drink will pall, neither will it ſettle ſo perfectly in all the parts. Let it ſtand ſome Twenty four hours, then take it, and put it again into a Bottle with Air, *ut ſuprà*; and thence into a Bottle ſtopped, *ut ſuprà*; and ſo repeat the ſame operation for ſeven days. Note, that in the emptying of one Bottle into another, you muſt do it ſwiftly, leſt the Drink

pall.

pall. It were good also to try it in a Bottle with a little air below the Neck without emptying. This Instance is referred to the even *Distribution* and *Refining* of the *Spirits* by *Motion*.

311. As for Percolation, inward, and outward (which belongeth to *Separation*,) Tryal would be made of Clarifying by Adhesion, with Milk put into new Beer, and stirred with it: For it may be, that the grosser part of the Beer will cleave to the *Milk*; the doubt is, whether the Milk will sever well again, which is soon tried. And it is usual in clarifying *Ippocrasse* to put in Milk, which after severeth and carrieth with it the grosser parts of the *Ippocrass*, as hath been said elsewhere. Also for the better Clarification by Percolation; when they Tun new Beer, they use to let it pass through a Strainer, and it is like the finer the Strainer is, the clearer it will be.

Experiments in Consort, touching *Maturation*, and the *Accelerating* thereof. And first touching the Maturation and Quickning of drinks, and next touching the Maturation of Fruits.

THE *Accelerating of Maturation*, we will now enquire of, and of *Maturation* it self. It is of three natures, the *Maturation of Fruits*, the *Maturation of Drinks*, and the *Maturation of Imposthumes and Ulcers*. This last we refer to another place, where we shall handle *Experiments Medicinal*. There be also other Maturations, as of Metals, &c. whereof we speak as occasion serveth. But we will begin with that of Drinks, because it hath such affinity with the Clarification of Liquors.

312. For the Maturation of Drinks, it is wrought by the Congregation of the Spirits together, whereby they digest more perfectly the grosser parts; and it is effected, partly by the same means that Clarification is (whereof we spake before:) But then note, that an extream Clarification doth spred the Spirits so smooth, as they become dull, and the drink dead, which ought to have a little flowring. And therefore all your clear *Amber drink* is flat.

313. We see the degrees of Maturation of Drinks, in Must, in Wine, as it is drunk, and in Vinegar. Whereof Must hath not the Spirits well congregated, Wine hath them well united, so as they make the parts somewhat more Oyly. Vinegar hath them congregated, but more Jejune, and in smaller quantity; the greatest and finest Spirit and part being exhaled: For we see Vinegar is made by setting the Vessel of Wine against the hot Sun. And therefore Vinegar will not burn, for that much of the finer part is exhaled.

314. The refreshing and quickning of Drink palled or dead, is by enforcing the motion of the Spirit. So we see that open weather relaxeth the Spirit, and maketh it more lively in Motion. We see also Bottelling of Beer or Ale, while it is new and full of Spirit, (so that it spirteth when the stopple is taken forth) maketh the Drink more quick and windy. A Pan of Coals in the Cellar, doth likewise good, and maketh the Drink work again. New Drink put to Drink that is dead, provoketh it to work again: Nay, which is more (as some affirm) a Brewing of new Beer, set by old Beer, maketh it work again: It were good also to enforce the Spirits by some mixtures, that may excite and quicken them, as by the putting into the Bottles, Nitre Chalk, Lime, &c. We see Cream is matured, and made to rise more speedily by putting in cold Water; which, as it seemeth, getteth down the Whey.

315. It is tryed, that the burying of Bottles of Drink well stopped, either in dry Earth, a good depth, or in the bottom of a Well within Water; and best of

of all, the hanging of them in a deep Well ſomewhat above the Water, for ſome fortnights ſpace, is an excellent means of making Drink freſh and quick: For the cold doth not cauſe any exhaling of the Spirits at all, as heat doth, though it rarifieth the reſt that remain: But cold maketh the Spirits vigorous, and irritateth them, whereby they incorporate the parts of the Liquor perfectly.

316. As for the *Maturation of Fruits*, it is wrought by the calling forth of the Spirits of the Body outward, and ſo ſpreading them more ſmoothly; and likewiſe by digeſting, in ſome degree, the groſſer parts: And this is effected by Heat, Motion, Attraction, and by a Rudiment of Putrefaction: For the Inception of Putrefaction hath in it a *Maturation.*

317. There were taken Apples, and laid in Straw, in Hay, in Flower, in Chalk, in Lime, covered over with Onions, covered over with Crabs, cloſed up in Wax, ſhut in a Box, &c. There was alſo an Apple hanged up in ſmoak. Of all which the Experiment ſorted in this manner.

318. After a moneths ſpace, the Apple, encloſed in Wax, was as Green and freſh as at the firſt putting in, and the Kernels continued White. The cauſe is, for that all excluſion of open Air, (which is ever predatory) maintaineth the Body in his firſt freſhneſs and moiſture; but the inconvenience is, that it taſteth a little of the Wax, which, I ſuppoſe, in a Pomegranate, or ſome ſuch thick coated fruit, it would not do.

319. The Apple hanged in the ſmoak, turned like an old Mellow-Apple wrinkled, dry, ſoft, ſweet, yellow within. The cauſe is, for that ſuch a degree of heat, which doth neither melt nor ſcorch (for we ſee that in a greater heat, a roaſt Apple ſoftneth and melteth, and Pigs feet made of quarters of Wardens, ſcortch and have a skin of coal) doth Mellow, and not adure: The ſmoak alſo maketh the Apple (as it were) ſprinkled with Soot, which helpeth to mature. We ſee, that in drying of Pears and Prunes, in the Oven, and removing of them often as they begin to ſweat, there is a like operation: but that is with a far more intenſe degree of heat.

320. The Apples covered in the Lime and Aſhes, were well matured as appeared both in their yellowneſs and ſweetneſs. The cauſe is, for that that Degree of Heat, which is in Lime and Aſhes, (being a ſmoothering heat) is of all the reſt moſt proper; for it doth neither Liquefie nor Arefie, and that is true Maturation. Note, that the taſte of thoſe Apples was good, and therefore it is the Experiment fitteſt for uſe.

321. The Apples covered with Crabs and Onions, were likewiſe well matured. The cauſe is not any heat, but for that the Crabs and the Onions draw forth the Spirits of the Apple, and ſpred them equally thorowout the Body; which taketh away hardneſs. So we ſee one Apple ripeneth againſt another. And therefore in making of Cider, they turn the Apples firſt upon a heap; ſo one Cluſter of Grapes, that toucheth another whileſt it groweth, ripeneth faſter. *Botrus contra Botrum citius matureſcit.*

322. The Apples in Hay and the Straw, ripened apparently, though not ſo much as the other, but the Apple in the Straw, more. The cauſe is, for that the Hay and Straw have a very low degree of Heat, but yet cloſe and ſmoothering, and which dryeth not.

323. The Apple in the cloſe Box was ripened alſo. The cauſe is, for that all Air kept cloſe, hath a degree of warmth; as we ſee in Wool, Fur, Pluſh, &c.

Note,

Note, That all these were compared with another Apple of the same kinde that lay of it self; and in comparison of that, were more sweet, and more yellow, and so appeared to be more ripe.

Take an Apple, or Pear, or other like Fruit, and roul it upon a Table hard: We see in common experience, that the rouling doth soften and sweeten the Fruit presently, which is nothing but the smooth distribution of the Spirits into the parts; for the unequal distribution of the Spirits maketh the harrishness: But this hard rouling is between Concoction, and a simple Maturation; therefore, if you should roul them but gently perhaps twice a day, and continue it some seven days, it is like they would Mature more finely, and like unto the *Natural Maturation.* 324.

Take an Apple, and cut out a piece of the top and cover it, to see whether that *Solution of Continuity* will not hasten a Maturation. We see that where a *Wasp*, or a *Fly*, or a *Worm*, hath bitten in a *Grape* or any *Fruit*, it will sweeten hastily. 325.

Take an Apple, *&c.* and prick it with a Pin full of Holes, not deep, and smear it a little with Sack, or Cinnamon Water, or Spirit of Wine, every day for ten days, to see if the *Virtual Heat* of the Wine, or Strong-Waters, will not Mature it. 326.

In these Tryals also as was used in the first, set another of the same Fruits by, to compare them, and try them by their Yellowness, and by their Sweetness.

Experiment Solitary, touching the *Making of Gold.*

THe World hath been much abused by the opinion of Making of Gold. The Work it self, I judge to be possible; but the Means (hitherto propounded) to effect it, are in the Practice, full of Error and Imposture; and in the Theory, full of unsound Imaginations. For to say, that *Nature* hath an intention to make all Metals Gold; and that, if she were delivered from Impediments, she would perform her own work; and that, if the Crudities, Impurities, and Leprosies of Metals were cured, they would become Gold; and that a little quantity of the Medicine in the Work of Projection, will turn a Sea of the baser Metal into Gold by multiplying. All these are but dreams, and so are many other Grounds of *Alchymy.* And to help the matter, the *Alchymists* call in likewise many vanities, out of *Astrology*, *Natural Magick*, Superstitious Interpretations of Scriptures, Auricular Traditions, Feigned Testimonies of Ancient Authors, and the like. It is true, on the other side they have brought to light not a few profitable Experiments, and thereby made the World some amends: But we, when we shall come to handle the *Version* and *Transmutation of Bodies*, and the Experiments concerning *Metals* and *Minerals*; will lay open the true Ways and Passages of *Nature*, which may lead to this great effect. And we commend the wit of the *Chineses*, who despair of making of Gold, but are mad upon the making of Silver. For certain it is, That it is more difficult to make Gold, (which is the most ponderous and materiate amongst Metals) of other Metals, less ponderous and less materiate, than (*Via versâ*) to make Silver of Lead, or Quick-silver; both which are more ponderous than Silver: So that they need rather a further degree of *Fixation*, than any *Condensation.* In the mean time, by occasion of handling the *Axioms* touching *Maturation*, we will direct a tryal touching the *Maturing of Metals*, and thereby turning some of them into Gold; for we conceive indeed, That a perfect good *Concoction*, or *Digestion*, or *Maturation* of some *Metals* will produce Gold. And here we call to minde, that we knew a *Dutchman* that had wrought himself into the belief of a great

great perſon, by undertaking, that he could make Gold: Whoſe diſcourſe was, That Gold might be made, but that the *Alchymiſts* over-fired the work: For (he ſaid) the making of Gold did require a very temperate Heat, as being in *Nature* a ſubterrany work, where little Heat cometh; but yet more to the making of Gold, than of any other Metal: And therefore, that he would do it with a great Lamp, that ſhould carry a temperate and equal Heat, and that it was the work of many Moneths. The deviſe of the Lamp was folly, but the overfiring now uſed, and the equal Heat to be required, and the making it a work of ſome good time, are no ill diſcourſes.

We reſort therefore to our *Axioms* of *Maturation*, in effect touched before.

The firſt is, That there be uſed a Temperate Heat; for they are ever Temperate Heats that Diſgeſts, and Mature; wherein we mean Temperate, according to the Nature of the Subject: For that may be Temperate to Fruits and Liquors, which will not work at all upon Metals.

The ſecond is, That the Spirit of the Metal be quickned, and the Tangible Parts opened: For without thoſe two operations, the Spirit of the Metal, wrought upon, will not be able to diſgeſt the Parts.

The third is, That the Spirits do ſpred themſelves even, and move not ſubſultorily, for that will make the parts cloſe and pliant. And this requireth a Heat that doth not riſe and fall, but continue as equal as may be.

The fourth is, That no part of the Spirit be emitted but detained: For if there be Emiſſion of Spirit, the Body of the Metal will be hard and churliſh. And this will be performed, partly by the temper of the Fire, and partly by the cloſeneſs of the Veſſel.

The fifth is, That there be choice made of the likelieſt and beſt prepared Metal for the Verſion; for that will facilitate the Work.

The ſixth is, That you give time enough for the Work, not to prolong hopes (as the *Alchymiſts* do, but indeed to give *Nature* a convenient ſpace to work in.

Theſe principles moſt certain and true, we will now derive a direction of Tryal out of them, which may (perhaps) by further Meditation be improved.

327. Let there be a ſmall Furnace made of a Temperate Heat; let the heat be ſuch as may keep the Metal perpetually molten, and no more; for that above all, importeth to the Work: For the Material, take Silver, which is the Metal, that in Nature, ſymbolizeth moſt with Gold; put in alſo, with the Silver a tenth part of Quick-ſilver, and a twelfth part of Nitre by weight: Both theſe to quicken and open the Body of the Metal; and ſo let the Work be continued by the ſpace of Six Moneths, at the leaſt. I wiſh alſo, That there be as ſometimes an Injection of ſome Oyled Subſtance; ſuch as they uſe in the recovering of Gold, which by vexing with Separations hath been made churliſh: And this is, to lay the parts more cloſe and ſmooth, which is the main work. For Gold (as we ſee) is the cloſeſt (and therefore the heavieſt) of Metals; and is likewiſe the moſt flexible and tenſible. Note, That to think to make Gold of Quick-ſilver becauſe it is the heavieſt, is a thing not to be hoped; for Quick-ſilver will not endure the mannage of the Fire: Next to Silver, I think Copper were fitteſt to be the Material.

Gold

328. Experiment Solitary, touching the *Nature of Gold.*

GOld hath these Natures: Greatness of VVeight; Closeness of Parts, Fixation, Pliantness or Softness, Immunity from Rust, Colour or Tincture of Yellow. Therefore the sure way (though most about) to make Gold, is to know the causes of the several Natures before rehearsed, and the Axioms concerning the same. For if a Man can make a Metal that hath all these Properties, let Men dispute, whether it be Gold, or no?

Experiments in Consort, touching the *Enducing and Accelerating of Putrefaction.*

THe Enducing and Accelerating of Putrefaction, is a subject of a very Universal Enquiry. For Corruption is a Reciprocal to Generation; and they two are as Natures to Terms or Boundaries; and the Guides to Life and Death. Putrefaction is the VVork of the Spirits of Bodies, which ever are unquiet to get forth and congregate with the Air, and to enjoy the Sun-Beams. The getting forth, or spreding of the Spirits, (which is a degree of getting forth) have five differing operations. If the Spirits be detained within the Body, and move more violently, there followeth Colliquation; as in Metals, &c. If more mildely, there followeth Digestion or Maturation; as in Drinks and Fruits. If the Spirits be not meerly detained, but Protrude a little, and that Motion be confused, and inordinate, there followeth Putrefaction; which ever dissolveth the Consistence of the Body into much inequality; as in Flesh, Rotten Fruits, Shining VVood, &c. and also in the Rust of Metals. But if that Motion be in a certain order, there followeth Vivification and Figuration; as both in Living Creatures bred of Putrefaction, and in Living Creatures perfect. But if the Spirits issue out of the Body, there followeth Desiccation, Induration, Consumption, &c. As in Brick, evaporation of Bodies Liquid, &c.

329.

The Means to enduce and accelerate Putrefaction, are, First, By adding some crude or watry moisture; as in VVetting of any Flesh, Fruit, Wood, with Water, &c. For contrariwise, Unctuous and Oyly Substances preserve.

330.

The second is, By Invitation or Excitation; as when a rotten Apple lieth close to another Apple that is found; or when Dung (which is a substance already putrified) is added to other Bodies. And this is also notably seen in Church-yards, where they bury much; where the Earth will consume the Corps, in far shorter time than other Earth will.

331.

The third is, By Closeness and Stopping, which detaineth the Spirits in Prison, more then they would, and thereby irritateth them to seek issue; as in Corn and Cloaths which wax musty; and therefore open Air (which they call *Aer perflabilis*) doth preserve: And this doth appear more evidently in Agues, which come (most of them) of obstructions and penning the Humors, which thereupon Putrifie.

332.

The fourth is, By Solution of Continuity; as we see an Apple will rot sooner, if it be cut or pierced, and so will Wood, &c. And so the Flesh of Creatures alive, where they have received any wound.

333.

The fifth is, Either by the Exhaling, or by the driving back of the principal Spirits, which preserve the consistence of the Body; so that when their Government is dissolved every part returneth to his Nature, or Homogeny. And this appeareth in Urine and Blood, when they cool and thereby break. It appeareth also in the Gangreen or Mortification of Flesh, either by Opiates, or by Intense Colds. I conceive also, the same effect

is in Peſtilences, for that the malignity of the infecting vapor, daunteth the principal Spirits, and maketh them flie, and leave their Regiment; and then the Humors, Fleſh, and Secondary Spirits, do diſſolve and break, as in an Anarchy.

334. The ſixth is, VVhen a Forreign Spirit, ſtronger and more eager than the Spirit of the Body, entreth the Body, as in the ſtinging of Serpents. And this is the cauſe (generally) that upon all Poyſons followeth Swelling; and we ſee Swelling followeth alſo, when the Spirits of the Body it ſelf congregate too much; as upon blows and bruiſes, or when they are pent in too much, as in Swelling upon Cold. And we ſee alſo, that the Spirits coming of Putrefaction of Humors in Agues, &c. which may be counted as Foreign Spirits, though they be bred within the Body, do extinguiſh and ſuffocate the Natural ſpirits and heat.

335. The ſeventh is, By ſuch a weak degree of heat, as ſetteth the Spirits in a little Motion, but is not able either to digeſt the parts, or to iſſue the Spirits, as is ſeen in Fleſh kept in a room that is not cool; whereas in a cool and wet Larder it will keep longer. And we ſee, that Vivification (whereof Putrefaction is the Baſtard Brother) is effected by ſuch ſoft heats; as the hatching of Eggs, the heat of the VVomb, &c.

336. The eighth is, By the releaſing of the Spirits, which before were cloſe kept by the ſolidneſs of their coverture, and thereby their appetite of iſſuing checked; as in the artificial ruſts induced by Strong waters in Iron, Lead, &c. And therefore wetting haſteneth Ruſt or Putrefaction of anything, becauſe it ſofteneth the Cruſt, for the Spirits to come forth.

337. The ninth is, By the enterchange of heat and cold, or wet and dry; as we ſee in the Mouldring of Earth in Froſts, and Sun; and in the more haſty rotting of VVood, that is ſometimes wet, ſometimes dry.

338. The tenth is, By time, and the work, and procedure of the Spirits themſelves, which cannot keep their ſtation; eſpecially, if they be left to themſelves, and there be not Agitation or Local Motion. As we ſee in Corn not ſtirred, and Mens Bodies not exerciſed.

339. All Moulds are Inceptions of Putrefaction; as the Moulds of Pyes and Fleſh the Moulds of Orenges and Lemmons, which Moulds afterwards turn into VVorms, or more odious Putrefactions: And therefore (commonly) prove to be of ill odor. And if the Body be liquid, and not apt to putrifie totally, it will caſt up a Mother in the top, as the Mothers of Diſtilled waters.

340. Moſs is a kinde of Mold of the Earth and Trees: But it may be better ſorted as a Rudiment of Germination, to which we refer it.

Experiments in Conſort, touching Prohibiting and Preventing Putrefaction.

IT is an Enquiry of excellent uſe to enquire of the Means of Preventing or Staying of Putrefaction; for therein conſiſteth the Means of Conſervation of Bodies: For Bodies have two kindes of Diſſolutions, the one by Conſumption and Dificcation, the other by Putrefaction. But as for the Putrefactions of the Bodies of Men and Living Creatures (as in Agues, VVorms, Conſumptions of the Lungs, Impoſthums, and Ulcers, both inwards and outwards) they are a great part of Phyſick and Surgery: And therefore we will reſerve the Enquiry of them to the proper place, where we ſhall handle Medicinal Experiments of all ſorts. Of the reſt, we will now enter into an Enquiry, wherein much light may be taken from that which hath been ſaid of the Means to enduce or accelerate Putrefaction: For the removing that which cauſed Putrefaction, doth prevent and avoid Putrefaction.

The

The first Means of prohibiting or checking Putrefaction is cold; for so we see that Meat and Drink will last longer, unputrified, or unsowred, in Winter, than in Summer: And we see that Flowers, and Fruits; put in conservatories of Snow, keep fresh. And this worketh by the Detention of the Spirits, and constipation of the Tangible parts. 341.

The second is Astriction: For Astriction prohibiteth Dissolution; as we see (generally) in Medicines, whereof such as are Astringents do inhibit Putrefaction: And by the same reason of Astringency, some small quantity of Oyl of Vitriol, will keep fresh water long from putrifying. And this Astriction is in a substance that hath a virtual cold, and it worketh (partly) by the same means that cold doth. 342.

The third is, The excluding of the Air; and again, the exposing to the Air: For these contraries, (as it cometh often to pass) work the same effect, according to the nature of the Subject-matter. So we see, that Beer or Wine in Bottles close stopped, last long; that the Garners under Ground keep Corn longer, than those above Ground; and that Fruit closed in Wax, keepeth fresh: And likewise, Bodies put in Honey, and Flower, keep more fresh: And Liquors, Drinks, and Juyces, with a little Oyl cast on the top, keep fresh. Contrariwise, we see that Cloath and Apparel, not aired, do breed Moaths and Mould; and the Diversity is, that in Bodies that need Detention of Spirits, the Exclusion of the Air doth good; as in Drinks, and Corn: But in Bodies that need Emission of Spirits, to discharge some of the superfluous moisture, it doth hurt, for they require airing. 343.

The fourth is Motion, and Stirring; for Putrefaction asketh Rest: For the subtil Motion which Putrefaction requireth, is disturbed by any Agitation, and all Local Motion keepeth Bodies integral, and their parts together: As we see, that turning over of Corn in a Garner, or Letting it run like an Hour-Glass, from an upper Room into a lower, doth keep it sweet: And running Waters putrifie not; and in Mens Bodies, exercise hindreth Putrefaction; and contrarywise Rest, and want of Motion or stoppings (whereby the running of Humors, or the Motion of Perspiration, is stayed) further Putrefaction; as we partly touched a little before. 344.

The fifth is, The Breathing forth of the Adventitious Moisture in Bodies, for as wetting doth hasten Putrefaction; so convenient drying (whereby the more Radical Moisture is onely kept in) putteth back Putrefaction: So we see that Herbs and Flowers, if they be dried in the shade, or dried in the hot Sun, for a small time keep best. For the Emission of the loose and adventitious Moisture, doth betray the Radical Moisture, and carryeth it out for company. 345.

The sixth is, The strengthning of the Spirits of Bodies; for as a great heat keepeth Bodies from Putrefaction; but a tepide heat enclineth them to Putrefaction: So a strong Spirit likewise preserveth, and a weak or faint Spirit disposeth to corruption. So we finde, that Salt-water corrupteth not so soon as fresh; and salting of Oysters, and powdring of Meat, keepeth them from Putrefaction. It would be tryed also, whether Chalk, put into Water, or Drink, doth not preserve it from Putrifying, or speedy Souring. So we see that Strong-Beer will last longer than small, and all things, that are hot and aromatical, do help to preserve Liquors, or Powders, &c. which they do, as well by strengthning the Spirits, as by soaking out the loose Moisture. 346.

347. The seventh is, *Separation of the cruder parts*, and thereby making the Body more equal; for all unperfect mixture is apt to putrifie, and Watry substances are more apt to putrifie, than oily. So, we see distilled Waters will last longer than raw Waters, and things that have passed the Fire, do last longer than those that have not passed the Fire; as dried Pears, &c.

348. The eighth is, The *drawing forth continually of that part, where the Putrefaction beginneth*: Which is (commonly) *the loose and watry moisture*; not onely for the reason before given, that it provoketh the radical moisture to come forth with it; but because being detained in the Body, the Putrefaction taking hold of it, infecteth the rest: As we see in the Embalming of Dead Bodies. And the same reason is, of preserving Herbs, or Fruits, or Flowers, in Bran or Meal.

349. The ninth is, The *commixture of any thing that is more oyly or sweet*: For such Bodies are least apt to putrifie, the Air working little upon them, and they not putrifying preserve the rest. And therefore we see Syrrups and Oyntments will last longer than Juyces.

350. The tenth is, The *commixture of somewhat that is dry*; for Putrefaction beginneth first from the Spirits, and then from the moisture; and that that is dry, is unapt to putrifie. And therefore smoak preserveth flesh; as we see in Bacon, and Neats-Tongues, and *Martlemas-Beef*, &c.

351. The opinion of some of the Ancients, That blown Airs do preserve Bodies longer than other Airs, seemeth to me probable; for that the blown Airs, being over-charged and compressed, will hardly receive the exhaling of any thing, but rather repulse it. It was tryed in a blown Bladder, whereinto flesh was put, and likewise a Flower, and it sorted not: For dry Bladders will not blow, and new Bladders rather further Putrefaction. The way were therefore, to blow strongly with a pair of Bellows, into a Hogshead, putting into the Hogshead (before) that which you would have preserved; and in the instant that you withdraw the Bellows, stop the hole close.

352. Experiment Solitary, touching *Wood Shining in the Dark*.

THe Experiment of Wood that shineth in the dark, we have diligently driven and pursued: The rather, for that of all things that give light here below, it is the most durable, and hath least apparent motion. Fire and Flame are in continual expence; Sugar shining onely while it is in scraping; and Salt-water while it is in dashing; Gloworms have their shining while they live, or a little after; onely Scales of Fishes (putrified) seem to be of the same nature with shining Wood. And it is true, that all Putrefaction hath with it an inward motion, as well as Fire or Light. The tryal sorted thus.

1. The shining is in some pieces more bright, in some more dim; but the most bright of all doth not attain to the light of a Gloworm. 2. The Woods that have been tryed to shine, are chiefly Sallow and Willow; also, the Ash and Hasle, it may be, it holdeth in others. 3. Both Roots, and Bodies do shine, but the Roots better. 4. The colour of the shining part, by day-light, is in some pieces white, in some pieces inclining to red; which in the Country they call the White and Red Carret. 5. The part that shineth, is (for the most part) somewhat soft, and moist to feel to; but some was found to be firm and hard; so as it might be figured into a Cross, or into Beads, &c. But you must not look to have an Image, or the like, in any thing that is Lightsom; for even a Face in Iron red hot, will

will not be seen, the light confounding the small differences of lightsome and darksome, which shew the figure. 6. There was the shining part pared off, till you came to that, that did not shine; but within two days the part contiguous began also to shine, being laid abroad in the Dew; so as it seemeth the putrefaction spredeth. 7. There was other dead Wood of like kinde that was laid abroad, which shined not at the first; but after a nights lying abroad, begin to shine. 8. There was other Wood that did first shine, and being laid dry in the House, within five or six days lost the shining; and laid abroad again, recovered the shining. 9. Shining Woods being laid in a dry room, within a seven night lost their shining; but being laid in a Cellar, or dark room, kept the shining. 10. The boring of holes in that kinde of Wood, and then laying it abroad, seemeth to conduce to make it shine; the cause is, for that all solution of continuity, doth help on putrefaction, as was touched before. 11. No Wood hath been yet tryed to shine that was cut down alive, but such as was rooted both in Stock and Root while it grew. 12. Part of the Wood that shined, was steeped in Oyl and retained the shining a fortnight. 13. The like succeeded in some steeped in Water, and much better. 14. How long the shining will continue, if the Wood be laid abroad every night, and taken in and sprinkled with Water in the day, is not yet tryed. 16. Tryal was made of laying it abroad in frosty weather, which hurt it not. 16. There was a great piece of a Root, which did shine, and the shining part was cut off, till no more shined; yet after two nights, though it were kept in a dry Room, it got a shining.

353. Experiment Solitary, touching the *Acceleration of Birth.*

THe bringing forth of Living Creatures may be accelerated in two respects: The one, if the Embryon ripeneth and perfecteth sooner; the other, if there be some cause from the Mothers Body of Expulsion or putting it down: Whereof the former is good, and argueth strength; the latter is ill, and cometh by accident or disease. And therefore the Ancient observation is true, that the *Childe born in the Seventh Moneth*, doth commonly well; but *Born in the Eighth Moneth*, doth (for the most part) die. But the cause assigned is fabulous, which is, That in the Eighth Moneth should be the return of the reign of the Planet *Saturn*, which (as they say) is a Planet malign; whereas in the Seventh is the reign of the *Moon*, which is a Planet propitious. But the true cause is, for that where there is so great a prevention of the ordinary time, it is the lustiness of the Childe; but when it is less, it is some indisposition of the Mother.

354. Experiment Solitary, touching the *Acceleration of Growth and Stature.*

TO Accelerate Growth or Stature, it must proceed; Either from the Plenty of the Nourishment, or from the Nature of the Nourishment, or from the Quickning and Exciting of the Natural heat. For the first, Excess of Nourishment, is hurtful; for it maketh the Childe corpulent, and growing in breadth, rather than in height. And you may take an Experiment from Plants, which if they spred much, are seldom tall. As for the Nature of the Nourishment; First, it may not be too dry, and therefore Children in Dairy Countreys do wax more tall, than where they feed more upon Bread and Flesh. There is also a received tale, that boyling of Daisie-Roots in Milk (which it is certain are great dryers) will make Dogs little. But so much is true, That an over-dry Nourishment in Childhood putteth back Stature. Secondly, The Nourishment must be of an opening

Nature; for that attenuateth the Juyce, and furthereth the Motion of the Spirits upwards. Neither is it without cause, that *Xenophon* in the Nouriture of the *Persian Children*, doth so much commend their feeding upon *Cardamon*, which (he saith) made them grow better, and be of a more active habit. *Cardamon* is in Latin, *Nasturtium*, and with us *Water-cresses*; which, it is certain, is an Herb, that whilst it is young, is friendly to Life. As for the quickning of Natural Heat, it must be done chiefly with exercise; and therefore (no doubt) much going to School, where they sit so much, hindereth the growth of Children; whereas Countrey-People, that go not to School, are commonly of better stature. And again, Men must beware how they give Children any thing that is cold in operation; even long sucking doth hinder both Wit and Stature. This hath been tryed, that a Whelp that hath been fed with *Nitre* in *Milk*, hath become very little, but extream lively: For the Spirit of Nitre is cold. And though it be an excellent Medicine in strength of years for Prolongation of Life; yet it is in Children and young Creatures an enemy to growth; and all for the same reason, For Heat is requisite to Growth. But after a Man is come to his middle age, Heat consumeth the Spirits; which the coldness of the Spirit of Nitre doth help to condence and correct.

Experiments in Consort, touching *Sulphure and Mercury, two of* Paracelsus *Principles.*

THere be two great Families of Things, you may term them by several names, *Sulphureous* and *Mercureal*, which are the *Chymists* words: (For as for their *Salts*, which is their third Principle, it is a Compound of the other two,) *Inflamable*, and *Not Inflamable*; *Mature* and *Crude*, *Oily* and *Watry*: For we see that in *Subterranies* there are, as the Fathers of their Tribes, Brimstone and Mercury; In Vegetables and Living Creatures, there is Water and Oyl; in the Inferior order of Pneumaticals, there is Air and Flame; and in the Superior, there is the Body of the Star, and the Pure Skey. And these Pairs, though they be unlike in the Primitive Differences of Matter, yet they seem to have many consents; for Mercury and Sulphure are principal materials of Metals; Water and Oyl are principal materials of Vegetables and Animals, and seem to differ but in Maturation or Concoction. Flame (in Vulgar Opinion) is but Air incensed, and they both have quickness of Motion, and facility of Cession, much alike: And the Interstellar Skey, (though the opinion be vain, that the Star is the Denser Part of his Orb,) hath notwithstanding so much affinity with the Star, that there is a rotation of that, as well as of the Star. Therefore, it is one of the greatest *Magnalia Naturæ*, to turn Water or Watry Juyce into Oyl or Oyly Juyce: Greater in Nature, than to turn Silver or Quick-silver into Gold.

355. The Instances we have wherein Crude and Watry Substance, turneth into Fat and Oyly, are of four kindes. First, In the Mixture of Earth and Water, which mingled by the help of the Sun, gathered a Nitrous Fatness, more than either of them have severally; As we see, in that they put forth Plants, which need both Juyces.

356. The second is in the Assimilation of Nourishment, made in the Bodies of Plants, and Living Creatures; whereof Plants turn the Juyce of meer Water and Earth, into a great deal of Oyly matter: Living Creatures, though much of their Fat, and Flesh, are out of Oyly Aliments, (as Meat, and Bread,) yet they assimilate also in a measure their Drink of Water,

&c.

&c. But these two ways of Version of Water into Oyl, (namely, by Mixture and by Assimilation) are by many Passages, and Percolations, and by continuance of soft Heats, and by circuits of Time.

The third is in the Inception of Putrefaction; as in Water corrupted, and the Mothers of Waters distilled, both which have a kinde of Fatness or Oyl. 357

The fourth is in the Dulcoration of some Metals; as *Saccharum Saturni, &c.* 358.

The Intension of Version of Water into a more Oyly substance is by Digestion: For Oyl is almost nothing else but Water digested and this Digestion is principally by Heat; which Heat must be either outward or inward. Again, It may be by Provocation or Excitation, which is caused by the mingling of Bodies already Oyly or Digested, for they will somewhat communicate their Nature with the rest. Digestion also is strongly effected by direct Assimilation of Bodies Crude into Bodies digested; as in Plants and Living Creatures, whose nourishment is far more Crude than their Bodies. But this Digestion is by a great compass as hath been said. As for the more full handling of these two principles, whereof this is but a taste; (the enquiry of which, is one of the profoundest enquiries of Nature,) we leave it to the title of Version of Bodies; and likewise to the title of the First Congregations of Matter, which like a General Assembly of Estates, doth give Law to all Bodies. 359.

A *Chamelion* is a Creature about the bigness of an ordinary *Lizard*, his Head unproportionably big, his eyes great; he moveth his Head without the writhing of his Neck (which is inflexible) as a *Hog* doth: His Back crooked, his Skin spotted with little Tumors, less eminent nearer the Belly, his Tail slender and long; on each Foot he hath five Fingers; three on the outside, and two on the inside; his Tongue of a marvellous length, in respect of his Body, and hollow at the end, which he will lanch out to prey upon *Flies*. Of colour Green, and of a dusky Yallow, brighter and whiter towards the Belly, yet spotted with Blew, White, and Red. If he be laid upon Green, the Green predominateth; if upon Yellow, the Yellow; not so, if he be laid upon Blew, or Red, or White, onely the Green spots receive a more orient lustre; laid upon Black, he looketh all Black, though not without a mixture of Green. He feedeth not onely upon Air, (though that be his principal sustenance;) for sometimes he taketh *Flies*, as was said; yet some that have kept *Chamelions* a whole year together, could never perceive that ever they fed upon any thing else but Air, and might observe their Bellies to swell after they had exhausted the Air, and closed their Jaws, which they open commonly against the Rayes of the Sun. They have a foolish Tradition in Magick, that if a *Chamelion* be burnt upon the top of an House, it will raise a Tempest, supposing (according to their vain Dreams of Sympathies) because he nourisheth with Air, his Body should have great vertue to make impression upon the Air. 360. Experiment Solitary, touching *Chamelions*.

IT is reported by one of the Ancients, that in part of *Media*, there are eruptions of Flames out of Plains, and that those Flames are clear, and cast not forth such smoak, and ashes, and pumice, as Mountain Flames do. The reason (no doubt) is, because the Flame is not pent, as it is in Mountains, and Earthquakes which cast Flame. There be also some blinde Fires, under 361. Experiment Solitary, touching *Subterrany Fires*.

under Stone, which flame not out, but Oyl being poured upon them; they flame out. The cauſe whereof is, for that it ſeemeth the Fire is ſo choaked, as not able to remove the Stone, it is heat rather than flame, which nevertheleſs is ſufficient the enflame to Oyl.

362. Experiment Solitary, touching *Nitre.*

IT is reported, that in ſome Lakes the Water is ſo Nitrous, as if foul Cloaths be put into it, it ſcoureth them of it ſelf: And if they ſtay any whit long they moulder away. And the ſcouring Vertue of Nitre is the more to be noted, becauſe it is a Body cold; and we ſee warm Water ſcoureth better than cold. But the cauſe is, for that it hath a ſubtil Spirit, which ſevereth and divideth any thing that is foul, and viſcous, and ſticketh upon a Body.

363. Experiment Solitary, touching *Congealing of Air.*

TAke a Bladder, the greateſt you can get; full it full of Wind, and tye it about the Neck with a Silk thred waxed; and upon that likewiſe Wax very cloſe; ſo that when the Neck of the Bladder drieth, no Air may poſſibly get in nor out. Then bury it three or four foot under the Earth, in a Vault, or in a Conſervatory of Snow, the Snow being made hollow about the Bladder; and after ſome fortnights diſtance, ſee whether the Bladder be ſhrunk: For if it be, then it is plain, that the coldneſs of the Earth or Snow, hath condenſed the Air, and brought it a degree nearer to Water: Which is an Experiment of great conſequence.

364. Experiment Solitary, touching *Congealing of Water into Chryſtal.*

IT is a report of ſome good credit, that in deep Caves there are Penſile Chryſtal, and degrees of Chryſtal that drop from above, and in ſome other (though more rarely) that riſe from below. Which though it be chiefly the work of cold, yet it may be, that Water that paſſeth thorow the Earth, gathereth a Nature more clammy, and fitter to congeal, and become ſolid than Water of it ſelf. Therefore tryal would be made to lay a heap of Earth in great Froſts, upon a hollow Veſſel, putting a Canvaſe between, that it falleth not in; and pour Water upon it, in ſuch quantity as will be ſure to ſoak thorow, and ſee whether it will not make an harder Ice in the bottom of the Veſſel, and leſs apt to diſſolve than ordinarily. I ſuppoſe alſo, that if you make the Earth narrower at the bottom than at the top, in faſhion of Sugar Loaf reverſed, it will help the Experiment. For it will make the Ice, where it iſſueth, leſs in bulk; and evermore ſmallneſs of quantity is a help to Verſion.

365. Experiment Solitary, touching *Preſerving of Roſe Leaves, both in Colour and Smell.*

TAke Damask Roſes and pull them, then dry them upon the top of an Houſe, upon a Lead or Tarras in the hot Sun, in a clear day, between the hours (onely) of Twelve and two or thereabouts. Then put them into a ſweet dry Earthen Bottle or a Glaſs with narrow mouths, ſtuffing them cloſe together, but without bruiſing: Stop the Bottle or Glaſs cloſe, and theſe Roſes will retain, not onely their ſmell perfect, but their colour freſh for a year at leaſt. Note, that nothing doth ſo much deſtroy any Plant, or other Body, either by *Putrefaction*, or *Arefaction*, as the *Adventitious Moiſture*, which hangeth looſe in the Body, if it be not drawn out. For it betrayeth and tolleth forth the Innate and Radicall Moiſture along with it when it ſelf goeth forth. And therefore in *Living Creatures*, moderate ſweat doth preſerve the Juyce of the Body. Note, that theſe Roſes when you take them from the drying, have little

or

or no ſmell; ſo that the ſmell is a ſecond ſmell that iſſueth out of the Flower afterwards.

366. Experiments in Conſort, touching the *Continuance of Flame.*

THe continuance of Flame, according unto the diverſity of the Body enflamed, and other circumſtances, is worthy the enquiry; chiefly, for that though Flame be (almoſt) of a momentany laſting, yet it receiveth the More, and the Leſs: We will firſt therefore ſpeak (at large) of Bodies enflamed, wholly, and immediately, without any Wiek to help the Inflammation. A ſpoonful of Spirit of Wine, a little heated, was taken, and it burnt as long as came to 116 Pulſes. The ſame quantity of Spirit of Wine, mixed with the ſixth part of a ſpoonful of Nitre, burnt but to the ſpace of 94 Pulſes. Mixed with the like quantity of Bay-Salt 83 Pulſes. Mixed with the like quantity of Gun-powder, which diſſolved into a Black-water 110 Pulſes. A Cube or Pellet of Yellow Wax, was taken, as much as half the Spirit of Wine, and ſet in the midſt, and it burnt onely to the ſpace of 87 Pulſes. Mixed with the ſixth part of a ſpoonful of Milk, it burnt to the ſpace of 100 Pulſes; and the Milk was crudled. Mixed with the ſixth part of a ſpoonful of Water, it burnt to the ſpace of 86 Pulſes; with an equal quantity of Water, onely to the ſpace of four Pulſes. A ſmall Pebble was laid in the midſt, and the Spirit of Wine burnt to the ſpace of 94 Pulſes. A piece of Wood of the bigneſs of an Arrow, and about a Fingers length, was ſet up in the midſt, and the Spirit of Wine burnt to the ſpace of 94 Pulſes. So that the Spirit of Wine Simple, endureth the longeſt, and the Spirit of Wine with the Bay-ſalt, and the equal quantity of Water, were the ſhorteſt.

367. Conſider well, whether the more ſpeedy going forth of the Flame, be cauſed by the greater vigor of the Flame in burning; or by the reſiſtance of the Body mixed, and the averſion thereof to take Flame: Which will appear by the quantity of the Spirit of Wine, that remaineth after the going out of the Flame. And it ſeemeth clearly to be the latter, for that the mixture of things leaſt apt to burn, is the ſpeedieſt in going out, and note by the way, that Spirit of Wine burned, till it go out of it ſelf, will burn no more, and taſteth nothing ſo hot in the mouth as it did; no nor yet ſour, (as if it were a degree towards Vinegar) which burnt Wine doth, but flat and dead.

368. Note, that in the Experiment of Wax aforeſaid, the Wax diſſolved in the burning, and yet did not incorporate it ſelf with the Spirit of Wine, to produce one Flame; but whereſoever the Wax floated, the Flame forſook it; till at laſt it ſpred all over, and put the Flame quite out.

369. The Experiments of the Mixtures of the Spirit of Wine enflamed, are things of diſcovery, and not of uſe: But now we will ſpeak of the continuance of Flames, ſuch as are uſed for Candles, Lamps, or Tapers, conſiſting of Inflamable Matters, and of a Wiek that provoketh Inflamation. And this importeth not onely diſcovery, but alſo uſe and profit; for it is a great ſaving in all ſuch Lights, if they can be made as fair and right as others, and yet laſt longer. Wax pure made into a Candle, and Wax mixed ſeverally into Candle-ſtuff, with the particulars that follow, (*Viz. Water, Aqua-vitæ, Milk, Bay-ſalt, Oyl, Butter, Nitre, Brimſtone, Saw duſt,*) every of theſe bearing a ſixth part to the Wax; and every of theſe Candles mixed, being of the ſame weight and wiek, with the Wax pure, proved thus in the burning, and laſting. The ſwifteſt in conſuming was that with Sawduſt, which firſt burned fair till ſome part of the Candle was conſumed, and

and the duſt gathered about the ſnaſte; but then it made the ſnaſte big, and long, and to burn duskiſhly, and the Candle waſted in half the time of the Wax pure. The next in ſwiftneſs, were the Oyl and Butter, which conſumed by a fifth part ſwifter than the pure Wax. Then followed in ſwiftneſs the clear Wax it ſelf; then the Bay-ſalt, which laſted about an eight part longer than the clear Wax; then followed the *Aqua-vitæ*, which laſted about a fifth part longer than the clear Wax; then follow the Milk and Water, with little difference from the *Aqua-vitæ*, but the Water ſloweſt. And in theſe four laſt, the VViek would ſpit forth little ſparks: For the Nitre, it would not hold lighted above ſome twelve Pulſes: But all the while it would ſpit out portions of Flame, which afterwards would go out into a vapor. For the Brimſtone, it would hold lighted much about the ſame with the Nitre; but then after a little while, it would harden and cake about the ſnaſte: So that the mixture of Bay-ſalt with VVax, will win an eighth part of the time of laſting, and the VVater a fifth.

370. After the ſeveral materials were tryed, Tryal was likewiſe made of ſeveral VVieks; as of ordinary *Cotten*, *Sowing Thred*, *Ruſh*, *Silk*, *Straw*, and *Wood*. The Silk, Straw, and Wood, would flame a little, till they came to the Wax, and then go out; of the other three, the Thred conſumed faſter than the Cotten, by a fixth part of time; the Cotten next; then the Ruſh conſumed ſlower than the Cotton, by at leaſt a third part of time. For the bigneſs of the Flame, the Cotton, and Thred, caſt a Flame much alike, and the Ruſh much leſs and dimmer. *Quære*, whether VVood and VVieks both, as in Torches conſume faſter, than the VVieks Simple?

371. VVe have ſpoken of the ſeveral Materials, and the ſeveral VVieks; but to the laſting of the Flame, it importeth alſo, not onely, what the material is, but in the ſame material, whether it be hard, ſoft, old, new, &c. Good Houſwives to make their Candles burn the longer, uſe to lay them (one by one) in Bran or Flower, which make them harder, and ſo they conſume the ſlower. Inſomuch, as by this means they will out-laſt other Candles of the ſame ſtuff, almoſt half in half. For Bran and Flower have a vertue to harden, ſo that both age, and lying in the Bran doth help to the laſting. And we ſee that VVax Candles laſt longer then Tallow-Candles, becauſe VVax is more firm and hard.

372. The laſting of Flame alſo dependeth upon the eaſie drawing of the Nouriſhment; as we ſee in the Court of *England*, there is a ſervice which they call *All-Night*; which is (as it were) a great Cake of Wax, with the Wiek in the midſt; whereby it cometh to paſs, that the Wiek fetcheth the Nouriſhment further off. We ſee alſo, that Lamps laſt longer, becauſe the Veſſel is far broader than the breadth of a Taper or Candle.

373. Take a Turreted Lamp of Tin made in the form of a Square; the height of the Turret, being thrice as much as the length of the lower part, whereupon the Lamp ſtandeth; make onely one hole in it, at the end of the return furtheſt from the Turret. Reverſe it, and fill it full of Oyl, by that hole; and then ſet it upright again, and put a Wiek in at the hole, and lighten it: You ſhall finde that it will burn ſlow, and a long time: Which is cauſed (as was ſaid laſt before) for that the Flame fetcheth the Nouriſhment a far off. You ſhall finde alſo, that as the Oyl waſteth and deſcendeth, ſo the top of the Turret, by little and little filleth with Air; which is cauſed by the Rarefaction of the Oyl by the heat. It were worthy the obſervation to make a hole, in the top of the Turret, and to try, when the

the Oyl is almoſt conſumed; whether the Air made of the Oyl, if you put to it a flame of a Candle, in the letting of it forth, will enflame. It were good alſo to have the Lamp made, not of Tin, but of Glaſs; that you may ſee how the Vapor or Air gathereth by degrees in the top.

374. A fourth point, that importeth the laſting of the Flame, is the cloſeneſs of the Air, wherein the Flame burneth. We ſee, that if Wind bloweth upon a Candle, it waſteth apace; we ſee alſo, it laſteth longer in a Lanthorn, than at large. And there are Traditions of Lamps and Candles, that have burnt a very long time in Caves and Tombs.

375. A fifth point, that importeth the laſting of the Flame, is the Nature of the Air where the Flame burneth; whether it be hot or cold, moiſt or dry. The Air, if it be very cold, irritateth the Flame, and maketh it burn more fiercely, (as Fire ſcorcheth in Froſty weather) and ſo further eth the Conſumption. The Air once heated, (I conceive) maketh the Flame burn more mildly, and ſo helpeth the continuance. The Air, if it be dry, is indifferent; the Air, if it be moiſt, doth in a degree quench the Flame, (as we ſee Lights will go out in the Damps of Mines;) and howſoever maketh it burn more dully, and ſo helpeth the continuance.

376. Experiments in Conſort, touching *Burials or Infuſions of divers Bodies in Earth.*

BUrials in Earth ſerve for Preſervation, and for Condenſation, and for Induration of Bodies. And if you intend Condenſation or Induration, you may bury the Bodies ſo, as Earth may touch them; as if you would make Artificial Procellane, &c. And the like you may do for Conſervation, if the Bodies be hard and ſolid, as Clay, Wood, &c. But if you intend Preſervation of Bodies, more ſoft and tender, then you muſt do one of theſe two: Either you muſt put them in caſes, whereby they may not touch the Earth; or elſe you muſt Vault the Earth, whereby it may hang over them, and not touch them: For if the Earth touch them, it will do more hurt by the moiſture, cauſing them to putrifie, than good by the virtual cold, to conſerve them, except the Earth be very dry and ſandy.

377. An *Orenge*, *Lemmon*, and *Apple*, wrapt in a Linning Cloth, being buried for a fortnights ſpace four foot deep within the Earth, though it were in a moiſt place, and a rainy time; yet came forth no ways mouldy or rotten, but were become a little harder than they were, otherwiſe freſh in their colour, but their Juyce ſomewhat flatted. But with the Burial of a fortnight more, they become putrified.

378. A Bottle of Beer buried in like manner as before, became more lively, better taſted, and clearer than it was: And a Bottle of Wine, in like manner. A Bottle of Vinegar ſo buried, came forth more lively and more odoriferous, ſmelling almoſt like a Violet. And after the whole Moneths Burial, all the three came forth as freſh and lively, if not better than before.

379. It were a profitable Experiment, to preſerve Orenges, Lemmons, and Pomgranates, till Summer; for then their price will be mightily encreaſed. This may be done, if you put them in a Pot or Veſſel well covered, that the moiſture of the Earth come not at them; or elſe by putting them in a Conſervatory of Snow. And generally, whoſoever will make Experiments of Cold, let him be provided of three things, a Conſervatory of Snow, a good large Vault, twenty foot at leaſt under the Ground, and a deep Well.

There

380. There hath been a Tradition, that Pearl, and Coral, Surchois-Stone, that have loſt their Colours, may be recovered by burying in the Earth; which is a thing of great profit, if it would ſort: But upon tryal of ſix weeks Burial, there followed no effect. It were good to try it in a deep Well, or in a Conſervatory of Snow, where the cold may be more conſtringent; and ſo make the Body more united, and thereby more reſplendent.

381. Experiment Solitary, touching the *Affects in Mens Bodies from ſeveral Winds.* *Mens Bodies* are heavier and leſs diſpoſed to Motion when Southern Winds blow, then when Northern. The cauſe is, for that when the Southern Winds blow, the Humors do (in ſome degree) melt, and wax fluide, and ſo flow into the parts; as it is ſeen in Wood, and other Bodies, which when the Southern Winds blow, do ſwell. Beſides, the Motion and Activity of the Body conſiſteth chiefly in the ſinews, which, when the Southern Wind bloweth, are more relax.

382. Experiment Solitary, touching *Winter and Summers Sicknesſes.* IT is commonly ſeen, that more are ſick in the Summer, and more dye in the Winter; except it be in Peſtilent Diſeaſes, which commonly reign in Summer or Autumn. The reaſon is, becauſe Diſeaſes are bred (indeed) chiefly by Heat; but then they are cured moſt by Sweat and Purge, which in the Summer cometh on, or is provoked more eaſily: As for Peſtilent Diſeaſes, the Reaſon why moſt dye of them in Summer, is becauſe they are bred moſt in the Summer; for otherwiſe, thoſe that are touched are in moſt danger in the Winter.

383. Experiment Solitary, touching *Peſtilential Seaſons.* THe general opinion is, That Years hot and moiſt, are moſt Peſtilent; upon the ſuperficial Ground, that Heat and Moiſture cauſe Putrefaction. In *England* it is found not true; for, many times, there have been great Plagues in dry years. VVhereof the cauſe may be, for that drought in the Bodies of Iſlanders, habituate to moiſt Airs, doth exaſperate the Humors, and maketh them more apt to Putrifie or Enflame; beſides, it tainteth the VVaters (commonly) and maketh them leſs wholſome. And again in *Barbary*, the Plagues break up in the Summer-Moneths, when the VVeather is hot and dry.

384. Experiment Solitary, touching *An Error received about Epidemical Diſeaſes.* MAny Diſeaſes, (both Epidemical and others) break forth at particular times. And the cauſe is falſly imputed to the conſtitution of the Air, at that time, when they break forth or reign; whereas it proceedeth (indeed) from a Precedent Sequence, and Series of the Seaſons of the Year: And therefore *Hippocrates*, in his Prognoſticks, doth make good obſervations of the Diſeaſes, that enſue upon the Nature of the precedent four Seaſons of the Year.

385. Experiment Solitary, touching the *Alteration or Preſervation of Liquors in Wells, or deep Vaults.* TRyal hath been made with Earthen Bottles, well ſtopped, hanged in a VVell of Twenty Fathom deep, at the leaſt; and ſome of the Bottles have been let down into the VVater, ſome others have hanged above, within about a Fathom of the VVater; and the Liquors ſo tryed have been, Beer, (not new, but ready for drinking) and VVine, and Milk. The proof hath been, that both the Beer, and the VVine, (as well within VVater, as above) have not been palled or deaded at all; but as good, or ſomewhat better than Bottles of the ſame Drinks and ſtaleneſs, kept in a Celler. But thoſe which did hang above VVater, were apparently the beſt; and that Beer did flower

flower a little; whereas that under Water did not, though it were fresh. The Milk soured, and began to putrifie. Nevertheless it is true, that there is a Village near *Blois*, where in deep Caves they do thicken Milk, in such sort, that it becometh very pleasant; which was some cause of this tryal of hanging Milk in the Well: But our proof was naught, neither do I know, whether that Milk in those Caves be first boyled. It were good therefore to try it with Milk sodden, and with Cream; for that Milk of it self, is such a Compound Body of Cream, Cruds, and Whey, as it is easily turned and dissolved. It were good also to try the Beer, when it is in Wort, that it may be seen, whether the hanging in the Well, will accelerate the ripening and clarifying of it.

386. Experiment Solitary, touching *Stutting*.

Divers, we see, do Stut. The cause may be (in most) the Refrigeration of the Tongue, whereby it is less apt to move; and therefore we see, that Naturals do generally Stut: And we see, that in those that Stut, if they drink Wine moderately, they Stut less, because it heateth: And so we see, that they that Stut, do Stut more in the first offer to speak, than in continuance; because the Tongue is, by motion, somewhat heated. In some also, it may be (though rarely) the dryness of the Tongue, which likewise maketh it less apt to move as well as cold; for it is an affect that cometh to some wise and great Men, as it did unto Moses, who was *Lingua Prapedita*: And many Stutters (we finde) are very Cholerick Men, Choler enducing a dryness in the Tongue.

387. Experiments in Consort, touching the *Smells*.

Smells, and other Odors, are sweeter in the Air, at some distance, than near the Nose; as hath been partly touched heretofore. The cause is double, first, The finer mixture, or incorporation of the Smell. For we see, that in Sounds likewise, they are sweetest, when we cannot hear every part by it self. The other reason is, For that all sweet Smells have joyned with them some Earthy or Crude Odors; and at some distance the Sweet, which is the more spiritual, is perceived; and the Earthy reacheth not so far.

388.

Sweet Smells are most forcible in dry Substances, when they are broken; and so likewise in *Orenges* or *Lemmons*, the nipping off their Rinde, giveth out their smell more: And generally, when Bodies are moved or stirred, though not broken, they smell more, as a Sweet-Bag waved. The cause is double; the one, for that there is a greater emission of the Spirit, when way is made: And this holdeth in the Breaking, Nipping, or Crushing; it holdeth also, (in some degree) in the Moving. But in this last, there is a concurrence of the second cause, which is the Impulsion of the Air, that bringeth the sent faster upon us.

389.

The daintiest smells of Flowers, are out of those Plants whose Leaves smell not; as *Violets*, *Roses*, *Wall-flowers*, *Gilly-flowers*, *Pincks*, *Wood-bine*, *Vine-flowers*, *Apple-blooms*, *Limetree-blooms*, *Bean-blooms*, &c. The cause is, for that where there is heat and strength enough in the Plant to make the Leaves odorate, there the smell of the Flower is rather evanide and weaker, than that of the Leaves; as it is in *Rosemary-flowers*, *Lavender-flowers*, and *Sweet-Brier Roses*: But where there is less heat, there the Spirit of the Plant is digested and refined, and severed from the grosser Juyce in the Efflorescence, and not before.

390. Most Odors smell best, broken, or crusht, as hath been said; but Flowers pressed or beaten, do lose the freshness and sweetness of their Odor. The cause is, for that when they are crushed, the grosser and more earthy Spirit cometh out with the Finer, and troubleth it; whereas in stronger Odors there are no such degrees of the issue of the smell.

391. Experiments in Consort, touching the *Goodness and Choice of Water.*

IT is a thing of very good use, to discover the goodness of Waters. The taste to those that drink Water onely doth somewhat: But other Experiments are more sure. First, try Waters by weight, wherein you may finde some difference, though not much: And the lighter, you may account the better.

392. Secondly, Try them by boiling upon an equal fire; and that which consumeth away fastest, you may account the best.

393. Thirdly, Try them in several Bottles or open Vessels, matches in every thing else, and see which of them last longest without stench or corruption; and that which holdeth unputrified longest, you may likewise account the best.

394. Fourthly, Try them by making Drinks, stronger or smaller, with the same quantity of Malt; and you may conclude, that that Water, which maketh the stronger Drink, is the more concocted and nourishing; though perhaps it be not so good for Medicinal use. And such VVater (commonly) is the VVater of large and navigable Rivers; and likewise in large and clean Ponds of standing VVater: For upon both them, the Sun hath more power than upon Fountains, or small Rivers. And I conceive, that Chalk-water is next them the best, for going furthest in Drink. For that also helpeth concoction, so it be out of a deep VVell; for then it cureth the rawness of the VVater; but Chalky-water towards the top of the Earth, is too fretting, as it appeareth in Laundry of Cloaths, which wear out apace, if you use such VVaters.

395. Fifthly, The Housvives do finde a difference in Waters, for the bearing or not bearing of Soap; and it is likely, that the more fat water will bear Soap best, for the hungry water doth kill the unctuous nature of the Soap.

396. Sixthly, You may make a judgment of Waters according to the place, whence they spring or come. The Rain-water is by the Physitians esteemed the finest and the best; but yet it is said to putrifie soonest, which is likely, because of the fineness of the Spirit; and in Conservatories of Rain-water, (such as they have in *Venice, &c*) they are found not so choice Waters; (the worse perhaps) because they are covered aloft, and kept from the Sun. Snow-water is held unwholesome, insomuch, as the people that dwell at the Foot of the Snow Mountains, or otherwise upon the ascent, (especially the VVomen) by drinking of Snow-water, have great bags hanging under their Throats. VVell VVater, except it be upon Chalk, or a very plentiful Spring maketh Meat red, which is an ill sign. Springs on the tops of high Hills are the best; for both they seem to have a Lightness and Appetite of Mounting; and besides, they are most pure and unmingled: And again are more percolated through a great space of Earth. For VVaters in Valleys, joyn in effect under ground with all VVaters of the same Level; whereas Springs on the tops of Hills, pass through a great deal of pure Earth with less mixture of other VVaters.

396. Seventhly, Judgment may be made of *Waters* by the Soyl whereupon the VVater runneth, as Pebble is the cleanest and best tasted; and next to that Clay-

Clay-water; and thirdly, Water upon Chalk; Fourthly, that upon Sand; and worst of all, upon Mud. Neither may you trust *Waters* that taste sweet, for they are commonly found in Rising-grounds of great Cities, which must needs take in a great deal of filth.

398. Experiment Solitary, touching the *Temperate Heat under the Æquinoctial.*

IN *Peru*, and divers parts of the *West-Indies*, though under the Line, the Heats are not so intolerable, as they be in *Barbary*, and the Skirts of the *Torrid Zone*. The causes are, first, the great Brizes which the motion of the Air in great Circles (such as are under the Girdle of the World) produceth, which do refrigerate; and therefore in those parts, Noon is nothing so hot when the Brizes are great, as about nine or ten of the clock in the Fore-noon. Another cause is, for that the length of the Night, and the Dews thereof, do compence the Heat of the day. A third cause is, the stay of the Sun; not in respect of day and night (for that we spake of before) but in respect of the Season: For under the Line, the Sun crosseth the Line, and maketh two Summers and two Winters; but in the skirts of the *Torrid Zone*, it doubleth and goeth back again, and so maketh one long Summer.

399. Experiment Solitary, touching the *Coloration of Black and Tawny Moors.*

THe heat of the Sun maketh Men black in some Countreys, as in *Æthiopia* and *Guinny*, *&c* Fire doth it not as we see in Glass-Men, that are continually about the Fire. The reason may be, because Fire doth lick up the Spirits and Blood of the Body, so as they exhale; so that it ever maketh Men look Pale and Sallow; but the Sun which is a gentler heat, doth but draw the Blood to the outward parts, and rather concocteth it, then soaketh it: And therefore, we see that all *Æthiopes* are fleshly, plump, and have great Lips. All which betoken moisture retained, and not drawn out. We see also, that the *Negroes* are bred in Countreys that have plenty of Water, by Rivers or otherwise: For *Mero*, which was the *Metropolis* of *Æthiopia*, was upon a great Lake; and *Congo*, where the *Negroes* are, is full of Rivers. And the confines of the River *Niger*, where the *Negroes* also are, are well watered; and the Region about *Capo Verde* is likewise moist, insomuch, as it is pestilent through moisture: But the Countreys of the *Abyssenes*, and *Barbary*, and *Peru*, where they are Tawney and Olivaster, and Pale, are generally more sandy and dry. As for the *Æthiopes*, as they are plump and fleshly, so (it may be) they are Sanguine and Ruddy coloured, if their Black Skin would suffer it to be seen.

400. Experiment Solitary, touching *Motion after the Instant of Death.*

SOme Creatures do move a good while after their head is off, as Birds. Some a very little time, as Men and all Beasts. Some move, though cut in several pieces, as Snakes, Eels, Worms, Flies, &c. First, therefore it is certain, that the immediate cause of Death, is the resolution or extinguishment of the Spirits; and that the destruction or corruption of the Organs, is but the mediate cause. But some Organs are so peremptorily necessary, that the extinguishment of the Spirits doth speedily follow; but yet so, as there is an interim of a small time. It is reported by one of the Ancients, of credit, That a Sacrificed Beast hath lowed after the Heart hath been severed; and it is a report also of credit, That the Head of a Pig hath been opened, and the Brain put into the Palm of a Mans Hand, trembling, without breaking any part of it, or severing it from the Marrow of the Back-bone: during which time, the Pig hath been, in all appearance, stark dead, and without motion: And after a small time the Brain hath been replaced.

and the Skull of the Pig closed, and the Pig hath a little after gone about. And certain it is, that an Eye upon Revenge, hath been thrust forth, so as it hanged a pretty distance by the Visual Nerve; and during that time, the Eye hath been without any power of Sight; and yet after (being replaced) recovered Sight. Now the *Spirits* are chiefly in the Head, and Cells of the Brain, which in Men and Beasts are large; and therefore, when the Head is off, they move little or nothing: But Birds have small Heads, and therefore the *Spirits* are a little more dispersed in the Sinews, whereby Motion remaineth in them a little longer; insomuch, as it is extant in story, that an Emperor of *Rome*, to shew the certainty of his hand, did shoot a great Forked Arrow at an *Estrich*, as she ran swiftly upon the Stage, and stroke off her Head; and yet she continued the race a little way with her Head off. As for Worms, and Flies, and Eels, the *Spirits* are diffused almost all over; and therefore they move in their several pieces.

NATURAL HISTORY.

Century V.

WE will now enquire of *Plants* or *Vegetables*; and we ſhall do it with diligence. They are the principal part of the *Third days Work*; they are the firſt *Producat*, which is the word of *Animation*, for the other words are but the words of Eſſence; and they are of excellent and general uſe, For *Food*, *Medicine*, and a number of *Medicinal Arts*.

Experiments in Conſort, touching the *Acceleration of Germination.*

There were ſown in a Bed, *Turnip ſeed*, *Raddiſh-ſeed*, *Wheat*, *Cucumber-ſeed*, and *Peaſe*. The Bed we call a Hot-bed, and the manner of it is this. There was taken *Horſe-dung*, old, and well rotted; this was laid upon a Bank half a foot high, and ſupported round about with Planks; and upon the top was caſt ſifted Earth, ſome two fingers deep; and then the Seed ſprinkled upon it, having been ſteeped all night in Water mixed with Cow-dung. The *Turnip-ſeed*, and the *Wheat*, came up half an inch above ground, within two days after, without any watering; the reſt the third day. The Experiment was made in *October*, and (it may be) in the Spring, the Accelerating would have been the ſpeedier. This is a noble Experiment; for, without this help, they would have been four times as long in coming up. But there doth not occur to me, at this preſent, any uſe thereof, for profit, except it ſhould be for Sowing of *Peaſe*; which have their price very much increaſed by the early coming. It may be tryed alſo with Cherries, Strawberries, and other Fruit which are deareſt, when they come early. 401.

There was Wheat ſteeped in Water mixed with Cow-dung, other in Water mixed with Horſe-dung, other in Water mixed with Pigeon-dung, 402.

other in Urine of Man, other in Water mixed with Chalk powdred, other in Water mixed with Soot, other in Water mixed with Ashes, other in Water mixed with Bay-Salt, other in Claret Wine, other in Malmsey, other in Spirit of Wine. The proportion of the mixture was, a fourth part of the ingredients to the Water, save that there was not of the Salt above an eight part. The Urine, and Winds, and Spirit of Wine, were simple without mixture of Water; the time of steeping was twelve hours; the time of the year *October*. There was also other Wheat sown unsteeped, but watred twice a day with warm Water; there was also other Wheat sown simple, to compare it with the rest. The event was, that those that were in the mixture of Dung, and Urine, Soot, Chalk, Ashes, and Salt, came up within six days; and those that afterwards proved the highest, thickest, and most lusty, were, first the Urine, and then the Dungs; next the Chalk, next the Soot, next the Ashes, next the Salt, next the Wheat simple of it self unsteeped and unwatered, next the watered twice a day with warm Water, next the Claret Wine. So that these three last were slower than the ordinary Wheat of it self; and this Culture did rather retard than advance. As for those that were steeped in Malmsey, and Spirit of Wine, they came not up at all. This is a rich Experiment for profit; for the most of the steepings are cheap things, and the goodness of the crop is a great matter of gain; if the goodness of the crop answer the earliness of the coming up, as it is like it will, both being from the vigor of the Seed; which also partly appeared in the former Experiment, as hath been said. This Experiment would be tryed in other Grains, Seeds, and Kernels; for it may be some steeping will agree best with some Seeds. It would be also tryed with Roots steeped as before, but for longer time; it would be tryed also in several seasons of the Year, especially in the Spring.

403. *Strawberries* watered now and then (as once in three days) with Water, wherein hath been steeped Sheeps-dung, or Pigeons-dung, will prevent and come early. And it is like the same effect would follow in other *Berries*, *Herbs*, *Flowers*, *Grains*, or *Trees*; and therefore it is an Experiment, though vulgar in *Strawberries*, yet not brought into use generally: For it is usual to help the Ground with Muck, and likewise to recomfort it sometimes with Muck put to the Roots, but to water it with Muck-water, which is like to be more forcible, is not practised.

404. *Dung*, or *Chalk*, or *Blood*, applied in substance (seasonably) to the Roots of Trees, doth set them forwards. But to do it unto *Herbs*, without mixture of Water or Earth, it may be these helps are too hot.

405. The former means of helping Germination, are either by the goodness and strength of the Nourishment, or by the comforting and exciting the Spirits in the Plant, to draw the Nourishment better. And of this latter kinde concerning the comforting of the Spirits of the Plant, are also the experiments that follow; though they be not applications to the Root or Seed. The planting of Trees warm upon a Wall, against the South or South-East Sun, doth hasten their coming on and ripening; and the South-East is found to be better than the South-West, though the South-West be the hotter Coast. But the cause is chiefly, for that the heat of the morning succeedeth the cold of the night; and partly, because (many times) the South-West Sun is too parching. So likewise planting of them upon the Back of a Chimney where a fire is kept, doth hasten their coming on, and ripening: Nay more, the drawing of the Boughs into the inside of a room, where a Fire is continually kept, worketh the same effect; which hath

hath been tryed with Grapes; insomuch, as they will come a Moneth earlier, then the Grapes abroad.

Besides the two Means of Accelerating Germination, formerly described; 406.
that is to say, the mending of the Nourishment, comforting of the Spirit of the Plant; there is a third, which is the making way for the easie coming to the Nourishment, and drawing it. And therefore gentle digging and loosning of the Earth about the Roots of Trees, and the removing Herbs and Flowers into new Earth, once in two years (which is the same thing, for the new Earth is ever looser) doth greatly further the prospering and earliness of Plants.

But the most admirable Acceleration by facilitating the Nourishment, is 407.
that of Water. For a Standard of a *Damask Rose* with the Root on, was set in a Chamber, where no Fire was, upright in an Earthen Pan, full of fair Water, without any mixture, half a foot under the Water, the Standard being more than two foot high above the Water. Within, in the space of ten days, the Standard did put forth a fair green Leaf, and some other little Buds, which stood at a stay without any shew of decay or withering, more then seven days. But afterwards that Leaf faded, but the young Buds did sprout on, which afterward opened into fair Leaves, in the space of three Moneths, and continued so a while after, till upon removal we left the tryal. But note, that the Leaves were somewhat paler, and light-coloured then the Leaves use to be abroad. Note, that the first Buds were in the end of *October*, and it is likely, that if it had been in the Spring time, it would have put forth with greater strength, and (it may) be to have grown on to bear Flowers. By this means, you may have (as it seemeth) Roses set in the midst of a Pool, being supported with some stay; which is matter of rareness and pleasure, though of small use. This is the more strange, for that the like Rose Standard was put at the same time, into Water mixed with Horse-dung, the Horse-dung about the fourth part to the Water, and in four Moneths space (while it was observed) put not forth any Leaf, though divers Buds at the first, as the other.

A *Dutch Flower* that had a *Bulbous Root*, was likewise put at the same time 408.
all under Water, some two or three fingers deep; and within seven days sprouted, and continued long after further growing. There were also put in, a *Beet-root*, a *Borrage-root*, and a *Raddish-root*, which had all their Leaves cut almost close to the Roots; and within six weeks had fair Leaves, and so continued till the end of *November*.

Note, that if Roots, or Pease, or Flowers may be accelerated in their 409.
coming and ripening, there is a double profit; the one in the high price that those things bear when they come early; the orher in the swiftness of their returns: For in some Grounds which are strong, you shall have a Raddish, &c. come in a moneth, that in other Grounds will not come in two, and so make double returns.

Wheat also was put into the Water, and came not forth at all; so as it 410.
seemeth there must be some strength and bulk in the Body, put into the Water, as it is in Roots; for Grains, or Seeds, the cold of the Water will mortifie. But casually some Wheat lay under the Pan, which was somewhat moistened by the suing of the Pan, which in six weeks (as aforesaid) looked mouldy to the eye, but it was sprouted forth half a fingers length.

It seemeth by these Instances of Water, that for nourishment the Water 411.
is almost all in all, and that the Earth doth but keep the Plant upright, and save it from over-heat, and over-cold; and therefore is a comfortable Experiment for good Drinkers. It proveth also that our former opinion, that

Drink

Drink incorporate with Flesh or Roots (as in *Capon-Beer, &c.*) will nourish more easily than Meat and Drink taken severally.

412. The Housing of Plants (I conceive) will both Accelerate Germination, and bring forth Flowers and Plants in the colder Seasons: And as we House-hot Countrey Plants, as *Lemmons, Orenges, Myrtles*, to save them; so we may House our own Country Plants to forward them, and make them come in the cold Seasons, in such sort, that you may have *Violets, Strawberries, Pease*, all Winter: So that you sow or remove them at fit times. This Experiment is to be referred unto the comforting of the *Spirit* of the Plant by warmth, as well as Housing their Boughs, &c. So then the means to Accelerate Germination, are in particular eight, in general three.

413. Experiments in Consort, touching the *Putting back or Retardation of Germination.*

TO make *Roses* or other *Flowers* come late, it is an Experiment of Pleasure. For the Ancients esteemed much of *Rosa Sera*, and indeed the *November Rose* is the sweetest, having been less exhaled by the Sun. The Means are these, First, The cutting off their tops immediately after they have done bearing, and then they will come again the same year about *November*; but they will not come just on the tops where they were cut, but out of those Shoots which were (as it were) Water-boughs. The cause is, for that the Sap, which otherwise would have fed the top, (though after bearing) will, by the discharge of that, divert unto the Side-sprouts, and they will come to bear, but later.

414. The second is the *Pulling of the Buds of the Rose*, when they are newly knotted, for then the side Branches will bear. The cause is the same with the former: For *cutting off the Tops, and pulling off the Buds*, work the same effect, in Retension of the Sap for a time, and Diversion of it to the Sprouts that were not so forward.

415. The third is the cutting off some few of the Top-boughs in the Spring time but suffering the lower Boughs to grow on. The cause is, for that the Boughs do help to draw up the Sap more strongly; and we see that in Pouling of Trees, many do use to leave a Bough or two on the top to help to draw up the Sap. And it is reported also, That if you graft upon the Bough of a Tree, and cut off some of the old Boughs, the new Cions will perish.

416. The fourth is by laying the Roots bare about *Christmas* some days. The cause is plain, for that it doth arrest the Sap from going upwards for a time; which arrest, is afterwards released by the covering of the Root again with Earth, and then the Sap getteth up, but later.

417. The fifth is the removing of the Tree some Moneth before it Buddeth. The cause is, for that some time will be required after the Remove, for the Resetling, before it can draw the Juyce; and that time being lost, the blossom must needs come forth later.

418. The sixth is the Grafting of Roses in *May*, which commonly Gardiners do not till *July*, and then they bear not till the next year; but if you graft them in *May*, they will bear the same year, but late.

419. The seventh is the Girding of the Body of the Tree about with some Packthred; for that also in a degree restraineth the Sap, and maketh it come up more late, and more slowly.

420. The eighth is the Planting of them in a Shade or in a Hedge. The cause is, partly the keeping out of the Sun, which hastneth the Sap to rise, and partly the robbing of them of Nourishment by the stuff in the Hedge;

these

these means may be practised upon other, both Trees, and Flowers, *Mutatis mutandis.*

Men have entertained a conceit that sheweth prettily, namely, That if you graft a Late-coming-Fruit, upon a Stock of a Fruit-tree that cometh early, the Graft will bear Fruit early, as a Peach upon a Cherry: And contrariwise, if an Early-coming-Fruit upon a Stock of a Fruit-tree that cometh late, the Graft will bear Fruit late; as a Cherry upon a Peach. But these are but imaginations, and untrue. The cause is, for that the Cions over-ruleth the Stock quite, and the Stock is but Passive onely, and giveth Aliment, but no Motion to the Graft. 421.

Experiments in Consort, touching the *Melioration of Fruit-Trees, and Plants.*

WE will speak now, how to make *Fruits*, *Flowers*, and *Roots* larger, in more plenty and sweeter than they use to be; and how to make the *Trees* themselves more tall, more spred, and more hasty and sudden, than they use to be. Wherein there is no doubt, but the former *Experiments* of *Acceleration* will serve much to these purposes. And again, that these *Experiments* which we shall now set down, do serve also for *Acceleration*, because both Effects proceeds from the encrease of Vigor in the Tree; but yet to avoid confusion. And because some of the Means are more proper for the one effect, and some for the other. We will handle them apart.

It is an assured Experience, That an heap of Flint or Stone, laid about the bottom of a wilde Tree, (as in Oak, Elm, Ash, &c.) upon the first planting, doth make it prosper double as much as without it. The cause is, for that it retaineth the moisture which falleth at any time upon the Tree, and suffereth it not to be exhaled by the Sun. Again, it keepeth the Tree warm from cold Blasts and Frosts, as it were in an House. It may be also, there is somewhat in the keeping of it steady at the first. *Quære*, if laying of Straw some height about the Body of a Tree, will not make the Tree forwards: For though the Root giveth the Sap, yet it is the Body that draweth it. But you must note, that if you lay Stones about the Stalk of Lettuce, or other Plants that are more soft, it will over-moisten the Roots, so as the *Worms* will eat them. 422.

A Tree at the first setting, should not be shaken, until it hath taken Root fully; And therefore some have put too little Forks about the bottom of their Trees, to keep them upright; but after a years rooting, then shaking doth the Tree good by loosning of the Earth, and (perhaps) by exercising (as it were) and stirring the Sap of the Tree. 423

Generally, the cutting away of Boughs and Suckers at the Root and Body, doth make Trees grow high; and contrariwise, the Poling and Cutting of the top, maketh them grow, spred, and bushy; as we see in Pollards, &c. 424.

It is reported, That to make hasty growing Coppice-wood, the way is, to take Willow, Sallow, Popler, Alder, of some seven years growth; and to set them, not upright, but a-slope, a reasonable depth under the Ground; and then instead of one Root they will put forth many, and so carry more shoots upon a Stem. 425.

When you would have many new Roots of Fruit-Trees, take a low Tree, and bow it, and lay all his Branches a flat upon the ground, and cast Earth upon them, and every twig will take Root. And this is a very profitable Experiment for costly Trees; (for the Boughs will make Stocks without charge) such as are *Apricots*, *Peaches*, *Almonds*, *Cornelians*, *Mulberries*, *Figs*, &c. 426.

&c. The like is continually practiſed with Vines, Roſes, Muſk-Roſes, &c.

427. From *May* to *July* you may take off the Bark of any Bough, being of the bigneſs of Three or four Inches, and cover the bare place, ſomewhat above and below with Loam, well tempered with Horſe-dung, binding it faſt down. Then cut off the Bough about *Alhollantide* in the bare place, and ſet it in Ground, and it will grow to be a fair Tree in one year. The cauſe may be, for that the Bearing from the Bark, keepeth the Sap from deſcending towards Winter, and ſo holdeth it in the Bough; and it may be alſo, that Loam and Horſe-dung applied to the bare place, do moiſten it and cheriſh it, and make it more apt to put forth the Root. Note, that this may be a general means for keeping up the Sap of Trees in their Boughs, which may ſerve to other effects.

428. It hath been practiſed in Trees that ſhew fair and bear not, to bore a hole thorow the Heart of the Tree, and thereupon it will bear. Which may be, for that the Tree before hath too much Repletion, and was oppreſſed with his own Sap; for Repletion is an enemy to Generation.

429. It hath been practiſed in Trees that do not bear, to cleave two or three of the chief Roots, and to put into the Cleft a ſmall Pebble which may keep it open, and then it will bear. The cauſe may be, for that a Root of a Tree may be (as it were) hide-bound, no leſs then the Body of the Tree; but it will not keep open without ſomewhat put into it.

430. It is uſually practiſed to ſet Trees that require much Sun, upon Walls againſt the South; as *Apricots*, *Peaches*, *Plumbs*, *Vines*, *Figs*, and the like. It hath a double commodity; the one, the heat of the Wall by reflexion; the other, the taking away of the ſhade: For when a Tree groweth round, the upper Boughs over ſhaddow the lower, but when it is ſpred upon a Wall, the Sun cometh alike upon the upper and lower Branches.

431. It hath alſo been practiſed (by ſome) to pull ſome Leaves from the Trees ſo ſpred, that the Sun may come upon the Bough and Fruit the better. There hath been practiſed alſo a curioſity, to ſet a Tree upon the North ſide of a Wall, and at a little height, to draw him through the Wall, and ſpred him upon the South ſide; conceiving, that the Root and lower part of the Stock ſhould enjoy the freſhneſs of the ſhade, and the upper Boughs and Fruit, the comfort of the Sun; but it ſorted not. The cauſe is, for that the Root requireth ſome comfort from the Sun, though under Earth, as well as the Body; and the lower part of the Body more than the upper, as we ſee in compaſſing a Tree below with ſtraw.

432. The lowneſs of the Bough, where the Fruit cometh, maketh the Fruit greater, and to ripen better; for you ſhall ever ſee in *Apricotes*, *Peaches*, or *Melo-Cotones* upon a Wall, the greateſt Fruits towards the bottom. And in *France* the Grapes that make the Wine, grow upon the low Vines, bound to ſmall Stakes; and the raiſed Vines in Arbors, make but Verjuyce. It is true, that in *Italy*, and other Countreys where they have hotter Sun, they raiſe them upon Elms and Trees: But I conceive, that if the French manner of Planting low, were brought in uſe, their Wines would be ſtronger and ſweeter: But it is more chargeable in reſpect of the Props. It were good to try whether a Tree grafted ſomewhat near the ground, and the lower Boughs onely maintained, and the higher continually proyned off, would not make a larger Fruit.

433. To have Fruit in greater Plenty, the way is to graft, not onely upon young Stocks, but upon divers Boughs of an old Tree; for they will bear great

great numbers of Fruit; whereas if you graft but upon one Stock, the Tree can bear but few.

The digging yearly about the Roots of Trees, which is a great means, both to the Acceleration and Melioration of Fruits, is practiſed in nothing but in Vines; which, if it were transferred unto other Trees and Shrubs, (as Roſes, &c.) I conceive, would advance them likewiſe. 434.

It hath been known, that a Fruit-tree hath been blown up (almoſt) by the Roots, and ſet up again, and the next year bare exceedingly. The cauſe of this was nothing but the looſening of the Earth, which comforteth any Tree, and is fit to be practiſed more than it is in Fruit-trees: For Trees cannot be ſo fitly removed into new Grounds, as Flowers and Herbs may. 435.

To revive an old Tree, the digging of it about the Roots, and applying new Mould to the Roots, is the way. We ſee alſo that Draught-Oxen put into freſh Paſture, gather new and tender fleſh; and in all things, better nouriſhment than hath been uſed, doth help to renew, eſpecially, if it be not onely better but changed, and differing from the former. 436.

If an Herb be cut off from the Roots in the beginning of Winter, and then the Earth be trodden and beaten down hard with the Foot and Spade, the Roots will become of very great magnitude in Summer. The reaſon is, for that the moiſture being forbidden to come up in the Plant, ſtayeth longer in the Root, and ſo dilateth it. And Gardiners uſe to tread down any looſe Ground after they have ſown Onions, or Turnips, &c. 437.

If *Panicum* be laid below, and about the bottom of a Root, it will cauſe the Root to grow to an exceſſive bigneſs. The cauſe is, for that being it ſelf of a ſpungy ſubſtance, it draweth the moiſture of the Earth to it, and ſo feedeth the Root. This is of greateſt uſe for *Onions*, *Turnips*, *Parſnips*, and *Carrets*. 438.

The ſhifting of Ground is a means to better the Tree and Fruit; but with this Caution, That all things do proſper beſt, when they are advanced to the better. Your Nurſery of Stocks ought to be in a more barren Ground, than the Ground is whereunto you remove them. So all *Graſiers* prefer their Cattle from meaner Paſtures to better. We ſee alſo, that hardneſs in youth lengthneth life, becauſe it leaveth a cheriſhing to the better of the Body in Age: Nay, in exerciſes it is good to begin with the hardeſt, as Dancing in thick Shooes, &c. 439.

It hath been obſerved that hacking of Trees in their Bark, both downright, and a croſs, ſo as you make them rather in ſlices, than in continued Hacks, doth great good to Trees, and eſpecially delivereth them from being Hide bound, and killeth their Moſs. 440.

Shade to ſome Plants conduceth to make them large and proſperous more than Sun; as in Strawberries, and Bays, &c. Therefore amongſt Strawberries, ſow here and there ſome Borrage-Seed; and you ſhall finde the Strawberries under thoſe Leaves, far more large than their fellows. And Bays you muſt plant to the North, or defend them from the Sun by a Hedg-Row; and when you ſow the Berries, weed not the Borders for the firſt half year; for the Weed giveth them Shade. 441.

To increaſe the Crops of Plants, there would be conſidered, not onely the increaſing the Luſt of the Earth, or of the Plant, but the ſaving alſo of that which is ſpilt. So they have lately made a tryal to ſet VVheat; which nevertheleſs hath been left off, becauſe of the trouble and pains; yet ſo much is true, that there is much ſaved by the Setting, in compariſon of 442.

that

that which is Sown; both by keeping it from being picked up by Birds, and by avoiding the ſhallow lying of it, whereby much that is ſown, taketh no Root.

443. It is preſcribed by ſome of the Ancients, that you take ſmall Trees, upon which Figs or other Fruit grow, being yet unripe, and cover the Trees in the middle of Autumn with Dung until the Spring, and then take them up in a warm day, and replant them in good Ground; and by that means, the former years Tree will be ripe, as by a new Birth, when other Trees of the ſame kinde do but bloſſom. But this ſeemeth to have no great probability.

444. It is reported, That if you take Nitre, and mingle it with VVater, to the thickneſs of Honey, and therewith anoint the Bud, after the Vine is cut, it will ſprout forth within eight days. The cauſe is like to be (if the Experiment be true) the opening of the Bud, and of the parts contiguous, by the Spirit of the Nitre; for Nitre is (as it were) the life of Vegetables.

445. Take *Seed* or *Kernels* of *Apples*, *Pears*, *Orenges*; or a *Peach*, or a *Plumb-Stone*, *&c.* And put them into a *Squill*, (which is like a great *Onion*) and they will come up much earlier than in the Earth it ſelf. This I conceive to be as a kinde of Grafting in the Root; for as the Stock of a Graft yielderh better prepared nouriſhment to the Graft, than the Crude Earth, ſo the Squill doth the like to the Seed; and, I ſuppoſe, the ſame would be done, by putting Kernels into a Turnip, or the like, ſave that the Squill is more vigorous and hot. It may be tryed alſo, with putting Onion-Seed into an Onion-Head, which thereby (perhaps) will bring forth a larger and earlier Onion.

446. The pricking of a Fruit in ſeveral places, when it is almoſt at his bigneſs, and before it ripeneth, hath been practiſed with ſucceſs, to ripen the Fruit more ſuddenly. We ſee the example of the biting of Waſps or Worms upon Fruit (whereby it manifeſtly) ripeneth the ſooner.

447. It is reported, That *Alga Marina* (*Sea-Weed*) put under the Roots of Colworts, and (perhaps) of other Plants, will further their growth. The vertue (no doubt) hath relation to Salt, which is a great help to Fertility.

448. It hath been practiſed to cut off the Stalks of Cucumbers, immediately after their bearing cloſe by the Earth; and then to caſt a pretty quantity of Earth upon the Plant that remaineth, and they will bear the next year Fruit long before the ordinary time. The cauſe may be, for that the Sap goeth down the ſooner, and is not ſpent in the Stalk or Leaf, which remaineth after the Fruit. Where note, that the Dying in the Winter, of the Roots or Plants that are Annual, ſeemeth to be partly cauſed by the over-expence of the Sap into Stalk and Leaves; which being prevented, they will ſuper annuate, if they ſtand warm.

449. The pulling off many of the Bloſſoms from a Fruit-tree, doth make the Fruit fairer. The cauſe is manifeſt, for that the Sap hath the leſs to nouriſh. And it is a common experience, That if you do not pull off ſome Bloſſoms, the firſt time a Tree bloometh, it will bloſſom it ſelf to death.

450. It were good to try what would be the effect, if all the Bloſſoms were pulled from a Fruit-tree, or the Acorns and Cheſnut-buds, &c. from a wilde Tree, for two years together. I ſuppoſe, that the Tree will either put forth the third year bigger, and more plentiful Fruit; or elſe, the ſame years, larger Leaves, becauſe of the Sap ſtored up.

It hath been generally received, that a Plant watred with warm Water, will come up ſooner and better, than with cold Water, or with Showers. But the Experiment of watering Wheat with warm Water (as hath been ſaid) ſucceeded not; which may be, becauſe the tryal was too late in the Year, *viz.* in the end of *October*. For the Cold then coming upon the Seed, after it was made more tender by the warm Water, might check it. 451.

There is no doubt, but that Grafting (for the moſt part) doth meliorate the Fruit. The cauſe is manifeſt, for that the nouriſhment is better prepared in the Stock, than in the Crude Earth: But yet note well, that there be ſome Trees that are ſaid to come up more happily from the Kernel, than from the Graft; as the *Peach*, and *Melocotone*. The cauſe, I ſuppoſe to be, for that thoſe Plants require a nouriſhment of great moiſture; and though the nouriſhment of the Stock be finer, and better prepared, yet it is not ſo moiſt and plentiful, as the nouriſhment of the Earth. And indeed we ſee thoſe Fruits are very cold Fruits in their Nature. 452.

It hath been received, that a ſmaller Pear grafted upon a Stock that beareth a greater Pear, will become great. But I think it is as true, as that of the Prime-Fruit upon the late Stock, and *è Converſo*, which we rejected before; for the Cions will govern. Nevertheleſs, it is probable enough, that if you can get a Cions to grow upon a Stock of another kinde, that is much moiſter than his own Stock, it may make the Fruit greater, becauſe it will yield more plentiful nouriſhment, though it is like it will make the Fruit baſer. But generally the grafting is upon a dryer Stock; as the Apple upon a Crab, the Pear upon a Thorn, &c. Yet it is reported, that in the *Low-Countreys* they will graft an Apple-Cions upon the Stock of a Colewort, and it will bear a great flaggy Apple; the Kernel of which, if it be ſet, will be a Colewort, and not an Apple. It were good to try, whether an Apple-Cions will proſper, if it be grafted upon a Sallow or upon a Poplar, or upon an Alder, or upon an Elm, or upon an Horſe-Plum, which are the moiſteſt of Trees. I have heard that it hath been tryed upon an Elm, and ſucceeded. 453.

It is manifeſt by experience, That Flowers removed, wax greater, becauſe the nouriſhment is more eaſily come by in the looſe Earth. It may be, that oft regrafting of the ſame Cions, may likewiſe make Fruit greater; as if you take a Cions, and graft it upon a Stock the firſt year; and then cut it off, and graft it upon another Stock the ſecond year, and ſo for a third, or fourth year, and then let it reſt, it will yield afterward, when it beareth, the greater Fruit. 454.

Of Grafting, *there are many Experiments worth the noting, but thoſe we reſerve to a proper place.*

It maketh Figs better, if a Fig-tree, when it beginneth to put forth Leaves, have his top cut off. The cauſe is plain, for that the Sap hath the leſs to feed, and the leſs way to mount: But it may be the Fig will come ſomewhat later, as was formerly touched. The ſame may be tried likewiſe in other Trees. 455.

It is reported, That Mulberries will be fairer, and the Tree more fruitful, if you bore the Trunk of the Tree thorow in ſeveral places, and thruſt into the places bored, Wedges of ſome hot Trees; as *Turpentine*, *Maſtick-tree*, *Guaiacum*, *Juniper*, *&c.* The cauſe may be, for that Adventive heat doth chear up the Native Juyce of the Tree. 456.

It is reported, That Trees will grow greater and bear better Fruit, if you put Salt, or Lees of Wine, or Blood to the Root. The cauſe may be the en- 457.

creasing the Luſt or Spirit of the Root: Theſe things being more forcible than ordinary compoſts.

458. It is reported by one of the Ancients, that Artichoaks will be leſs prickly, and more tender, if the Seeds have their tops dulled or grated off upon a Stone.

459. *Herbs* will be tenderer, and fairer, if you take them out of Beds when they are newly come up, and remove them into Pots with better Earth. The remove from Bed to Bed was ſpoken of before; but that was in ſeveral years, this is upon the ſudden. The cauſe is the ſame with other removes, formerly mentioned.

460. *Cole-worts* are reported by one of the Ancients, to proſper exceedingly, and to be better taſted, if they be ſometimes watred with Salt-water, and much more with Water mixed with Nitre; the Spirit of which is leſs Adurent than Salt.

461. It is reported, That *Cucumbers* will prove more tender and dainty, if their Seeds be ſteeped (little) in Milk; the cauſe may be, for that the Seed being mollified with the Milk, will be too weak to draw the groſſer Juyce of the Earth, but onely the finer. The ſame Experiment may be made in Artichoaks, and other Seeds, when you would take away, either their Flaſhineſs or Bitterneſs. They ſpeak alſo, that the like effect followeth of ſteeping in Water mixed with Honey; but that ſeemeth to me not ſo probable, becauſe Honey hath too quick a Spirit.

462. It is reported, That *Cucumbers* will be leſs Watry, and more Melon-like, if in the Pit where you ſet them, you fill it (half way up) with Chaff, or ſmall Sticks, and then power Earth upon them; for *Cucumbers*, as it ſeemeth, do extreamly affect moiſture, and over-drink themſelves; which this Chaff, or Chips forbiddeth. Nay it is further reported, That if when a Cucumber is grown, you ſet a Pot of water about five or ſix inches diſtance from it, it will in Four and twenty hours ſhoot ſo much out as to touch the Pot; which if it be true, it is an Experiment of an higher nature than belongeth to this Title: For it diſcovereth Perception in Plants to move towards that which ſhould help and comfort them, though it be at a diſtance. The ancient Tradition of the Vine is far more ſtrange: It is, that if you ſet a ſtake, or prop, ſome diſtance from it, it will grow that way, which is far ſtranger (as is ſaid) than the other: For that Water may work by a Sympathy of Attraction: But this of the Stake ſeemeth to be a reaſonable diſcourſe.

463. It hath been touched before, that Terebration of Trees doth make them proſper better. But it is found alſo, that it maketh the Fruit ſweeter, and better. The cauſe is, for that notwithſtanding the Terebration, they may receive Aliment ſufficient, and yet no more than they can well turn, and diſgeſt; and withal do ſweat out the courſeſt and unprofitableſt Juyce, even as it is in Living Creatures; which, by moderate feeding, and exerciſe, and ſweat, attain the ſoundeſt habit of Body.

464. As Terebration doth meliorate Fruit, ſo, upon the like reaſon, doth Letting of Plants Blood; as Pricking Vines, or other Trees, after they be of ſome growth, and thereby letting forth Gum or Tears, though this be not to continue, as it is in Terebration, but at ſome Seaſons. And it is reported, that by this artifice, *Bitter Almonds* have been turned into ſweet.

465. The Ancients for the Dulcorating of Fruit, do commend Swines dung above all other Dung, which may be, becauſe of the moiſture of that Beaſt, whereby the Excrement hath leſs Acrimony, for we ſee Swines and Pigs Fleſh is the moiſteſt of fleſhes.

466. It is observed by some, that all Herbs wax sweeter, both in smell and taste, if after they be grown up some reasonable time, they be cut, and so you take the latter Sprout. The cause may be, for that the longer the Juyce stayeth in the Root and Stalk, the better it concocteth. For one of the chief causes, why Grains, Seeds, and Fruits, are more nourishing than Leaves, is the length of time, in which they grow to Maturation. It were not amiss to keep back the Sap of Herbs, or the like, by some fit means till the end of Summer, whereby (it may be) they will be more nourishing.

467. As Grafting doth generally advance and Meliorate Fruits, above that which they would be, if they where set of Kernels or Stones, in regard the nourishment is better concocted. So (no doubt) even in Grafting, for the same cause the choice of the Stock doth much; always provided, that it be somewhat inferior to the Cions. For otherwise it dulleth it. They commend much the Grafting of Pears, or Apples, upon a Quince.

468. Besides the Means of Melioration of Fruits before-mentioned, it is set down as tryed, that a mixture of Bran and Swines Dung or Chaff and Swines-Dung (especially laid up together for a moneth to rot) is a very great nourisher and comforter to a Fruit-tree.

469. It is delivered, that Onions wax greater if they be taken out of the Earth, and laid a drying twenty days, and then set again; and yet more, if the outermost Pill be taken off all over.

470. It is delivered by some, that if one take the Bough of a low Fruit-tree, newly budded, and draw it gently, without hurting it, into an Earthen pot perforate at the bottom to let in the Plant, and then cover the Pot with Earth, it will yield a very large Fruit within the Ground. Which Experiment is nothing but potting of Plants, without removing and leaving the Fruit in the Earth. The like (they say) will be effected by an empty Pot without Earth in it, put over a Fruit, being propped up with a stake as it hangeth upon the Tree, and the better, if some few Pertusions be made in the Pot. VVherein, besides the defending of the Fruit from extremity of Sun or VVeather, some give a reason, that the Fruit loving and coveting the open Air and Sun, is invited by the Pertusions to spred and approach as near the open Air as it can, and so inlargeth in Magnitude.

471. All Trees in high and Sandy Grounds, are to be set deep; and in VVatry Grounds more shallow. And in all Trees when they be removed (especially Fruit-trees) care ought to be taken, that the sides of the Trees be coasted, (North and South, &c.) as they stood before. The same is said also of Stone out of the Quarry, to make it more durable, though that seemeth to have less reason; because the Stone lyeth not so near the Sun, as the Tree groweth.

472. Timber Trees in a Coppice-wood, do grow better than in an open Field; both, because they offer not to spred so much, but shoot up still in height, and chiefly, because they are defended from too much Sun and Wind, which do check the growth of all Fruit; and so (no doubt) Fruit-trees, or Vines, set upon a Wall, against the Sun, between Elbows and Buttrisses of Stone, ripen more than upon a plain Wall.

473. It is said, that if *Potado Roots* be set in a Pot filled with Earth, and then the Pot with Earth be set likewise within the Ground, some two or three inches, the Roots will grow greater than ordinary. The cause may be, for that having Earth enough within the Pot to nourish them; and then being stopped by the bottom of the Pot from putting strings downward, they must needs grow greater in breadth and thickness. And it may be

that all Seeds, Roots, potted, and so set into the Earth, will prosper the better.

474. The cutting off the Leaves of Raddish, or other Roots, in the beginning of Winter before they wither; and covering again the Root, something high with Earth, will preserve the Root all Winter, and make it bigger in the Spring following, as hath been partly touched before. So that there is a double use of this cutting off the Leaves: For in Plants, where the Root is the Esculent, as Raddish, and Parsnips, it will make the Root the greater; and so it will do to the Heads of Onions, and where the Fruit is the Esculent, by strengthning the Root, it will make the Fruit also the greater.

475. It is an Experiment of great pleasure to make the Leaves of shaddy Trees, larger than ordinary. It hath been tryed (for certain) that a Cions of a Weech Elm, grafted upon the stock of an ordinary Elm, will put forth Leaves, almost as broad as the brim of ones Hat. And it is very likely that as in Fruit-Trees, the Graft maketh a greater Fruit; so in Trees that bear no Fruit, it will make the greater Leaves. It would be tryed therefore in Trees of that kinde chiefly; as *Birch*, *Ash*, *Willow*, and especially the *Shining Willow*, which they call *Swallow-Tail*, because of the pleasure of the Leaf.

476. The Barrenness of Trees by accident (besides the weakness of the Soil Seed, or Root, and the injury of the Weather) coming either of their overgrowing with Mosse, or their being hide bound, or their planting too deep, or by issuing of the Sap too much into the Leaves: For all these three are remedies mentioned before.

Experiments in Consort, touching *Compound Fruits and Flowers*.

WE see that in Living Creatures that have Male and Female, there is copulation of several kindes, and so Compound Creatures; as the *Mule*, that is generated betwixt the *Horse* and *Ass*; and some other Compounds which we call Monsters, though more rare: And it is held, that that *Proverb*, *Africa semper aliquid Monstri parit*, cometh, for that the Fountains of Waters there being rare, divers sorts of Beasts come from several parts to drink, and so being refreshed, fall to couple, and many times with several kindes. The compounding or mixture of Kindes in Plants is not found out; which nevertheless, if it be possible is more at command than that of Living Creatures, for that their lust requireth a voluntary motion; wherefore it were one of the most notable Experiments touching Plants, to finde it out, for so you may have great variety of new Fruits, and flowers yet unknown. Grafting doth it not, that mendeth the Fruit, or doubleth the Flowers, &c. But it hath not the power to make a new Kind. For the Cions ever over-ruleth the Stock.

477. It hath been set down by one of the Ancient, That if you take two Twigs of several Fruit Trees, and flat them on the sides, and then binde them close together, and set them in the ground, they will come up in one Stock; but yet they will put forth in their several Fruits without any commixture in the Fruit. Wherein note (by the way) that Unity of Continuance, is easier to procure, than Unity of Species. It is reported also, That Vines of Red and White Grapes, being set in the Ground, and the upper parts being flatted, and bound close together, will put forth Grapes of the several colours, upon the same Branch; and Grape-stones of several colours within the same Grape: But the more, after a year or two, the unity (as it seemeth) growing more perfect. And this will likewise help, if from the

the first uniting, they be often watred; for all moisture helpeth to Union: And it is prescribed also to binde the Bud, as soon as it cometh forth, as well as the Stock, at the least for a time.

They report, that divers Seeds put into a Clout, and laid in Earth well dunged, will put up *Plants* contiguous; which (afterwards) being bound in, their Shoots will incorporate. The like is said of *Kernels* put into a *Bottle*, with a narrow mouth, filled with Earth. 478.

It is reported, that young Trees of several kindes set contiguous without any binding, and very often watred in a fruitful ground, with the very luxury of the Trees, will incorporate and grow together. Which seemeth to me the likeliest means that hath been propounded; for that the binding doth hinder the natural swelling of the Tree; which, while it is in motion, doth better unite. 479.

Experiments in Consort, touching the *Sympathy* and *Antipathy* of *Plants*.

THere are many ancient and received Traditions and Observations, touching the *Sympathy* and *Antipathy* of *Plants*; for that some will thrive best growing near others, which they impute to *Sympathy*; and some worse which they impute to *Antipathy*. But these are idle and ignorant conceits, and forsake the true indication of the causes; as the most part of *Experiments*, that concern *Sympathies* and *Antipathies* do. For as to *Plants*, neither is there any such secret Friendship, or Hatred, as they imagine. And if we should be content to call it *Sympathy* and *Antipathy*, it is utterly mistaken; for their *Sympathy* is an *Antipathy*, and their *Antipathy* is a *Sympathy*: For it is thus, whersoever one *Plant* draweth such a particular Juyce out of the Earth, as it qualifieth the Earth, so as that Juyce which remaineth is fit for the other *Plant*, there the Neighborhood doth good, because the nourishments are contrary, or several: But where two *Plants* draw (much) the same Juyce, there the Neighborhood hurteth; for the one deceiveth the other.

First, therefore, all *Plants* that do draw much nourishment from the Earth, and so soak the Earth, and exhaust it, hurt all things that grow by them; as great Trees, (especially *Ashes*) and such Trees, as spred their Roots near the top of the ground. So the *Colewort* is not an enemy (though that were anciently received) to the *Vine* onely; but it is an enemy to any other *Plant*, because it draweth strongly the fattest Juyce of the Earth. And if it be true, that the *Vine*, when it creepeth near the *Colewort*, will turn away: This may be, because there it findeth worse nourishment; for though the Root be where it was, yet (I doubt) the Plant will bend as it nourisheth. 480.

Where *Plants* are of several Natures, and draw several Juyces out of the Earth, there (as hath been said) the one set by the other helpeth: As it is set down by divers of the Ancients, that *Rew* doth prosper much, and becometh stronger, if it be set by a *Fig-Tree*: Which (we conceive) is caused not by reason of Friendship, but by Extraction of contrary Juyces; the one drawing Juyce fit to relish sweet, the other bitter. So they have set down likewise, that a *Rose* set by *Garlick* is sweeter; which likewise may be, because the more Fetide Juyce of the Earth goeth into the *Garlick*, and the more odorate into the *Rose*. 481.

This we see manifestly, That there be certain *Corn-Flowers* which come seldom or never in other places, unless they be set, but onely amongst 482.

Corn: As the blew Bottle a kinde of yellow Mary-Gold, Wilde Poppey, and Fumitory. Neither can this be by reason of the culture of the Ground, by Ploughing or Furrowing, as some Herbs and Flowers will grow but in Ditches new cast; for if the ground lye fallow and unsown, they will not come: So as it should seem to be the Corn that qualifieth the Earth, and prepareth it for their growth.

483. This observation if it holdeth (as it is very probable) is of great use, for the meliorating of taste in Fruits, and Esculent Herbs, and of the sent of Flowers. For I do not doubt, but if the Fig-tree do make the Rew more strong and bitter, (as the Ancients have noted) good store of Rew planted about the Fig-tree, will make the Fig more sweet. Now the tastes that do most offend in Fruits, and Herbs, and Roots, are bitter, harsh, sour, and watrish, or flashy. It were good therefore to make the Tryals following.

484. Take Wormwood or Rew, and set it near Lettuce, or Coleflory, or Artichoak; and see whether the Lettuce, or the Coleflory, &c. become not the sweeter.

485. Take a Service-tree, or a Cornelian-tree, or an Elder-tree, which we know have Fruits of harsh and binding Juyce, and set them near a Vine or Fig-tree, and see whether the Grapes or Figs will not be the sweeter.

486. Take Cucumbers or Pumpions, and set them (here and there) amongst Musk-Melons, and see whether the Melons will not be more winy, and better tasted. Set Cucumbers (likewise) amongst Raddish, and see whether the Raddish will not be made the more biting.

487. Take Sorrel and set it amongst Rasps, and see whether the Rasps will not be the sweeter.

488. Take Common Bryar, and set it amongst Violets or Wall-flowers, and see whether it will not make the Violets or Wall-flowers sweeter, and less earthy in their smell. So set Lettuce or Cucumbers, amongst Rosemary or Bays, and see whether the Rosemary or Bays, will not be the more oderate or aromatical.

489. Contrariwise, you must take heed how you set Herbs together that draw much the like Juyce. And therefore I think Rosemary will leese in sweetness, if it be set with Lavender or Bays, or the like. But yet, if you will correct the strength of an Herb, you shall do well to set other like Herbs by him, to take him down; and if you would set Tansey by Angelica, it may be the Angelica would be the weaker and fitter for mixture in perfume. And if you should set Rew by Common Wormwood, it may be, the Wormwood would turn to be liker *Roman* Wormwood.

490. This Axiom is of large extent; and therefore would be severed, and refined by Tryal. Neither must you expect to have a gross difference by this kinde of Culture, but onely further Perfection.

491. Tryal would be also made in Herbs, Poysonous, and Purgative, whose ill quality (perhaps) may be discharged or attempted, by setting stronger Poysons or Purgatives by them.

492. It is reported, That the Shrub called *Our Ladies Seal*, (which is a kinde of Briony) and Coleworts, set near together, one or both will die. The cause is, for that they be both great Depredators of the Earth, and one of them starveth the other. The like is said of Reed, and a Brake, both which are succulent; and therefore the one deceiveth the other. And the like of Hemlock and Rew, both which draw strong Juyces.

493. Some of the Ancients, and likewise divers of the Modern Writers, that have labored in Natural Magick, have noted a Sympathy between the Sun, Moon,

Moon, and some principal Stars, and certain Herbs, and Plants. And so they have denominated some Herbs Solar, and some Lunar, and such like toys put into great words. It is manifest, that there are some Flowers that have respect to the Sun in two kindes; the one by opening and shutting, and the other by bowing and inclining the Head. For Marygolds, Tulippas, Pimpernel, and indeed most flowers do open or spred their Leaves abroad, when the Sun shineth serene and fair: And again, (in some part) close them, or gather them inward, either toward night, or when the Sky is overcast. Of this, there needeth no such solemn Reason to be assigned, as to say, That they rejoyce at the presence of the Sun, and mourn at the absence thereof. For it is nothing else, but a little loading of the Leaves, and swelling them at the bottom, with the moisture of the Air; whereas the dry Air doth extend them. And they make it a piece of the wonder, That Gatden Glaver will hide the Stalk, when the Sun sheweth bright, which is nothing but a full expansion of the Leaves; for the bowing and inclining the Head, it is found in the great Flower of the Sun, in Marygolds, Wartwort, Mallow flowers, and others. The cause is somewhat more obscure than the former: But I take it to be no other, but that the part, against which the Sun beateth, waxeth more faint and flaccide in the Stalk, and thereby less able to support the Flower.

494. What a little Moisture will do in Vegetables, even though they be dead, and severed from the Earth, appeareth well in the Experiment of *Juglers*. They take the Beard of an Oat, which (if you mark it well) is wreathed at the bottom, and one smooth entire straw at the top. They take onely the part that is wreathed, and cut off the other, leaving the Beard half the bredth of a finger in length. Then they make a little Cross of a Quill long ways, of that part of the Quill which hath the Pith; and Cross ways of that piece of the Quill without Pith, the whole Cross being the bredth of a finger high: Then they prick the bottom where the Pith is, and therein to they put the *Oaten-Beard*, leaving half of it sticking forth of the Quill: Then they take a little white Box of Wood to deceive men, as if somewhat in the Box did work the feat; in which, with a Pin, they make a little hole, enough to take Beard, but not to let the Cross sink down, but to stick: Then likewise, by way of Imposture, they make a question: As, who is the faireſt Woman in the company? or who hath a Glove or Card? and cause another to name divers persons; and upon every naming, they stick the Cross in the Box, having first put it towards their Mouth, as if they charmed it, and the Cross stirreth not: But when they come to the person that they would take, as they hold the Cross to their Mouth, they touch the Beard with the tip of their Tongue, and wet it, and so stick the Cross in the Box, and then you shall see it turn finely and softly, three or four turns, which is caused by the untwining of the Beard by the moisture. You may see it more evidently if you stick the Cross between your fingers, instead of the Box: And therefore you may see, that this Motion, which is effected by so little wet, is stronger than the closing or bending of the Head of a Marygold.

495. It is reported by some, That the Herb called *Rosa-Solis* (whereof they make *Strong-Waters*) will at the Noon-day, when the Sun shineth hot and bright, have a great Dew upon it. And therefore, that the right name is *Ros Solis*; which they impute to a delight and sympathy that it hath with the Sun. Men favor wonders. It were good first to be sure, That the Dew that is found upon it, be not the Dew of the Morning preserved, when

when the Dew of other *Herbs* is breathed away: For it hath a ſmooth and thick Leaf that doth not diſcharge the Dew ſo ſoon as other *Herbs*, that are more Spungy and Porous. And it may be *Purſlane*, or ſome other Herb doth the like, and is not marked. But if it be ſo, that it hath more Dew at Noon than in the Morning, then ſure it ſeemeth to be an exudation of the *Herb* it ſelf. As Plums ſweat when they are ſet into the Oven: For you will not (I hope) think, that it is like *Gideons* Fleece of Wooll, that the Dew ſhould fall upon that, and no where elſe.

496. It is certain, that the *Hony-dews* are found more upon *Oak Leaves*, than upon *Aſh*, or *Beech*, or the like: But whether any cauſe be from the Leaf it ſelf, to concoct the Dew; or whether it be onely, that the Leaf is cloſe and ſmooth (and therefore drinketh not in the Dew, but preſerveth it) may be doubted. It would be well inquired, whether *Manna* the *Drug*, doth fall but upon certain *Herbs* or *Leaves* onely. *Flowers* that have deep *Sockets*, do gather in the bottom, a kinde of *Honey*; as *Honey-Suckles* (both the *Woodbine*, and the *Trifoil*) *Lillies*, and the like. And in them certainly the *Flower* beareth part with the *Dew*.

497. The Experience is, That the Froth, which they call *Woodſare*, (being like a kinde of Spittle) is found but upon certain Herbs, and thoſe hot ones; as *Lavender*, *Lavender-cotton*, *Sage*, *Hyſſope*, *&c.* Of the cauſe of this enquire further, for it ſeemeth a ſecret. There falleth alſo *Mildew* upon *Corn*, and ſmutteth it: But it may be, that the ſame falleth alſo upon other Herbs, and is not obſerved.

498. It were good, Tryal were made, whether the great conſent between Plants and Water, which is a principal nouriſhment of them, will make an Attraction or Diſtance, and not at touch onely. Therefore take a Veſſel, and in the middle of it make a falſe bottom of courſe Canvas; fill it with Earth above the Canvas, and let not the Earth be watred, then ſow ſome good Seeds in that Earth: But under the Canvas, ſome half a foot in the bottom of the Veſſel, lay a great Spunge, thorowly wet in Water, and let it lie ſome ten days; and ſee whether the Seeds will ſprout, and the Earth become more moiſt, and the Spunge more dry. The Experiment formerly mentioned of the Cucumber, creeping to the Pot of Water, is far ſtranger than this.

499. *Experiments in Conſort, touching the Making herbs and fruits Medicinable.*

THe altering of the Sent, Colour, or Taſte of Fruit, by Infuſing, Mixing, or Letting into the Bark, or Root of the Tree, Herb, or Flower, any Coloured, Aromatical, or Medicinal Subſtance, are but fancies. The cauſe is, for that thoſe things have paſſed their period, and nouriſh not; and all alteration of Vegetables, in thoſe qualities, muſt be by ſomewhat that is apt to go into the nouriſhment of the Plant. But this is true, that where Kine feed upon Wilde Garlick, their Milk taſted plainly of the Garlick. And the Fleſh of Muttons is better taſted where the Sheep feed upon Wilde Thyme, and other wholſome Herbs. *Galen* alſo ſpeaketh of the curing of the *Scirrus* of the *Liver*, by Milk of a Cow, that feedeth upon certain Herbs; and *Honey* in *Spain* ſmelleth (apparently) of the *Roſemary*, or *Orenge*, from whence the Bee gather it: And there is an old Tradition of a Maiden that was fed with *Napellus*, (which is counted the ſtrongeſt poyſon of all Vegetables) which with uſe, did not hurt the Maid, but poyſoned ſome that had carnal company with her. So it is obſerved by ſome, that there is a vertuous *Bezoar*, and another without vertue, which appear to the ſhew alike; but the vertuous is taken from the Beaſt, that feedeth upon the Mountains, where there

there are Theriacel Herbs; and that without vertue, from those that fed in the Valleys, where no such Herbs are. Thus far I am of opinion, that as steeped Wines and Beers are very Medicinal, and likewise Bread tempered with divers powders; so of *Meat* also, (as *Flesh*, *Fish*, *Milk*, and *Eggs*) that they may be made of great use for Medicine and Diet, if the *Beast*, *Fowl*, or *Fish*, be fed with a special kinde of food, fit for the disease. It were a dangerous thing also for secret empoysonments. But whether it may be applied unto Plants, and Herbs, I doubt more, because the nourishment of them is a more common Juyce; which is hardly capable of any special quality until the Plant do assimilate it.

But lest our incredulity may prejudice any profitable operations in this kinde (especially since many of the Ancients have set them down) we think good briefly to propound the four Means, which they have devised of making Plants Medicinable. The first is by slitting of the Root, and infusing into it the Medicine, as *Hellebore*, *Opium*, *Scammomy*, *Triacle* &c. and then binding it up again. This seemeth to me the least probable, because the Root draweth immediately from the Earth, and so the nourishment is the more common and less qualified; and besides, it is a long time in going up, ere it come to the Fruit. The second way is, to perforate the Body of the Tree, and there to infuse the Medicine, it hath the less way, and the less time to go up. The third is, the steeping of the Seed or Kernel in some Liquor wherein the Medicine is infused; which I have little opinion of, because the Seed (I doubt) will not draw the parts of the matter which have the propriety; but it will be far the more likely, if you mingle the Medicine with Dung, for that the Seed, naturally drawing the moisture of the Dung, may call in withal some of the propriety. The fourth is, the Watering of the Plant oft, with an infusion of the Medicine. This, in one respect may have more force than the rest, because the Medication is oft renewed, whereas the rest are applied, but at one time; and therefore the vertue may the sooner vanish. But still I doubt, that the Root is somewhat too stubborn to receive those fine Impressions; and besides (as I have said before) they have a great Hill to go up. I judge therefore the likeliest way to be the perforation of the Body of the Tree, in several places, one above the other, and the filling of the Holes with Dung mingled with the Medicine. And the Watring of those Lumps of Dung, with Squirts of an Infusion of the Medicine in dunged Water, once in three or four days. 500.

NATURAL HISTORY.

Century VI.

OUr Experiments we take care to be (as we have often said,) either *Experimenta Fructifera*, or *Lucifera*; either of Use, or of Discovery: For we hate Impostures; and despise Curiosities. Yet because we must apply our selves somewhat to others, we will set down some Curiosities touching Plants.

Experiments in Consort, touching Curiosities about Fruits and Plants.

501. It is a Curiosity to have several Fruits upon one Tree; and the more, when some of them come early, and some come late: So that you may have, upon the same Tree, ripe Fruits all Summer. This is easily done by Grafting of several Cions upon several Boughs of a Stock, in a good ground, plentifully fed. So you may have all kindes of Cherries, and all kindes of Plumbs, and Peaches, and Apricots upon one Tree: But, I conceive the Diversity of Fruits must be such, as will graft upon the same Stock. And therefore, I doubt, whether you can have Apples, or Pears, or Orenges, upon the same Stock, upon which you graft Plumbs.

502. It is a Curiosity to have Fruits of divers Shapes and Figures. This is easily performed by Moulding them, when the Fruit is young, with Moulds of Earth or Wood. So you may have Cucumbers, &c. as long as a Cane, or as round as a Sphere, or formed like a Cross. You may have also Apples in the form of Pears or Lemmons. You may have also Fruit in more accurate Figures; as we said of Men, Beasts, or Birds, according as you make the Moulds, wherein you must understand, that you make the Mould big enough to contain the whole Fruit, when it is grown to the greatest; for else you will choak the spreding of the Fruit, which otherwise would spred it self, and fill the Concave, and so be turned into the shape desired; as it is in Mould-works of Liquid things. Some doubt may be conceived,

ceived, that the keeping of the Sun from the Fruit, may hurt it: But there is ordinary experience of Fruit that groweth covered. *Quare* also, whether some small holes may not be made in the Wood, to let in the Sun. And note, that it were best to make the Moulds partible, glued, or cemented together, that you may open them when you take out the Fruit.

503. It is a curiosity to have *Inscriptions* or *Engravings*, in Fruit or Trees. This is easily performed, by writing with a *Needle*, or *Bodkin*, or *Knife*, or the like, when the Fruit or Trees are young; for as they grow, so the Letters will grow more large, and graphical.

——Teneriſque meos incidere Amores
Arboribus, creſcent illæ, creſcetis Amores.

504. You may have Trees apparelled with Flowers or Herbs by boring holes in the Bodies of them, and putting into them Earth holpen with Muck, and setting Seeds or Slips, of *Violets*, *Strawberries*, *Wilde Time*, *Camomil*, and such like in the Earth, wherein they do but grow in the Tree, as they do in Pots, though (perhaps) with some feeding from the Trees. As it would be tryed also with Shoots of *Vines*, and Roots of *Red-Roses*; for it may be, they being of a more Ligneous Nature, will incorporate with the Tree it self.

505. It is an ordinary curiosity to form Trees and Shrubs (as *Rosemary*, *Juniper*, and the like) into sundry shapes; which is done by moulding them within, and cutting them without. But they are but lame things, being too small to keep Figure; great Castles made of Trees upon Frames of Timber, with Turrets and Arches, were anciently matters of magnificence.

506. Amongst curiosities, I shall place Colouration, though it be somewhat better; for Beauty in Flowers is their pre-eminence. It is observed by some, that *Gilly-Flowers*, *Sweet-Williams*, *Violets*, that are coloured, if they be neglected, and neither Watered, nor new Moulded, nor Transplanted, will turn White. And it is probable, that the White, with much culture, may turn coloured; for this is certain, That the white colour cometh of scarcity of Nourishment; except in Flowers that are onely white, and admit no other colours.

507. It is good therefore to see what Natures do accompany what colours; for by that you shall have light, how to induce colours, by producing those Natures. Whites are more inodorate (for the most part) than Flowers of the same kinde coloured; as is found in single White Violets, White Roses, White Gilly-Flowers, White Stock-Gilly-Flowers, &c. We finde also, that Blossoms of Trees that are White, are commonly inodorate; as Cherries, Pears, Plums, whereas those of Apples, Crabs, Almonds, and Peaches, are blushy, and smell sweet. The cause is, for that the substance that maketh the Flower, is of the thinnest and finest of the Plant; which also maketh Flowers to be of so dainty Colours. And if it be too sparing and thin, it attaineth no strength of odor, except it be in such Plants as are very succulent; whereby they need rather to be scanted in their nourishment, than repleniſhed, to have them sweet. As we see in White Satyrion, which is of a dainty smell; and in Bean-flowers, &c. And again, if the Plant be of Nature to put forth White Flowers onely, and those not thin or dry, they are commonly of rank and fulsome smell; as May-Flowers and White Lillies.

508. Contrariwise, in Berries, the White is commonly more delicate and sweet in taste, than the Coloured; as we see in white Grapes, in white Raspes, in white Strawberries, in white Currans, &c. The cause is for that the

the coloured are more juyced, and courſer juyced; and therefore not ſo well and equally concocted, but the white are better proportioned to the diſgeſtion of the *Plant*.

But in *Fruits* the white commonly is meaner, as in *Pear-Plumbs*, *Damoſins*, *&c.* and the choiceſt Plumbs are black; the *Mulberry*, (which though they call it a *Berry*, is a Fruit) is better the Black, than the White. The *Harveſt* White-Plumb, is a baſe Plumb, and the *Perdoccio* and White Date-Plumb, are no very good Plumbs. The cauſe is, for that they are all over-watry: Whereas an higher Concoction is required for ſweetneſs, or pleaſure of taſte; and therefore all your dainty Plumbs, are a little dry, and come from the Stone; as the *Muskle-Plumb*, the *Damoſin-Plumb*, the *Peach*, the *Apricot*, *&c.* Yet ſome *Fruits* which grow not to be Black, are of the Nature of Berries, ſweeteſt ſuch as are paler, as the *Cœur-Cherry*, which inclineth more to White, is ſweeter than the Red; but the *Egriot* is more ſowre. 509.

Take *Gilliflowers Seed*, of one kinde of *Gilliflowers* (as of the *Clove-Gilliflower* which is the moſt common) and ſow it, and there will come up Gilliflowers, ſome of one colour, and ſome of another, caſually, as the Seed meeteth with nouriſhment in the Earth: So that the Gardiners finde, that they may have two or three Roots amongſt an hundred that are rare, and of great price, as *Purple Carnation* of ſeveral ſtripes. The cauſe is (no doubt) that in Earth, though it be contiguous, and in one Bed, there are very ſeveral Juyces; and as the Seed doth caſually meet with them, ſo it cometh forth. And it is noted eſpecially, that thoſe which do come up Purple, do always come up ſingle; the Juyce, as it ſeemeth, not being able to ſuffice a ſucculent colour, and a double Leaf. This *Experiment* of ſeveral colours, coming up from one Seed, would be tryed alſo in *Larks-foot*, *Monk-hood*, *Poppy*, and *Hollioak*. 510.

Few Fruits are coloured Red within; the *Queen-Apple* is, and another Apple, called the *Roſe-Apple*; *Mulberries* likewiſe, and *Grapes*, though moſt toward the skin. There is a *Peach* alſo, that hath a circle of Red towards the ſtone; and the *Egriot-Cherry* is ſomewhat Red within: But no *Pear*, nor *Warden*, nor *Plumb*, nor *Apricot*, although they have (many times) Red ſides, are coloured Red within. The cauſe may be enquired. 511.

The general colour of *Plants* is Green, which is a colour that no *Flower* is of. There is a greeniſh *Prime-Roſe*, but it is pale, and ſcarce a green; the Leaves of ſome Trees turn a little Murrey or Reddiſh, and they be commonly young Leaves that do ſo; as it is in *Oaks* and *Vines*. And *Haſle-Leaves* rot into a Yellow; and ſome *Hollies* had part of their Leaves Yellow, that are (to all ſeeming) as freſh and ſhining as the Green. I ſuppoſe alſo, that Yellow is a leſs ſucculent colour than Green, and a degree nearer White. For it hath been noted, that thoſe Yellow Leaves of *Holly*, ſtand ever toward the North or North-Eaſt. Some *Roots* are Yellow, as *Carrets*; and ſome *Plants*, Blood-red, Stalk and Leaf, and all; as *Amaranthus*. Some *Herbs* incline to Purple and Red; as a kinde of *Sage* doth, and a kinde of *Mint*, and *Roſa Solis*, *&c.* And ſome have White Leaves, as another kinde of *Sage*, and another kinde of *Mint*: But *Azure* and a fair *Purple* are never found in Leaves. This ſheweth, that *Flowers* are made of a refined Juyce of the Earth, and ſo are Fruits; but Leaves of a more courſe and common. 512.

It is a curioſity alſo to make *Flowers* double, which is effected by often removing them into new Earth; as on the contrary part, double *Flowers*, 513.

by neglecting, and not removing, prove ſingle. And the way to do it ſpeedily, is to ſow or ſet Seeds, or Slips of Flowers; and as ſoon as they come up, to remove them into new ground that is good: Enquire alſo, whether inoculating of Flowers, (as Stock-Gilliflowers, Roſes, Muſk-Roſes, &c.) doth not make them double. There is a Cherry-Tree that hath double Bloſſoms, but that Tree beareth no Fruit; and, it may be, that the ſame means which applied to the Tree, doth extreamly accelerate the Sap to riſe and break forth, would make the Tree ſpend it ſelf in Flowers, and thoſe to become double, which were a great pleaſure to ſee, eſpecially in Apple-trees, Peach-trees, and Almond-trees, that have Bloſſoms Bluſh coloured.

514. The making of Fruits without Core or Stone, is likewiſe a curioſity, and ſomewhat better; becauſe whatſoever maketh them ſo, is like to make them more tender and delicate. If a Cions or Shoot fit to be ſet in the Ground, have the Pith finely taken forth (and not altogether, but ſome of it left, the better to ſave the life) it will bear a Fruit with little or no Core or Stone. And the like is ſaid to be of dividing a quick Tree down to the Ground, and taking out the Pith, and then binding it up again.

515. It is reported alſo, that a Citron grafted upon a Quince will have ſmall or no Seeds; and it is very probable, that any ſowre Fruit grafted upon a Stock that beareth a ſweeter Fruit, may both make the Fruit ſweeter, and more void of the harſh matter of Kernels or Seeds.

516. It is reported, that not onely the taking out of the Pith, but the ſtopping of the Juyce of the Pith from riſing in the midſt, and turning it to riſe on the outſide, will make the Fruit without Core or Stone; as if you ſhould bore a Tree clean thorow, and put a wedge in. It is true, there is ſome affinity between the Pith and the Kernel, becauſe they are both of a harſh ſubſtance, and both placed in the midſt.

517. It is reported, that Trees watered perpetually with warm Water, will make a Fruit with little or no Core or Stone. And the rule is general, That whatſoever will make a wilde Tree, a Garden Tree, will make a Garden Tree to have leſs Core or Stone.

518. *Experiments in Conſort, touching the Degenerating of Plants, and of the Tranſmutation of them, one into another.*

THe Rule is certain, That Plants for want of Culture, degenerate to be baſer in the ſame kinde; and ſometimes ſo far, as to change into another kinde. 1. The ſtanding long, and not being removed, maketh them degenerate. 2. Drought, unleſs the Earth of it ſelf be moiſt, doth the like. 3. So doth removing into worſe Earth, or forbearing to compoſt the Earth; as we ſee, that Water-Mint turneth into Field-Mint, and the Colewort into Rape by neglect, &c.

519. Whatſoever Fruit uſeth to be ſet upon a Root, or a Slip, if it be ſown, will degenerate; Grapes ſown, Figs, Almonds, Pomegranate Kernels ſown, make the Fruits degenerate, and become wilde. And again, moſt of thoſe Fruits that uſe to be grafted, if they be ſet of Kernels, or Stones degenerate. It is true, that Peaches (as hath been touched before) do better upon Stones ſet, than upon grafting: And the rule of Exception ſhould ſeem to be this, That whatſoever Plant requireth much moiſture, proſpereth better upon the Stone or Kernel, than upon the Graft. For the Stock, though it giveth a finer nouriſhment, yet it giveth a ſcanter, than the Earth at large.

520. Seeds, if they be very old, and yet have ſtrength enough to bring forth a Plant, make the Plant degenerate. And therefore skilful Gardiners make tryal of the Seeds, before they buy them, whether they be good or no, by putting

them in Water gently boiled; and if they be good, they will ſprout within half an hour.

It is ſtrange which is reported, That *Baſil* too much expoſed to the Sun, doth turn into *Wilde Time*: Although thoſe two Herbs ſeem to have ſmall Affinity; but Baſil is almoſt the onely hot Herb that hath fat and ſucculent Leaves; which Oylineſs if it be drawn forth by the Sun, it is like it will make a very great change. 521.

There is an old Tradition, that *Boughs of Oak* put into the Earth, will put forth *Wilde Vines*; which if it be true, (no doubt) it is not the *Oak* that turneth into a *Vine*, but the *Oak-bough* putrifying, qualifieth the Earth to put forth a *Vine* of it ſelf. 522.

It is not impoſſible, and I have heard it verified, that upon cutting down of an old Timber-Tree, the Stub hath put out ſometimes a Tree of another kinde; as that Beech hath put forth Birch: Which if it be true, the cauſe may be, for that the old Stub is too ſcant of Juyce to put forth the former Tree; and therefore putteth forth a Tree of ſmaller kinde, that needeth leſs Nouriſhment. 523.

There is an opinion in the Countrey, That if the ſame Ground be oft ſown with the Grain that grew upon it, it will, in the end, grow to be of a baſer kinde. 524.

It is certain, that in Sterile Years, Corn ſown will grow to an other kinde. 525.

Grandia ſæpe quibus mandavimus Hordea Sulcis,
Infœlix Lolium, & ſteriles dominatur Avenæ.

And generally it is a Rule, that Plants that are brought forth by Culture, as Corn, will ſooner change into other Species, than thoſe that come of themſelves: For that Culture giveth but an Adventitious Nature, which is more eaſily put off.

This work of the *Tranſmutation* of *Plants*, one into another, is *inter Magnalia Naturæ*: For the *Tranſmutation of Species* is, in the vulgar Philoſophy, pronounced impoſſible: And certainly, it is a thing of difficulty, and requireth deep ſearch into Nature: But ſeeing there appear ſome manifeſt inſtances of it, the opinion of impoſſibility is to be rejected, and the means thereof to be found out. We ſee that in *Living Creatures*, that come of Putrefaction, there is much Tranſmutation of one into another. As Caterpillers turn into Flies, &c. And it ſhould ſeem probable, that whatſoever Creature having life, is generated without Seed, that Creature will change out of one Species into another; for it is the Seed, and the Nature of it, which locketh and boundeth in the Creature, that it doth not expatiate. So as we may well conclude, that ſeeing the Earth of it ſelf, doth put forth Plants without Seed; therefore Plants may well have a Tranſmigration of Species. Wherefore wanting Inſtances, which do occur, we ſhall give Directions of the moſt likely tryals: And generally, we would not have thoſe that read this work of *Sylva Sylvarum*, account it ſtrange, or think that it is an overhaſte, that we have ſet down particulars untried: For contrariwiſe, in our own eſtimation, we account ſuch particulars more worthy than thoſe that are already tryed and known. For theſe latter muſt be taken as you finde them, but the other do level point blank at the inventing of cauſes, and Axioms.

526. First, therefore you must make account, that if you will have one Plant change into another, you must have the Nourishment over-rule the Seed: And therefore you are to practise it by Nourishments as contrary as may be, to the Nature of the Herb; so nevertheless as the Herb may grow, and likewise with Seeds that are of the weakest sort, and have least vigor. You shall do well therefore to take Marsh Herbs, and plant them upon tops of Hills and Champaigns; and such Plants as require much moisture, upon Sandy and very dry grounds. As for example, Marsh-Mallows, and Sedge upon Hills, Cucumber and Lettuce Seeds, and Coleworts upon a Sandy Plat; so contrariwise plant Bushes, Heath, Ling, and Brakes upon a Wet or Marsh Ground. This I conceive also, that all Esculent and Garden Herbs, set upon the tops of Hills, will prove more *Medicinal*, though less Esculent, than they were before. And it may be likewise, some Wilde Herbs you may make Salet Herbs. This is the first Rule for Transmutation of Plants.

527. The second Rule should be to bury some few Seeds of the Herb you would change amongst other Seeds; and then you shall see whether the Juyce of those other Seeds do not so qualifie the Earth, as it will alter the Seed whereupon you work. As for example, Put Parsly-seed amongst Onion-seed, or Lettuce-seed amongst Parsly-seed, or Basil-seed amongst Thyme-seed, and see the change of taste or otherwise. But you shall do well to put the Seed you would change into a little Linnen Cloth, that it mingle not with the Foreign Seed.

528. The third Rule shall be the making of some medly, or mixture of Earth, with some other Plants bruised, or shaved, either in Leaf or Root: As for example make Earth, with a mixture of Colewort Leaves stamped, and set in it Artichoaks, or Parsnips: So take Earth made with *Majoram*, or *Origannum*, or *Wilde Thyme*, bruised, or stamped, and set in it *Fennel-seed*, *&c.* In which operation, the Proces of Nature still will be, (as I conceive,) not that the Herb you work upon, should draw the Juyce of the Foreign Herb; (for that opinion we have formerly rejected) but there will be a new confection of mould, which perhaps will alter the Seed, and yet not to the kinde of the former Herb.

529. The fourth Rule shall be to mark what Herbs some Earths do put forth of themselves, and to take that Earth, and to Pot it, or to Vessel it; and into that, set the Seed you would change: As for Example, take from under Walls, or the like; where Nettles put forth in abundance, the Earth which you shall there finde, without any String or Root of the Nettles; and pot that Earth, and set in it Stock-Gilly-flowers, or Wall-flowers, &c. Or sow in the Seeds of them, and see what the event will be; or take Earth, that you have prepared to put forth *Mushrooms* of it self, (whereof you shall finde some instances following,) and sow it in Purslane-seed, or Lettuce-seed; for in these Experiments, it is likely enough, that the Earth being accustomed to send forth one kinde of Nourishment, will alter the new Seed.

530. The fifth Rule shall be, to make the Herb grow contrary to his nature, as to make Ground Herbs rise in height: As for example, Carry Camomile, or Wilde Thyme, or the Green Strawberry, upon sticks, as you do Hops upon Poles, and see what the event will be.

531. The sixth Rule shall be to make Plants grow out of the Sun, or open Air; for that is a great mutation in Nature, and may induce a change in the Seed: As barrel up Earth, and sow some Seed in it, and put in the bottom of a Pond, or put it in some great hollow Tree; try also the sowing

of

of Seeds in the bottoms of Caves; and Pots with Seeds sown, hanged up in Wells, some distance from the Water; and see what the event will be.

532. Experiments in Consort, touching the *Procerity, and Lowness, and Artificial Dwarfing of Trees.*

IT is certain, that *Timber-Trees* in *Coppice Woods*, grow more upright, and more free from under Boughs, than those that stand in the Fields. The cause whereof is, for that *Plants* have a natural motion to get to the Sun; and besides, they are not glutted with too much nourishment; for that the Coppice shareth with them, and Repletion ever hindreth stature. Lastly, they are kept warm, and that ever in Plants helpeth mounting.

533.

Trees that are of themselves full of Heat, (which heat appeareth by their inflamable Gums) as Firrs, and Pines, mount of themselves in heighth without Side-boughs, till they come towards the top. The cause is partly heat, and partly tenuity of Juyce; both which send the Sap upwards. As for Juniper, it is but a Shrub, and groweth not big enough in Body to maintain a tall Tree.

534.

It is reported, that a good strong Canvas, spred over a Tree grafted low, soon after it putteth forth, will dwarf it, and make it spred. The cause is plain; for that all things that grow, will grow as they finde room.

535.

Trees are generally set of *Roots* or *Kernels*; but if you set them of *Slips*, (as of some *Trees* you may; by name the *Mulberry*) some of the *Slips* will take; and those that take, (as is reported) will be *Dwarf-trees*. The cause is, for that a *Slip* draweth nourishment more weakly, than either a *Root* or *Kernel*.

536.

All *Plants* that put forth their Sap hastily, have their Bodies not proportionable to their length, and therefore they are Winders and Creepers; as *Ivy*, *Briony*, *Hops*, *Woodbine*: Whereas Dwarfing requireth a slow putting forth, and less vigor of mounting.

Experiments in Consort, touching the *Rudiments of Plants, and of the Excrescences of Plants, or Super-Plants.*

THe Scripture saith, That *Solomon* wrote a Natural History, from the *Cedar* of *Libanus*, to the *Moss* growing upon the Wall; for so the best *Translations* have it. And it is true, that *Moss* is but the *Rudiment* of a *Plant*, and (as it were) the *Mould* of *Earth* or *Bark*.

537.

Moss groweth chiefly upon Ridges of Houses, tiled or thatched, and upon the Crests of Walls, and that Moss is of a lightsome and pleasant Green. The growing upon Slopes is caused for that Moss, as on the one side it cometh of Moisture and Water, so on the other side the Water must but slide, and not stand or pool. And the growing upon Tiles, or Walls, &c. is caused, for that those dried Earths, having not moisture sufficient to put forth a *Plant*, do practice Germination by putting forth Moss; though when by age, or otherwise, they grow to relent and resolve, they sometimes put forth Plants, as Wall-flowers. And almost all Moss hath here and there little Stalks, besides the low Thrum.

538.

Moss groweth upon Alleys, especially such as lye cold, and upon the North; as in divers Tarrases. And again, if they be much trodden; or if they were at the first gravelled: For wheresoever Plants are kept down, the Earth putteth forth Moss.

539. Old Ground, that hath been long unbroken up, gathereth Moſs; and therefore Husbandmen uſe to cure their Paſture-Grounds, when they grow to Moſs, by Tilling them for a year, or two: Which alſo dependeth upon the ſame cauſe; for that the more ſparing and ſtarving Juyce of the Earth, inſufficient for Plants, doth breed Moſs.

540. Old Trees are more Moſſie, (far) than young; for that the Sap is not ſo frank as to riſe all to the Boughs, but tireth by the way, and putteth out *Moſs*.

541. *Fountains* have *Moſs* growing upon the Ground about them;

Muſcoſi Fontes——————

The cauſe is, for that the *Fountains* drain the Water from the Ground adjacent, and leave but ſufficient moiſture to breed *Moſs*; and beſides, the coldneſs of the Water conduceth to the ſame.

542. The *Moſs* of *Trees*, is a kinde of Hair; for it is the Juyce of the Tree, that is excerned, and doth not aſſimilate, and upon great Trees the Moſs gathereth a figure, like a Leaf.

543. The moiſture ſort of Trees yield little Moſs, as we ſee in *Aſps*, *Poplars*, *Willows*, *Beeches*, *&c.* Which is partly cauſed for the reaſon that hath been given of the frank putting up of the Sap into the Boughs; and partly, for that the Barks of thoſe Trees are more cloſe and ſmooth, than thoſe of Oaks, and Aſhes, whereby the Moſs can the hardlier iſſue out.

544. In Clay Grounds, all Fruit Trees grow full of Moſs, both upon Body and Boughs; which is cauſed, partly by the coldneſs of the Ground, whereby the Plants nouriſh leſs; and partly by the toughneſs of the Earth, whereby the Sap is ſhut in, and cannot get up, to ſpred ſo frankly as it ſhould do.

545. We have ſaid heretofore, that if Trees be hide-bound, they wax leſs fruitful and gather Moſs; and that they are holpen by hacking, &c. And therefore by the reaſon of contraries, if Trees be bound in with Cords or ſome outward Bands, they will put forth more Moſs: Which (I think) hapneth to Trees that ſtand bleak, and upon the cold Winds. It would alſo be tried, whether, if you cover a Tree, ſomewhat thick upon the top, after his powling, it will not gather more Moſs. I think alſo, the Watring of Trees with cold Fountain Water will make them grow full of Moſs.

546. There is a Moſs the *Perfumers* have, which cometh out of Apple-Trees, that hath an excellent ſent. *Quære*, particularly for the manner of the growth, and the nature of it. And for this Experiments ſake, being a thing of price, I have ſet down the laſt Experiments, how to multiply and call on Moſſes.

Next unto Moſ, I will ſpeak of *Mushromes*, which are likewiſe an unperfect Plant. The Muſhromes have two ſtrange properties; the one, that they yield ſo delicious a Meat; the other, that they come up ſo haſtily, as in a night, and yet they are unſown. And therefore ſuch as are Upſtarts in State, they call in reproach, *Mushromes*. It muſt needs be therefore, that they be made of much moiſture; and that moiſture fat, groſs, and yet ſomewhat concocted. And (indeed) we finde, that *Mushromes* cauſe the accident, which we call *Incubus*, or the *Mare* in the Stomach. And therefore the Surfeit of them may ſuffocate and empoyſon. And this ſheweth, that they are windy; and that windineſs is groſs, and ſwelling, not ſharp or griping. And upon the ſame reaſon *Mushromes* are a venereous Meat.

It

It is reported, that the Bark of white or Red Poplar, (which are of the moisteſt of Trees) cut ſmall, and caſt into Furrows well dunged, will cauſe the ground to put forth *Mushromes*, at all ſeaſons of the year fit to be eaten, ſome add to the mixture Leaven of Bread, reſolved in Water. 547.

It is reported, that if a Hilly-field, where the ſtubble is ſtanding, be ſet on fire, in the ſhowry ſeaſon, it will put forth great ſtore of *Mushromes*. 548.

It is reported, that *Harts-Horn* ſhaken, or in ſmall pieces, mixed with Dung, and watred, putteth up *Mushromes*. And we know that *Harts-Horn* is of a fat and clammy ſubſtance: And it may be *Ox-Horn* would do the like. 549.

It hath been reported, though it be ſcarce credible, that Ivy hath grown out of a *Stags-Horn*; which they ſuppoſe did rather come from a confrication of the Horn upon the Ivy, than from the Horn it ſelf. There is not known any ſubſtance, but Earth, and the Procedeurs of Earth, (as *Tile-Stone, &c.*) that yieldeth any Moſs, or Herby ſubſtance. There may be tryal made of ſome Seeds, as that Fennel-Seed, Muſtard-Seed, and Rape-Seed, put into ſome little holes made in the Horns of Stags, or Oxen, to ſee if they will grow. 550.

There is alſo another unperfect Plant, that (in ſhew) is like a great Muſhrome: And it is ſometimes as broad as ones Hat, which they call a *Toads-ſtool*; but it is not Eſculent, and it groweth (commonly) by a dead Stub of a Tree, and likewiſe about the Roots of rotten Trees; and therefore ſeemeth to take his Juyce from Wood putrified. Which ſheweth by the way, that Wood putrified yieldeth a frank moiſture. 551.

There is a Cake that groweth upon the ſide of a dead Tree, that hath gotten no name, but it is large and of a Cheſnut colour. and hard and pithy; whereby it ſhould ſeem, that even dead Trees forget not their putting forth, no more than the Carcaſſes of Mens Bodies that put forth Hair and Nails for a time. 552.

There is a Cod or Bag that groweth commonly in the Fields; that at firſt is hard like a Tennis-Ball, and white; and after growth of a Muſhrome colour, and full of light duſt upon the breaking; and is thought to be dangerous for the eyes, if the Powder get into them, and to be good for Kibes. Belike it hath a Corroſive, and fretting Nature. 553.

There is an Herb called *Jews-Ear*, that groweth upon the Roots, and lower parts of the Bodies of Trees, eſpecially of Elders, and ſometimes Aſhes. It hath a ſtrange propriety; for in warm Water, it ſwelleth, and openeth extreamly. It is not green, but of a dusky brown colour. And it is uſed for ſquinancies, and inflamations in the Throat, whereby it ſeemeth to have a mollifying, and lenifying vertue. 554.

There is a kinde of Spongy excreſcence, which groweth chiefly upon the Roots of the Laſer-Tree, and ſometimes upon Cedar, and other Trees. It is very white, and light, and fryable; which we call *Agarick*. It is famous in Phyſick for the purging of tough Flegm. And it is alſo an excellent opener for the Liver, but offenſive to the Stomach; and in taſte it is, at the firſt ſweet and after bitter. 555.

We finde no Super-Plant, that is a formed Plant, but *Miſſeltoe*. They have an idle Tradition, that there is a Bird called a *Miſſel-Bird*, that feedeth upon a Seed, which many times ſhe cannot diſgeſt, and ſo expelleth it whole with her Excrement; which falling upon a Bough of a Tree, that hath ſome rift, putteth forth *Miſſeltoe*. But this is a Fable; for it is not probable, that Birds ſhould feed upon that they cannot diſgeſt. But allow that, 556.

that, yet it cannot be for other Reasons: For first, it is found but upon certain Trees; and those Trees bear no such Fruit, as may allure that Bird to sit and feed upon them. It may be, that Bird feedeth upon the Misseltoe-Berries, and so is often found there; which may have given occasion to the tale. But that which maketh an end of the question is, that Misseltoe hath been found to put forth under the Boughs, and not (onely) above the Boughs; so it cannot be any thing that falleth upon the Bough. Misseltoe groweth chiefly upon Crab-trees, Apples-trees, sometimes upon Hasles, and rarely upon Oaks; the Misseltoe whereof is counted very Medicinal. It is ever green, Winter and Summer, and beareth a white glistering Berry; and it is a Plant, utterly differing from the Plant, upon which it groweth. Two things therefore may be certainly set down: First, that Superfætation must be by abundance of Sap, in the Bough that putteth it forth. Secondly, that that Sap must be such as the Tree doth excern, and cannot assimilate, for else it would go into a Bough; and besides, it seemeth to be more fat and unctuous, than the ordinary Sap of the Tree; both by the Berry which is clammy, and by that it continueth green Winter and Summer, which the Tree doth not.

557. This *Experiment of Misseltoe* may give light to other practices; therefore tryal would be made, by ripping of the Bough of a Crab-tree in the Bark, and watering of the Wound every day, with warm water dunged, to see if it would bring forth Misseltoe, or any such like thing. But it were yet more likely, to try it with some other watering or anointing, that were not so natural to the Tree as Water is; as Oyl, or Barm of Drink, &c. So they be such things as kill not the Bough.

558. It were good to try, what *Plants* would put forth, if they be forbidden to put forth their natural Boughs: Powl therefore a Tree, and cover it, some thickness with Clay on the top, and see what it will put forth. I suppose it will put forth Roots; for so will a Cions, being turned down into Clay. Therefore in this Experiment also, the Tree would be closed with somewhat that is not so natural to the Plant as Clay is; try it with Leather, or Cloth, or Painting, so it be not hurtful to the Tree. And it is certain, that a Brake hath been known to grow out of a Pollard.

559. A Man may count the Prickes of Trees to be a kinde of Excrescence, for they will never be Boughs, nor bear Leaves. The Plants that have Prickles, are Thorns, Black and White; Bryer, Rose, Lemmon-trees, Crab-trees, Goosberry, Berberry; these have it in the Bough. The Plants that have Prickles in the Leaf are, Holly, Juniper, Whin-bush, Thistle; Nettles also have a small venemous Prickle; so hath Borrage, but harmless. The cause must be, hasty putting forth, want of moisture, and the closeness of the Bark: For the haste of the Spirit to put forth, and the want of nourishment to put forth a Bough, and the closeness of the Bark, cause Prickles in Boughs; and therefore they are ever like a *Pyramis*, for that the moisture spendeth after a little putting forth. And for Prickles in Leaves, they come also of putting forth more Juyce into the Leaf, that can spred in the Leaf smooth; and therefore the Leaves otherwise are rough, as Burrage and Nettles are. As for the Leaves of Holly, they are smooth, but never plain, but as it were with folds for the same cause.

560. There be also *Plants*, that though they have no Prickles, yet they have a kinde of Downey or Velvet Rine upon their Leases; as *Rose-Campion*, *Stock-Gilliflowers*, *Colts-foot*; which Down or Nap cometh of a subtile Spirit, in a soft or fat substance. For it is certain, that both *Stock-Gilliflowers*, and *Rose-Campions*,

Campions, ſtamped, have been applied (with ſucceſs) to the Wreſts of thoſe that have had *Tertian* or *Quartan Agues*; and the *Vapor* or *Colts-foot* have a ſanative vertue towards the Lungs, and the Leaf alſo is healing in *Surgery*.

Another kinde of Excreſcence is an Exudation of Plants, joyned with Putrefaction, as we ſee in Oak-Apples, which are found chiefly upon the Leaves of Oaks, and the like upon Willows: And Countrey people have a kinde of Prediction, that if the Oak-Apple, broken, be full of Worms, it is a ſign of a peſtilent year; which is a likely thing, becauſe they grow of corruption. 561.

There is alſo upon *Sweet*, or other *Bryer*, a fine Tuft, or Bruſh of Moſs of divers colours; which if you cut, you ſhall ever finde full of little white Worms. 562.

563. Experiments in Conſort, touching the *Producing of perfect Plants without Seeds*.

IT is certain, that *Earth* taken out of the Foundations of *Vaults* and *Houſes* and bottoms of *Wells*, and then put into Pots, will put forth ſundry kinde of *Herbs*: But ſome time is required for the Germination; for if it be taken but from a Fathom deep, it will put forth the firſt year, if much deeper, not till after a year or two.

The nature of the *Plants* growing out of the *Earth* ſo taken up, doth follow the nature of the Mould it ſelf, as if the Mould be ſoft and fine, it putteth forth ſoft *Herbs*; as *Graſs*, *Plantine*, and the like: If the *Earth* be harder and courſer, it putteth forth *Herbs* more rough, as *Thiſtles*, *Firs*, *&c.* 564.

It is common Experience, that where *Alleys* are cloſe gravelled, the Earth putteth forth the firſt year *Knot Graſs*, and after *Spire Graſs*. The cauſe is, for that the hard Gravel or Pebble at the firſt laying, will not ſuffer the *Graſs* to come forth upright, but turneth it to finde his way where it can; but after that the Earth is ſomewhat looſened at the top, the ordinary Graſs cometh up. 565.

It is reported, that Earth being taken out of ſhady and watry Woods, ſome depth, and potted, will put forth Herbs of a fat and juycy ſubſtance; as *Penny-wort*, *Purſlane*, *Houſleek*, *Penny-Royal*, *&c.* 566.

The Water alſo doth ſend forth Plants that have no Roots fixed in the bottom; but they are leſs perfect Plants being almoſt but Leaves, and thoſe ſmall ones: Such is that we call *Duck-weed*, which hath a Leaf no bigger then a Thyme Leaf, but of a freſher Green, and putteth forth a little ſtring into the Water, far from the bottom. As for the Water-Lilly, it hath a Root in the Ground; and ſo have a number of other Herbs that grow in Ponds. 567.

It is reported by ſome of the *Ancients*, and ſome *Modern Teſtimony* likewiſe, that there be ſome Plants, that grow upon the top of the Sea; being ſuppoſed to grow of ſome concretion of Slime from the Water, where the *Sun* heateth hot, and where the *Sea* ſtirreth little. As for the *Alga Marina*, (*Sea-weed*) and *Eringium* (*Sea-Thiſtle*) both the Roots; but have *Sea-weed* under the Water, the *Sea Thiſtle* but upon the Shore. 568.

The *Ancients* have noted, that there are ſome Herbs that grow out of *Snow*, laid up cloſe together, and putrified; and that they are all bitter, and they name one eſpecially, *Flomus*, which we call *Moth-Mullein*. It is certain, that Worms are found in *Snow* commonly, like Earth-worms; and therefore it is not unlike, that it may likewiſe put forth Plants. 569.

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570. The Ancients have affirmed, that there are ſome Herbs that grow out of Stone, which may be, for that it is certain, that Toads have been found in the middle of a Freeſtone. We ſee alſo, that Flints lying above ground gather Moſs; and Wall-flowers, and ſome other Flowers grow upon Walls. But whether upon the main Brick or Stone, or whether out of the Lime, or Chinks, is not well obſerved. For Elders and Aſhes have been ſeen to grow out of Steeples; but they manifeſtly grow out of Clefts, inſomuch as, when they grow big, they will disjoyn the Stone. And beſides, it is doubtful, whether the Mortar it ſelf putteth it forth, or whether ſome Seeds be not let fall by Birds. There be likewiſe Rock-Herbs, but I ſuppoſe thoſe are, where there is ſome Mould or Earth. It hath likewiſe been found, that great Trees, growing upon Quarries, have put down their Root into the Stone.

571. In ſome Mines in *Germany*, as is reported, there grow in the bottom Vegetables; and the Workfolks uſe to ſay, They have *Magical Vertue*, and will not ſuffer men together them.

572. The Sea-ſands ſeldom bear Plants. Whereof the cauſe is yielded by ſome of the Ancients, for that the Sun exhaleth the Moiſture, before it can incorporate with the Earth, and yield a Nouriſhment for the Plant. And it is affirmed alſo, that Sand hath (always) his Root in Clay; and that there be no Veins of Sand, any great depth within the Earth.

573. It is certain, that ſome Plants put forth for a time of their own ſtore, without any Nouriſhment from Earth, Water, Stone, &c. Of which, *vide the Experiment* 29.

574. Experiments in Conſort, touching *Foreign Plants*

IT is reported, That Earth that was brought out of the *Indies*, and other remote Countreys for Ballaſt for Ships, caſt upon ſome Grounds in *Italy*, did put forth Foreign Herbs, to us in *Europe* not known; and, that which is more, that of their Roots, Barks, and Seeds, contuſed together, and mingled with other Earth, and well watred with warm Water, there came forth Herbs much like the other.

575. Plants, brought out of hot Countreys, will endeavor to put forth at the ſame time, that they do uſually do in their own climate; and therefore to preſerve them, there is no more required than to keep them from the injury of putting back by Cold. It is reported alſo, that Grain out of the hotter Countreys tranſlated into the Colder, will be more foreward than the ordinary Grain of the cold Countrey. It is likely, that this will prove better in Grains, than in Trees; for that Grains are but Annual, and ſo the vertue of the Seed is not worn out; whereas in a Tree, it is embaſed by the Ground, to which it is removed.

576. Many Plants, which grow in the hotter Countreys, being ſet in the colder, will nevertheleſs, even in thoſe cold Countreys, being ſown of Seeds late in the Spring come up and abide moſt part of the Summer; as we finde it in Orenge, and Lemmon Seeds, &c. The Seeds whereof, ſown in the end of *April*, will bring forth excellent Sallets, mingled with other Herbs. And I doubt not, but the Seeds of Clove-Trees, and Pepper-Seeds, &c. If they could come hither Green enough to be ſown, would do the like.

There

577. Experiments in Consort, touching the *Seasons in which Plants come forth.*

THere be some *Flowers*, *Blossoms*, *Grains*, and *Fruits*, which come more early, and others which come more late in the year. The Flowers that come early with us, are, *Prime-Roses*, *Violets*, *Anemonies*, *Water-Daffadillies*, *Crocus Vernus*, and some early *Tulippa's*. And they are all cold Plants, which therefore (as it should seem) have a quicker Perception of the heat of the Sun increasing, than the hot Herbs have, as a cold hand will sooner finde a little warmth, than a hot. And those that come next after, are Wall-Flowers, Cowslips, Hyacinths, Rosemary-flowers, &c. And after them Pinks, Roses, Flowerdeluces, &c. And the latest are, Gilly-flowers, Holly-Oaks, Larks-Foot, &c. The earliest Blossoms are, the Blossoms of Peaches, Almonds, Cornelians, Mezerions, &c. And they are of such Trees, as have much moisture, either Watery, or Oyly. And therefore *Crocus Vernus* also, being an Herb that hath an Oyly Juyce, putteth forth early. For those also finde the Sun sooner than the dryer Trees. The Grains are, first Rye and Wheat, then Oats and Barley, then Pease and Beans; for though Green Pease and Beans be eaten sooner, yet the dry ones that are used for Horse-meat, are ripe last; and it seemeth, that the fatter Grain cometh first. The earliest Fruits are, Strawberries, Cherries, Gooseberries, Corrans; and after them early Apples, early Pears, Apricots, Rasps; and after them, Damosins, and most kinde of Plumbs, Peaches, &c. And the latest are, Apples, Wardens, Grapes, Nuts, Quinces, Almonds, Sloes, Brier-berries, Heps, Medlars, Services, Cornelians, &c.

578. It is to be noted, That (commonly) Trees that ripen latest, blossom sooneſt; as Peaches, Cornelians, Sloes, Almonds, &c. And it seemeth to be a work of providence that they blossom so soon, for otherwise they could not have the Sun long enough to ripen.

579. There be Fruits (but rarely) that come twice a year; as some Pears, Strawberries, &c. And it seemeth, they are such as abound with nourishment, whereby after one period, before the Sun waxeth too weak, they can endure another. The *Violet* also, amongst Flowers, cometh twice a year, especially the double White, and that also is a Plant full of moisture. *Roses* come twice, but it is not without cutting, as hath been formerly said.

580. In *Muscovia*, though the Corn come not up till late Spring, yet their Harvest is as early as ours. The cause is, for that the strength of the Ground is kept in with the Snow; and we see with us, that if it be a long Winter, it is commonly a more plentiful year: And after those kinde of Winters likewise, the Flowers and Corn which are earlier and later, do come commonly at once, and at the same time; which troubleth the Husbandman many times: For you shall have Red-Roses and Damask-Roses come together, and likewise the Harvest of Wheat and Barley. But this hapneth ever, for that the earlier stayeth the later, and not that the later cometh sooner.

581. There be divers Fruit Trees, in the hot Countreys, which have Blossoms, and young fruit, and ripe fruit, almost all the year, succeeding one another. And it is said, the Orenge hath the like with us, for a great part of Summer, and so also hath the Fig. And no doubt, the Natural Motion of Plants is to have so: But that either they want Juyce to spend, or they meet with the cold of the Winter. And therefore this Circle of ripening cannot be, but in succulent Plants, and hot Countreys.

Some

582. Some Herbs are but *Annual*, and die *Root* and all once a year; as *Borrage, Lettuce, Cucumbers, Musk-Melons, Basil, Tobacco, Mustard-seed*, and all kindes of Corn; some continue many years, as *Hyssope, Germander, Lavender, Fennel, &c.* The cause of the Dying is double; the first is, the tenderness and weakness of the Seed, which maketh the period in a small time, as it is in *Borrage, Lettuce, Cucumbers, Corn, &c.* And therefore none of these are hot. The other cause is, for that some Herbs can worse endure cold, as *Basil, Tobacco, Mustard seed*; and these have (all) much heat.

583. Experiments in Consort, touching the *Lasting of Herbs and Trees.*

THe lasting of *Plants*, is most in those that are largest of Body, as *Oaks, Elm, Chesnut* the *Loat-tree, &c.* And this holdeth in Trees, but in Herbs it is often contrary; for Borrage, Coleworts, Pompions, which are Herbs of the largest size, are of small durance; whereas *Hyssope, Winter-Savory, Germander, Time, Sage*, will last long. The cause is, for that Trees last according to the strength, and quantity of their Sap and Juyce, being well munited by their Bark, against the injuries of the Air: But Herbs draw a weak Juyce, and have a soft Stalk; and therefore those amongst them which last longest, are Herbs of strong smell, and with a sticky stalk.

584. Trees that bear Mast and Nuts, are commonly more lasting than those that bear Fruits, especially the moister Fruits; as Oaks, Beeches, Chesnuts, Walnuts, Almonds, Pine trees, &c. last longer than Apples, Pears, Plumbs, &c. The cause is, the fatness, and oylines of the Sap; which ever wasteth less, than the more Watry.

585. Trees that bring forth their Leaves late in the year, and cast them likewise late, are more lasting than those that sprout their Leaves early, or shed them betimes. The cause is, for that the late coming forth, sheweth a moisture more fixed; and the other loose, and more easily resolved. And the same cause is, that wilde Trees last longer than Garden-trees; and in the same kinde, those whose Fruit is acide more than those whose Fruit is sweet.

586. Nothing procureth the lasting of Trees, Bushes, and Herbs, so much as often cutting; for every cutting causeth a renovation of the Juyce of the Plant; that it neither goeth so far, nor riseth so faintly, as when the Plant is not cut: Insomuch, as *Annual Plants*, if you cut them seasonably, and will spare the use of them, and suffer them to come up still young, will last more years than one, as hath been partly touched; such as is Lettuce, Purslane, Cucumber, and the like. And for great Trees, we see almost all overgrown Trees in Church-yards, or near ancient Building, and the like, are Pollards or Dottards, and not Trees at their full height.

587. Some *Experiment* would be made, how by Art to make Plants more lasting than their ordinary period; as to make a Stalk of Wheat, &c. last a whole year. You must ever presuppose, that you handle it so, as the Winter killeth it not; for we speak onely of prolonging the Natural Period. I conceive, that the Rule will hold, That whatsoever maketh the Herb come later, than at his time will make it last longer time: It were good to try it in a Stalk of Wheat, &c. set in the shade, and encompassed with a case of Wood, not touching the Straw, to keep out open Air.

588. As for the Preservation of Fruits, as well upon the Tree or Stalk, as gathered, we shall handle it under the Title of *Conservation of Bodies.*

The

THe Particular Figures of *Plants* we leave to their descriptions, but some few things in general, we will observe. Trees and Herbs, in the growing forth of their Boughs and Branches, are not figured, and keep no order. The cause is, for that the Sap, being restrained in the Rinde and Bark, breaketh not forth at all, (as in the Bodies of Trees, and Stalks of Herbs,) till they begin to branch, and then, when they make an eruption, they break forth casually, where they finde best way in the Bark or Rinde. It is true, that some Trees are more scattered in their Boughs; as *Sallow trees*, *Warden-trees*, *Quince-trees*, *Medlar-trees*, *Lemmon trees*, *&c.* Some are more in the form of a *Pyramis*, and come almost to tod; as the *Pear-trees* (which the *Criticks* will have to borrow his name of πῦρ Fire) *Orenge-trees*, *Fir-trees*, *Service trees*, *Lime-trees*, *&c.* And some are more spred and broad, as *Beeches*, *Hornbeam*, *&c.* The rest are more indifferent. The cause of scattering the Boughs is, the hasty breaking forth of the Sap; and therefore those Trees rise not in a Body of any height, but Branch near the Ground. The cause of the *Pyramis* is, the keeping in of the Sap, long before it branch, and the spending of it, when it beginneth to branch, by equal degrees: The spreding is caused, by the carrying up of the Sap plentifully, without expence, and then putting it forth speedily, and at once.

588 Experiments in Consort, touching the *several Figures of Plants.*

There be divers Herbs, but no Trees, that may be said to have some kinde of order, in the putting forth of their Leaves: For they have Joynts, or Knuckles, as it were stops in their Germination; as have *Gilliflowers*, *Pinks*, *Fennel*, *Corn*, *Reeds*, and *Canes*. The cause whereof is, for that the Sap ascendeth unequally, and doth (as it were) tire and stop by the way. And it seemeth, they have some closeness and hardness in their Stalk, which hindereth the Sap from going up, until it hath gathered into a knot, and so is more urged to put forth. And therefore, they are most of them hollow, when the Stalk is dry; as *Fennel Stalks*, *Stubble*, and *Canes*.

589.

Flowers have (all) exquisite *Figures*, and the Flower numbers are (chiefly) five and four; as in *Prime-Roses*, *Bryer-Roses*, *single Musk-Roses*, *single Pinks*, and *Gilliflowers*, *&c.* which have five Leaves; *Lillies*, *Flower-de-luces*, *Borage*, *Bugloss* *&c.* which have four Leaves. But some put forth Leaves not numbred, but they are ever small ones; as *Marigolds*, *Trifole*, *&c.* We see also, that the Sockets, and Supporters of Flowers, are Figured; as in the five Brethren of the *Rose*, *Sockets* of *Gilliflowers*, *&c.* Leaves also are all figured, some round, some long, none square, and many jagged on the sides; which Leaves of *Flowers* seldom are. For, I account, the jagging of *Pinks*, and *Gilliflowers*, to be like the inequality of *Oak-leaves*, of *Vine-leaves*, or the like; but they seldom or never have any small Purls.

590.

OF *Plants* some few put forth their Blossoms before their Leaves; as *Almonds*, *Peaches*, *Cornelians*, *Black-Thorn*, *&c.* But most put forth some Leaves before their Blossoms; as *Apples*, *Pears*, *Plumbs*, *Cherry*, *White-Thorn*, *&c* The cause is for that those that put forth their Blossoms first, have either an acute and sharp spirit; (and therefore commonly they all put forth early in the *Spring*, and ripen very late, as most of the particulars before mentioned) or else an oyly Juyce, which is apter to put out Flowers than Leaves.

591. Experiments in Consort, touching *Some principal differences in Plants.*

Of *Plants* some are Green all Winter, others cast their Leaves. There are Green all Winter, *Holly*, *Ivy*, *Box*, *Firr*, *Eugh*, *Cypress*, *Juniper*, *Bays*, *Rosemary*, *&c.* The cause of the holding Green, is the close and compact sub-

592.

ſtance of their Leaves, and the Pedicles of them. And the cauſe of that again, is, either the tough and viſcous Juyce of the Plant, or the ſtrength and heat thereof. Of the firſt ſort, is *Holly*; which is of ſo viſcous a Juyce, as they make Birdlime of the Bark of it. The Stalk of *Ivy* is tough, and not fragile, as we ſee it in other ſmall Twigs dry. *Firr* yieldeth Pitch. *Box* is a faſt and heavy Wood, as we ſee it in Bowls. *Eugh* is a ſtrong and tough Wood, as we ſee it in Bows. Of the ſecond ſort, is *Juniper*, which is a Wood odorate, and maketh a hot Fire. *Bays* is likewiſe a hot and aromatical Wood, and ſo is *Roſemary* for a Shrub. As for the Leaves, their denſity appeareth in that, either they are ſmooth and ſhining, as in *Bays*, *Holly*, *Ivy*, *Box*, *&c.* or in that they are hard and ſoiry, as in the reſt. And tryal would be made of Grafting of *Roſemary*, and *Bays*, and *Box*, upon a *Holly* Stock, becauſe they are Plants that come all Winter. It were good to try it alſo with Grafts of other Trees, either Fruit trees, or Wild-trees, to ſee whether they will not yield their Fruit, or bear their Leaves later, and longer in the Winter; becauſe the Sap of the *Holly* putteth forth moſt in the Winter. It may be alſo a Mezerion-tree grafted upon a *Holly*, will prove both an earlier, and a greater Tree.

593. There be ſome Plants that bear no Flower, and yet bear Fruit; there be ſome that bear Flowers, and no Fruit; there be ſome that bear neither Flowers nor Fruit. Moſt of the great Timber-trees, (as Oaks, Beeches, &c.) bear no apparent Flowers; ſome few (likewiſe) of the Fruit-trees, as Mulberry, Walnuts, &c. And ſome Shrubs, (as Juniper, Holly, &c.) bear no Flowers. Divers Herbs alſo bear Seeds, (which is as the Fruit,) and yet bear no Flowers, as Purſlane, &c. Thoſe that bear Flowers, and no Fruit, are few, as the double Cherry, the Sallow, &c. But for the Cherry, it is doubtful, whether it be not by Art or Culture; for if it be by Art, then tryal would be made, whether Apples and other Fruits Bloſſoms may not be doubled. There are ſome few, that bear neither Fruit, nor Flower; as the Elm, the Poplars, Box, Braks, &c.

594. There be ſome Plants that ſhoot ſtill upwards, and can ſupport themſelves, as the greateſt part of Trees and Plants: There be ſome other, that creep along the Ground, or wind about other Trees, or props, and cannot ſupport themſelves; as Vines, Ivy, Bryar, Briony, Wood-bines, Hops, Climatis, Camomil, &c. The cauſe is, (as hath been partly touched) for that all Plants, (naturally) move upwards; but if the Sap put up too faſt, it maketh a ſlender Stalk, which will not ſupport the weight; and therefore theſe latter ſort are all ſwift and haſty comers.

595. Experiments in Conſort, touching all *Manner of Compoſts and Help of Ground.*

THe firſt and moſt ordinary help is *Stercoration*. The *Sheeps-dung* is one of the beſt; and next, the *Dung* of *Kine*; and thirdly, that of *Horſes*; which is held to be ſomewhat too hot, unleſs it be mingled; that of *Pigeons* for a Garden, as a ſmall quantity of Ground, excelleth. The ordering of Dung is, if the Ground be Arable, to ſpred it immediately before the Ploughing and Sowing, and ſo to Plough it in: For if you ſpred it long before, the Sun will draw out much of the fatneſs of the Dung: If the Ground be Grazing Ground, to ſpred it ſomewhat late towards Winter, that the Sun may have the leſs power to dry it up. As for ſpecial *Compoſts* for *Gardens* (as a *Hot Bed*, *&c.*) we have handled them before.

596. The ſecond kinde of Compoſt is, the ſpreding of divers kindes of Earth; as *Marl*, *Chalk*, *Sea Sand*, *Earth* upon *Earth*, *Pond-Earth*, and the mixtures of them. *Marl* is thought to be the beſt, as having moſt fatneſs. And not heating

heating the Ground too much. The next is *Sea-ſand*, which (no doubt) obtained a ſpecial vertue by the *Salt*; for *Salt* is the firſt rudiment of life. Chalk over-heateth the Ground a little; and therefore is beſt upon cold Clay Grounds, or moiſt Grounds: But I heard a great *Husband* ſay, that it was a common error to think that Chalk helpeth Airable Grounds, but helpeth not Grazing Grounds, whereas (indeed) it helpeth Graſs as well as Corn. But that which breedeth the error is, becauſe after the chalking of the Ground, they wear it out with many Crops, without reſt; and then (indeed) afterwards it will bear little Graſs; becauſe the Ground is tired out. It were good to try the laying of Chalk upon Airable Grounds, a little while before Ploughing, and to Plough it in, as they do the Dung; but then it muſt be Friable firſt, by Rain or Lying: As for *Earth* it compaſſeth it ſelf; for I knew a great *Garden*, that had a *Field* (in a manner) poured upon it, and it did bear Fruit excellently the firſt year of the Planting; for the Surface of the *Earth* is ever the fruitfulleſt: And *Earth* ſo prepared hath a double Surface. But it is true, as I conceive, that ſuch *Earth* as hath *Salt-Peter* bred in it, if you can procure it without too much charge, doth excel. The way to haſten the breeding of *Salt-Peter*, is to forbid the *Sun*, and the growth of Vegetables. And therefore, if you make a large Hovel, thatched, over ſome quantity of Ground; nay, if you do but planck the Ground over, it will breed *Salt-Peter*. As for *Pond-earth* or *River-earth*, it is a very good compoſt, eſpecially, if the *Pond* have been long uncleanſed, and ſo the Water be not too hungry; and I judge it will be yet better, if there be ſome mixture of Chalk.

The third help of Ground is, by ſome other Subſtances that have vertue to make Ground Fertile, though they be not meerly *Earth*, wherein Aſhes excel; inſomuch as the *Countreys* about *Ætna* and *Veſuvius* have a kinde of amends made them, for the miſchief the eruptions (many times) do, by the exceeding fruitfulneſs of the ſoyl, cauſed by the Aſhes ſcattered about. Soot alſo, though thin, ſpred in a *Field* or *Garden*, is tryed to be a very good compoſt. For *Salt* it is too coſtly; but it is tryed, that mingled with Seed-corn, and ſown together, it doth good: And I am of opinion, that Chalk in *Powder*, mingled with Seed-corn, would do good; perhaps as much as Chalking the Ground all over. As for the ſteeping of the Seeds in ſeveral mixtures with Water, to give them vigor, or watring Grounds with Compoſt-water, we have ſpoken of them before. 597.

The fourth help of Ground is, the ſuffering of Vegetables to die into the Ground, and ſo to fatten it; as the Stubble of Corn, eſpecially Peaſe. *Brakes* caſt upon the Ground in the beginning of Winter, will make it very fruitful. It were good (alſo) to try whether Leaves of Trees ſwept together, with ſome Chalk and Dung mixed, to give them more heart, would not make a good Compoſt: For there is nothing loſt, ſo much as Leaves of Trees, and as they lie ſcattered, and without mixture, they rather make the Ground ſour, than otherwiſe. 598.

The fifth help of Ground is, Heat and Warmth. It hath been anciently practiſed to burn *Heath*, and *Ling*, and *Sedge*, with the vantage of the Wind, upon the Ground. We ſee, that Warmth of Walls and Incloſures, mendeth Ground; we ſee alſo, that lying open to the *South*, mendeth Ground; we ſee again that the Foldings of Sheep help Gound as well by their warmth, as by their compoſt: And it may be doubted, whether the covering of the Ground with *Brakes*, in the beginning of the Winter (whereof we ſpake in the laſt *Experiment*) helpeth it not, by reaſon of the Warmth. Nay, ſome very good 599.

Husbands do ſuſpect, that the gathering up of Flints in Flinty Ground, and laying them on heaps (which is much uſed) is no good Husbandry for that they would keep the Ground warm.

600. The ſixth help of Ground is, by Watring and Irrigation, which is in two manners; The one by Letting in, and Shutting out Waters, at ſeaſonable times; for Water, at ſome ſeaſons, and with reaſonable ſtay, doth good; but at ſome other ſeaſons, and with too long ſtay, doth hurt. And this ſerveth onely for Meadows, which are along ſome River. The other way is to bring Water from ſome hanging Grounds, where there are Springs into the lower Grounds, carrying it in ſome long Furrows; and from thoſe Furrows, drawing it traverſe to ſpred the Water: And this maketh an excellent improvement, both for Corn and Graſs. It is the richer, if thoſe hanging Grounds, be fruitful, becauſe it waſheth off ſome of the fatneſs of the Earth; but howſoever it profiteth much. Generally where there are great overflows in Fens, or the like, the drowning of them in the Winter, maketh the Summer following more fruitful: The cauſe may be for, that it keepeth the Ground warm, and nouriſheth it. But the Fen-men hold, that the Sewers muſt be kept ſo, as the Water may not ſtay too long in the Spring, till the Weeds and Sedge be grown up; for then the Ground will be like a Wood which keepeth out the Sun, and ſo continueth the wet; whereby it will never graze (to purpoſe) that year. Thus much for Irrigation; but for Avoidances, and Drainings of Water, where there is too much, and the helps of Ground in that kinde, we ſhall ſpeak of them in another place.

NATURAL HISTORY.

Century VII.

601. Experiments in Consort, touching the *Affinities and Differences, between Plants and Inanimate Bodies.*

THe differences between *Animate* and *Inanimate Bodies*, we shall handle fully under the Title of *Life*, and *Living Spirits*, and *Powers*. We shall therefore make but a brief mention of them in this place. The main differences are two. All Bodies have Spirits, and Pneumatical parts within them; but the main differences between *Animate* and *Inanimate* are two. The first is, that the Spirits of things animate, are all contined with themselves, and are branched in Veins, and secret Sanales, as Blood is: And in Living Creatures, the Spirits have not onely Branches, but certain Sells or Seats, where the principal Spirits do reside, and whereunto the rest do resort: But the Spirits in things Inanimate are shut in, and cut off by the Tangible parts; and are not pervious one to another, as Air is in Snow. The second main difference is, that the Spirits of Animate Bodies are all in some degree (more or less) kindled and inflamed, and have a fine commixture of Flame, and an Ærial substance: But Inanimate Bodies have their Spirits no whit inflamed or kindled. And this difference consisteth not in the Heat or Coolness of Spirits; for *Cloves* and other Spices, *Naptha* and *Petroleum*, have exceeding hot Spirits (hotter a great deal than *Oyl*, *Wax*, or *Tallow*, *&c.*) but not inflamed. And when any of those weak and temperate Bodies come to be inflamed, than they gather a much greater heat, than others have uninflamed, besides their light and motion, &c.

602. The differences which are secondary, and proceed from these two radical differences are, first, *Plants* are all figurate and determinate, which inanimate Bodies are not; for look how far the Spirit is able to spred and continue it self, so far goeth the shape or figure, and then is determined. Secondly, *Plants* do nourish, inanimate Bodies do not; they have an Accretion, but no Alimentation. Thirdly, *Plants* have a period of life, which inanimate Bodies have not. Fourthly, they have a succession and propagation of their kinde, which is not in Bodies inanimate.

603. The differences between *Plants*, and *Metals*, or *Fossiles* besides those four beforementioned, (for *Metals* I hold inanimate) are these: First, *Metals* are more durable than *Plants*: Secondly, they are more solid and hard: Thirdly, they are wholly subterrany; whereas *Plants* are part above *Earth*, and part under *Earth*.

604. There be very few *Creatures* that participate of the Nature of *Plants*, and *Metals* both; *Coral* is one of the nearest of both kindes; another is *Vitriol*, for that is apteſt to ſprout with moiſture.

605. Another ſpecial Affinity is between *Plants* and *Mould*, or *Putrefaction*: For all Putrefaction, (if it diſſolve not in Arefaction) will in the end iſſue into *Plants* or *Living Creatures* bred of Putrefaction. I account *Moſs*, and *Muſhromes*, and *Agarick*, and other of thoſe kindes, to be but *Moulds* of the Ground, Walls, and Trees; and the like. As for *Flesh* and *Fish* and *Plants* themſelves, and a number of other things, after a *Mouldineſs*, or *Rottenneſs*, or *Corrupting*, they will fall to breed *Worms*. Theſe Putrefactions, which have *Affinity* with *Plants*, have this difference from them; that they have no ſucceſſion or propagation, though they nouriſh, and have a period of Life, and have likewiſe ſome Figure.

606. I left once, by chance, a *Citron* cut in a cloſe room, for three Summermoneths, that I was abſent; and at my return, there were grown forth out of the Pith cut, *Tufts* of *Hairs*, an inch long, with little black Heads as if they would have been ſome *Herb*.

607. Experiments in Conſort, touching the *Affinities and Differences of Plants, and Living Creatures: And the Confines and Participles of them.*

THe Affinities and Differences between *Plants* and *Living Creatures*, are theſe that follow. They have both of them *Spirits* continued and branched, and alſo inflamed. But firſt in *Living Creatures* the *Spirits* have a *Cell* or *Seat*, which *Plants* have not, as was alſo formerly ſaid. And ſecondly, the *Spirits* of *Living Creatures* hold more of *Flame*, than the *Spirits* of *Plants* do; and theſe two are the Radical differences. For the Secondary differences, they are as follow. Firſt, Plants are all fixed to the Earth; whereas all Living Creatures are ſevered, and of themſelves. Secondly, Living Creatures have Local Motion, Plants have not. Thirdly, Living Creatures nouriſh from their upper parts by the Mouth chiefly; Plants nouriſh from below, namely from the Roots. Fourthly, Plants have their Seed and Seminal parts uppermoſt, Living Creatures have them lowermoſt; and therefore it was ſaid, not Elegantly alone, but Philoſophically: *Homo eſt Planta inverſa*. *Man is like a Plant turned upwards*; For the Root in Plants, is as the Head in Living Creatures. Fifthly, *Living Creatures* have a more exact Figure than Plants. Sixthly, Living Creatures have more diverſity of Organs within their Bodies and (as it were) inward Figures than Plants have. Seventhly, Living Creatures have Senſe, which Plants have not. Eightly, Living Creatures have Voluntary Motion, which Plants have not.

608. For the difference of *Sexes* in *Plants*, they are oftentimes by name diſtinguiſhed; as *Male-Piony*, *Female-Piony*; *Male Roſemary*, *Female-Roſemary*; *He-Holly*, *She-Holly*, *&c.* But Generation by Copulation (certainly) extendeth not to Plants. The neareſt approach of it, is between the He-Palm, and the She-Palm, which (as they report) if they grow near, incline the one to the other; inſomuch as, (that which is more ſtrange) they doubt not to report, that to keep the Trees upright from bending, they tye Ropes or Lines from the one to the other, that the contact might be enjoyned by the contact of a middle Body. But this may be feigned, or at leaſt amplified. Nevertheleſs, I

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am apt enough to think, that this same *Binarium* of a stronger and a weaker, like unto *Masculine* and *Feminine*, doth hold in all Living Bodies. It is confounded sometimes; as in some Creatures of Putrefaction, wherein no marks of distinction appear; and it is doubled sometimes, as in Hermaphrodites: but generally there is a degree of strength in most Species.

609. The Participles or Confiners between Plants and Living Creatures, are such chiefly as are fixed, and have not Local Motion of remove; though they have a Motion in their parts, such as are Oysters, Cockles, and such like. There is a fabulous Narration, That in the *Northern Countreys* there should be an Herb that groweth in the likeness of a *Lamb*, and feedeth upon the Grass, in such sort, as it will bear the Grass round about. But, I suppose, that the Figure maketh the Fable; for so we see there be Bee-flowers, &c. And as for the Grass, it seemeth the Plant, having a great stalk and top, doth prey upon the Grass a good way about, by drawing the Juyce of the *Earth* from it.

610. Experiments Promiscuous touching *Plants*.

THe *Indian Fig* boweth his Roots down so low in one year, as of it self it taketh Root again; and so multiplieth from Root to Root, making of one Tree a kinde of Wood. The cause is, the plenty of the Sap, and the softness of the stalk, which maketh the Bough, being over-loaden, and not stiffly upheld, weigh down. It hath Leaves as broad as a little Target, but the Fruit no bigger than Beans. The cause is, for that the continual shade increaseth the Leaves, and abateth the Fruit; which nevertheless is of a pleasant taste. And that (no doubt) is caused, by the suppleness and gentleness of the Juyce of that Plant, being that which maketh the Boughs also so flexible.

611. It is reported by one of the *Ancients*, that there is a certain *Indian Tree*, having few, but very great Leaves, three cubits long, and two broad; and that the Fruit being of good taste, groweth out of the Bark. It may be there be Plants that pour out the Sap so fast, as they have no leisure, either to divide into many Leaves, or to put forth Stalks to the Fruit. With us Trees generally have small Leaves in comparison. The *Fig* hath the greatest, and next it the *Vine*, *Mulberry*, and *Sycamore*, and the least are those of the *Willow*, *Birch*, and *Thorn*. But there be found Herbs with far greater Leaves than any Tree; as the *Bur*, *Gourd*, *Cucumber*, and *Colewort*. The cause is, (like to that of the *Indian Fig*) the hasty and plentiful putting forth of the Sap.

612. There be three things in use for sweetness, *Sugar*, *Honey*, *Manna*. For *Sugar*, to the *Ancients* it was scarce known, and little used. It is found in Canes; *Quare* whether to the first *Knuckle*, or further up? and whether the very Bark of the Cane it self do yield Sugar, or no? For *Honey*, the *Bee* maketh it, or gathereth it; but I have heard from one, that was industrious in Husbandry, that the labor of the *Bee* is about the Wax, and that he hath known in the beginning of *May*, Honey-Combs empty of *Honey*, and within a fortnight, when the sweet Dews fall, filled like a Cellar. It is reported by some of the *Ancients*, that there is a Tree called *Octhus*, in the Valleys of *Hyrcania*, that distilleth Honey in the Mornings. It is not unlike, that the Sap and Tears of some Trees may be sweet. It may be also, that some sweet Juyces, fit for many uses, may be concocted out of Fruits, to the thickness of Honey, or perhaps of Sugar; the likeliest are Rasins of the Sun, Figs, and Corrans: The Means may be enquired.

613. The *Ancients* report of a Tree, by the *Persian Sea*, upon the Shore-sands, which

which is nouriſhed with the Salt-water; and when the Tide ebbeth, you ſhall ſee the Roots, as it were, bare without Bark (being, as it ſeemeth, corroded by the Salt) and graſping the Sands like a Crab, which nevertheleſs beareth a Fruit. It were good to try ſome hard Trees, as a Service-Tree or Fir-Tree, by ſetting them within the Sands.

614. There be of Plants which they uſe for Garments, theſe that follow, *Hemp, Flax, Cotton, Nettles,* (whereof they make *Nettle Cloth*) *Sericum*, which is a growing Silk; they make alſo *Cables* of the *Bark* of *Lime-Trees*. It is the *Stalk* that maketh the *Filaceous* matter commonly, and ſometimes the *Down* that groweth above.

615. They have in ſome Countreys, a Plant of a *Roſie-colour*, which ſhutteth in the Night, openeth in the Morning, and openeth wide at Noon; which the Inhabitants of thoſe Countreys ſay, is a Plant that ſleepeth. There be Sleepers enough then; for almoſt all Flowers do the like.

616. Some Plants there are, but rare, that have a Moſſie or Downy Root, and likewiſe that have a number of Threds like Beards, as *Mandrakes*; whereof *Witches* and *Impoſtors* make an ugly Image, giving it the form of a face at the top of the Root, and leave thoſe ſtrings to make a broad Beard down to the foot. Alſo there is a kinde of *Nard* in *Creet* (being a kinde of *Phu*) that hath a Root hairy, like a Rough-footed Doves foot. So as you may ſee, there are of Roots, *Bulbous Roots*, *Fibrous Roots*, and *Hirſute Roots*. And, I take it, in the *Bulbous*, the Sap haſtneth moſt to the Air and Sun: In the *Fibrous*, the Sap delighteth more in the Earth, and therefore putteth downward; and the *Hirſute* is a middle between both, that beſides the putting forth upwards and downwards, putteth forth in round.

617. There are ſome *Tears* of *Trees*, which are kembed from the *Beards* of *Goats*; for when the *Goats* bite and crop them, eſpecially in the Mornings, the Dew being on, the Tear cometh forth, and hangeth upon their Beards: Of this ſort is ſome kinde of *Ladanum*.

618. The irrigation of the Plane-tree by Wine, is reported by the *Ancients*, to make it fruitful. It would be tryed likewiſe with Roots; for upon Seeds it worketh no great effect.

619. The way to carry Foreign Roots, a long way, is to veſſel them cloſe in Earthen veſſels; but if the Veſſels be not very great, you muſt make ſome holes in the bottom, to give ſome refreſhment to the Roots; which otherwiſe (as it ſeemeth) will decay, and ſuffocate.

620. The ancient *Cinnamon*, was, of all other Plants, while it grew, the dryeſt; and thoſe things which are known to comfort other Plants, did make that more ſteril; for in ſhowers it proſpered worſt: It grew alſo amongſt Buſhes of other kindes, where commonly Plants do not thrive, neither did it love the Sun. There might be one cauſe of all thoſe effects, namely, the ſparing nouriſhment, which that Plant required. *Quære*, how far *Caſſia*, which is now the ſubſtitute of *Cinnamon*, doth participate of theſe things.

621. It is reported by one of the *Ancients*, that *Caſſia*, when it is gathered, is put into the Skins of Beaſts newly fleyed; and that the Skins corrupting, and breeding Worms, the Worms do devour the Pith and Marrow of it, and ſo make it hollow, but meddle not with the Bark, becauſe to them it is bitter.

622. There were in ancient time, *Vines* of far greater Bodies, then we know any; for there have been Cups made of them, and an Image of *Jupiter*. But it is like they were wilde Vines; for the Vines that they uſe for Wine, are ſo

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often cut; and so much digged and dressed, that their Sap spendeth into the Grapes, and so the Stalk cannot increase much in bulk. The Wood of Vines is very durable, without rotting. And that which is strange, though no Tree hath the Twigs, while they are green, so brittle, yet the Wood dried is extream tough, and was used by the Captains of Armies amongst the *Romans* for their Cudgels.

It is reported, That in some places, Vines are suffered to grow like Herbs spreading upon the Ground, and that the Grapes of those Vines are very great. It were good to make tryal, whether Plants that use to be born up by props, will put forth greater Leaves, and greater Fruits if they be laid along the Ground; as *Hops, Ivy, Woodbine, &c.* 623.

Quinces or *Apples, &c.* if you will keep them long, drown them in *Honey*; but because *Honey* (perhaps) will give them a taste over-lushious, it were good to make tryal in Powder of Sugar, or in Syrrup of Wine onely boiled to height. Both these would likewise be tried in Orenges, Lemmons, and Pomegranates; for the Powder of Sugar, and Syrrup of Wine, will serve for times more than once. 624.

The *Conservation of Fruit* would be also tried in Vessels, filled with fine Sand, or with Powder of Chalk, or in Meal and Flower, or in Dust of Oak-wood, or in Mill. 625.

Such Fruits as you appoint for long keeping, you must gather before they be full ripe, and in a fair and dry day, towards Noon; and when the Wind bloweth not South, and when the Moon is under the Earth, and in decrease. 626.

Take Grapes, and hang them in an empty Vessel, well stopped; and set the Vessel not in a Cellar, but in some dry place, and it is said, they will last long. But it is reported by some, they will keep better in a Vessel half full of Wine, so that the Grapes touch not the Wine. 627.

It is reported, that the preserving of the Stalk, helpeth to preserve the Grape; especially, if the Stalk be put into the Pith of Elder, the Elder not touching the Fruit. 628.

It is reported by some of the *Ancients*, that Fruit put into Bottles, and the Bottles let down into Wells under water, will keep long. 629.

Of Herbs and Plants, some are good to eat Raw; as Lettuce, Endive, Purslane, Tarragon, Cresses, Cucumbers, Musk-Melons, Radish, &c. Others onely after they are boiled, or have passed the Fire; as Parsley, Clary, Sage, Parsnips, Turnips, Asparagus, Artichoaks, (though they also being young are eaten raw.) But a number of Herbs are not esculent at all; as Wormwood, Grass Green-Corn, Centory, Hyssope, Lavender, Balm, &c. The causes are, for that the Herbs that are not esculent, do want the two tastes, in which nourishment resteth; which are fat and sweet, and have (contrariwise) bitter and over-strong tastes, or a juyce so crude, as cannot be ripened to the degree of Nourishment, Herbs, and Plants, that are Esculent raw, have fatness, or sweetness (as all Esculent Fruits) such are Onions, Lettuce, &c. But then it must be such a fatness (for as for sweet things, they are in effect always esculent) as is not over-gross, as loading of the Stomack; for Parsnips and Leeks have fatness; but it is too gross and heavy without boiling. It must be also in a substance somewhat tender; for we see Wheat, Barley, Artichoaks, are no good Nourishment, till they have passed the Fire; but the Fire doth ripen, and maketh them soft and tender, and so they become esculent. As for Raddish, and Tarragon, and the like, they are for Condiments, and not for Nourishment; and even some of those Herbs, which are 630.

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not esculent, are notwithstanding poculent; as *Hops*, *Broom*, *&c.* *Quare*, what Herbs are good for Drink, besides the two aforenamed; for that it may (perhaps) ease the charge of Brewing, if they make Beer to require less Malt, or make it last longer.

631. Parts fit for the nourishment of *Man* in *Plants*, are *Seeds*, *Roots*, and *Fruits*; but chiefly *Seeds* and *Roots*. For *Leaves*, they give no nourishment at all, or very little; no more do *Flowers*, or *Blossoms*, or *Stalks*. The reason is, for that *Roots*, and *Seeds*, and *Fruits*, (in as much as all *Plants* consist of an Oyly, and Watry substance commixed) have more of the Oyly substance, and *Leaves*, *Flowers*, *&c.* of the Watry. And secondly, they are more concocted, for the *Root*, which continueth ever in the *Earth*, is still concocted by the *Earth*; and *Fruits* and *Grains* (we see) are half a year, or more in concocting; whereas *Leaves* are out, and perfect in a Moneth.

632. *Plants* (for the most part) are more strong, both in taste and smell in the *Seed*, than in the *Leaf* and *Root*. The cause is, for that in *Plants* that are not of a fierce and eager spirit, the vertue is increased by Concoction and Maturation, which is ever most in the *Seed*; but in *Plants* that are of a fierce and eager spirit, they are stronger whilest the spirit is inclosed in the *Root*; and the spirits do but weaken and dissipate, when they come to the *Air* and *Sun*; as we see in *Onions*, *Garlick*, *Dragon*, *&c.* Nay, there be *Plants* that have their *Roots* very hot and aromatical, and their *Seeds* rather insipide as *Ginger*. The cause is (as was touched before) for that the heat of those *Plants* is very dissipable; which under the *Earth* is contained and held in, but when it cometh to the Air, it exhaleth.

633. The Juyces of *Fruits*, are either Watry or Oyly. I reckon amongst the Watry, all the *Fruits*, out of which, Drink is expressed; as the *Grape*, the *Apple*, the *Peer*, the *Cherry*, the *Pomegranate*, *&c.* And there are some others, which though they be not in use for Drink, yet they appear to be of the same nature; as *Plums*, *Services*, *Mulberries*, *Raspes*, *Orenges*, *Lemmons*, *&c.* And for those Juyces that are so fleshy, as they cannot make Drink by Expression, yet (perhaps) they may make Drink by mixture of Water.

Poculaque admistis imitantur vitea Sorbis.

And it may be *Heps* and *Brier-Berries* would do the like. Those that have Oyly Juyces, are *Olives*, *Almonds*, *Nuts* of all sorts, *Pine-Apples*, *&c.* and their Juyces are all inflamable. And you must observe also, that some of the Watry Juyces, after they have gathered spirit, will burn and enflame, as *Wine*. There is a third kinde of *Fruit* that is sweet, without either sharpness or oyliness; such as is the *Fig* and the *Date*.

634. It hath been noted, that most Trees, and especially those that bear *Mast*, are fruitful but once in two years. The cause, no doubt, is the expence of Sap; for many *Orchard Trees* well cultured, will bear divers years together.

635. There is no Tree, which besides the Natural Fruit, doth bear so many Bastard Fruits as the *Oak* doth; for besides the *Acorn*, it beareth *Galls*, *Oak-Apples*, and certain *Oak-Nuts*, which are inflamable; and certain *Oak-Berries* sticking close to the Body of the Tree without Stalk. It beareth also *Misseltoe*, though rarely. The cause of all these may be, the closeness, and solidness of the Wood, and Pithe of the *Oak*; which maketh several Juyces finde several Eruptions. And therefore, if you will devise to make any *Super-Plants*, you must ever give the Sap plentiful rising, and hard issue.

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636. There are two Excreſcences which grow upon Trees, both of them in the nature of *Mushromes*; the one the *Romans* called *Boletus*, which groweth upon the Roots of Oaks, and was one of the dainties of their Table: The other is *Medicinal*, that is called *Agarick* (whereof we have ſpoken before) which groweth upon the tops of Oaks; though it be affirmed by ſome, that it groweth alſo at the Roots. I do conceive, that many Excreſcences of Trees grow chiefly, where the Tree is dead or faded; for that the Natural Sap of the Tree, corrupteth into ſome Prenatural ſubſtance.

637. The greater part of Trees bear moſt, and beſt on the lower Boughs; as *Oaks, Figs, Walnuts, Pears, &c.* But ſome bear beſt on the top Boughs; as *Crabs, &c.* Thoſe that bear beſt below, are ſuch, as ſhade doth more good to than hurt: For generally all Fruits bear beſt loweſt, becauſe the Sap itreth, not having but a ſhort way. And therefore in Fruits ſpred upon Walls, the loweſt are the greateſt, as was formely ſaid: So it is, the ſhade that hindreth the lower Boughs, except it be in ſuch Trees as delight in ſhade, or at leaſt bear it well. And therefore they are either ſtrong Trees, as the Oak, or elſe they have large Leaves, as the Walnut and Fig, or elſe they grow in *Pyramis* as the Pear. But if they require very much Sun, they bear beſt on the top; as it is Crabs, Apples, Plumbs, &c.

638. There be Trees that bear beſt when they begin to be old; as Almonds, Pears, Vines, and all Trees that give Maſt. The cauſe is, for that all Trees that bear Maſt have an oyly Fruit; and young Trees have a more watry Juyce, and leſs concocted; and of the ſame kinde alſo is the Almond. The Pear likewiſe though it be not oyly, yet it requireth much Sap, and well concocted; for we ſee it is a heavy Fruit and ſolid, much more than Apples, Plumbs, &c. As for the Vine, it is noted that it beareth more Grapes when it is young; but Grapes that make better Wine when it is old, for that the Juyce is the better concocted: And we ſee, that Wine is inflamable, ſo as it hath a kinde of oylineſs. But the moſt part of Trees, amongſt which are Apples, Plumbs, &c. bear beſt when they are young.

639. There be Plants that have a Milk in them when they are cut; as Figs, Old Lettuce, Sow-thiſtles, Spurge, &c. The cauſe may be an Inception of Putrefaction: For thoſe Milks have all an Acrimony, though one would think they ſhould be Lenitive. For if you write upon Paper with the Milk of the Fig, the Letters will not be ſeen, until you hold the Paper before the fire, and then they wax brown; which ſheweth, that it is a ſharp or fretting Juyce. Lettuce is thought poyſonous, when it is ſo old as to have Milk: Spurge is a kinde of poyſon in it ſelf; and as for Sow-thiſtles, though Coneys eat them, yet Sheep and Cattel will not touch them; and beſides, the Milk of them, rubbed upon Warts, in ſhort time weareth them away: Which ſheweth the Milk of them to be Corrowſive. We ſee alſo, that Wheat and other Corn ſown, if you take them forth of the Ground, before they ſprout, are full of Milk; and the beginning of Germination is ever a kinde of Putrefaction of the Seed. *Euphorbium* alſo hath a Milk, though not very white, which is of a great Acrimony. And *Saladine* hath a yellow Milk, which hath likewiſe much Acrimony, for it cleanſeth the Eyes; it is good alſo for Cataracts.

640. *Mushromes* are reported to grow, as well upon the Bodies of Trees as upon their Roots, or upon the Earth, and eſpecially upon the Oak. The cauſe is, for that ſtrong Trees are towards ſuch Excreſcences in the nature of Earth, and therefore put forth *Moſs, Mushromes*, and the like.

The

641. There is hardly found a *Plant* that yieldeth a red Juyce in the Blade or Ear, except it be the Tree that beareth *Sanguis Draconis*; which groweth chiefly in the Island *Soquotra*: The Herb *Aramanthus* (indeed) is red all over; and *Brasil* is red in the Wood; and so is *Red Sanders*. The Tree of *Sanguis Draconis* groweth in the form of a Sugar-Loaf; it is like the Sap of that *Plant* concocteth in the Body of the Tree. For we see, that Grapes and Pomegranates are red in the Juyce, but are Green in the Tear. And this maketh the Tree of *Sanguis Draconis* lesser towards the top, because the Juyce hasteneth not up; and besides, it is very Astringent, and therefore of slow motion.

642. It is reported, that Sweet Moss, besides that upon the Apple-trees, groweth likewise (sometimes) upon Poplars, and yet (generally) the Poplar is a smooth Tree of Bark, and hath little Moss. The Moss of the Larix-tree burneth also sweet, and sparkleth in the burning. *Quare*, of the Mosses of Odorate Trees; as *Cedar*, *Cypress*, *Lignum*, *Aloes* &c.

643. The *Death*, that is most without pain, hath been noted to be upon the taking of the Potion of *Hemlock*; which in Humanity was the form of execution of capital offenders in *Athens*. The Poyson of the *Aspe*, that *Cleopatra* used, hath some affinity with it. The cause is, for that the torments of Death are chiefly raised by the strife of the Spirits; and these Vapors quench the Spirits by degrees; like to the death of an extream old Man. I conceive it is less painful then *Opium*, because *Opium* hath parts of heat mixed.

644. There be *Fruits* that are sweet before they ripen, as *Mirabolanes*; so *Fennel-seeds* are sweet before they ripen, and after grow spicy; and some never ripen to be sweet; as *Tamarinds*, *Barberries*, *Crabs*, *Sloes*, &c. The cause is, for that the former kinde have much and subtile heat, which causeth early sweetness; the latter have a cold and acide Juyce, which no heat of the Sun can sweeten. But as for the *Mirabolane*, it hath parts of contrary natures, for it is sweet and astringent.

645. There be few Herbs that have a Salt taste; and contrariwise, all Blood of Living Creatures hath a saltness; the cause may be, for that Salt, though it be the Rudiment of Life, yet in Plants the original taste remaineth not; for you shall have them bitter, sowre, sweet, biting, but seldom salt: But in Living Creatures, all those high tastes may happen to be (sometimes) in the humors, but are seldom in the flesh, or substance; because it is of a more oyly Nature, which is not very susceptible of those tastes; and the saltness it self of Blood, is but a light and secret saltness: And even among Plants, some do participate of saltness, as *Alga Marina*, *Samphire*, *Scurvy Grass*, &c. And they report there is in some of the *Indian Seas*, a Swiming Plant, which they call *Salgazus*, spreding over the Sea, in sort, as one would think it were a Meadow. It is certain, that out of the Ashes of all Plants, they extract a Salt which they use in Medicines.

646. It is reported by one of the *Ancients*, that there is an Herb, growing in the Water, called *Lincostis*, which is full of Prickles: This Herb putteth forth another small Herb out of the Leaf, which is imputed to some moisture, that is gathered between the Prickles, which putrified by the Sun, germinateth. But I remember also, I have seen, for a great rarity, one Rose grow out of another, like Honey-Suckles, that they call Top and Top-gallants.

647. *Barley* (as appeareth in the *Malting*) being steeped in Water three days, and afterwards the Water drained from it, and the Barley turned upon a dry Floar, will sprout half an inch long, at least: And if it be let alone, and not

not turned, much more, until the heart be out. Wheat will do the same; try it also with Pease and Beans. This Experiment is not like that of the Orpin and *Semper-vive*; for there it is of the old store, for no Water is added, but here it is nourished from the Water. The Experiment would be further driven; for it appeareth already, by that which hath been said, that Earth is not necessary to the first sprouting of Plants; and we see, that Rose-Buds set in Water, will blow: Therefore try whether the Sprouts of such Grains may not be raised to a further degree, as to an Herb or Flower, with Water onely, or some small commixture of Earth: For if they will, it should seem by the Experiments before, both of the Malt, and of the Roses, that they will come far faster on in Water then in Earth; for the nourishment is easilier drawn out of Water then out of Earth. It may give some light also, that Drink infused with Flesh, as that with the Capon, &c. will nourish faster and easilier, then Meat and Drink together. Try the same Experiment with Roots, as well as with Grains. As for example, take a Turnip and steep it a while, and then dry it, and see whether it will sprout.

Malt in the Drenching will swell, and that in such a manner, as after the putting forth in sprouts, and the drying upon the Kiln, there will be gained, at least, a Bushel in eight, and yet the sprouts are rubbed off, and there will be a Bushel of Dust besides the Malt; which I suppose to be, not onely by the loose and open laying of the Parts, but by some addition of substance drawn from the Water, in which it was steeped. 648.

Malt gathereth a sweetness to the taste, which appeareth yet more in the Wort. The Dulcoration of things is worthy to be tryed to the full; for that Dulcoration importeth a degree to nourishment. And the making of things inalimental to become alimental, may be an Experiment of great profit for making new victual. 649.

Most Seeds in the growing, leave their Husk or Rind about the Root; but the Onion will carry it up, that it will be like a cap upon the top of the young Onion. The cause may be, for that the Skin or Husk is not easie to break; as we see by the pilling of Onions, what a holding substance the Skin is. 650.

Plants that have curled Leaves, do all abound with moisture; which cometh so fast on, as they cannot spred themselves plain, but must needs gather together. The weakest kinde of curling is roughness, as in Clary and Bur. The second is, curling on the sides; as in Lettuce and young Cabbage. And the third is, folding into an Head, as in Cabbage full grown, and Cabbage Lettuce. 651.

It is reported, that Firr and Pine, especially if they be old and putrefied, though they shine not as some rotten Woods do, yet in the sudden breaking they will sparkle like hard Sugar. 652.

The Roots of Trees do (some of them) put downwards deep into the Ground; as the *Oak, Pine, Firr, &c.* Some spred more towards the Surface of the Earth; as the *Ash, Cypress-tree, Olive, &c.* The cause of this latter may be, for that such Trees as love the Sun, do not willingly descend far into the Earth; and therefore they are (commonly) Trees that shoot up much; for in their Body their desire of approach to the Sun maketh them spred the less. And the same reason, under Ground, to avoid recess from the Sun, maketh them spred the more. And we see it cometh to pass in some Trees which have been planted too deep in the Ground, that for love of approach to the Sun, they forsake their first Root, and put out another more towards the top of the Earth. And we see also, that 653.

the Olive is full of Oily Juyce, and Aſh maketh the beſt Fire, and Cypreſs is an hot Tree. As for the Oak, which is of the former ſort, it loveth the Earth, and therefore groweth ſlowly. And for the Pine, and Firr likewiſe, they have ſo much heat in themſelves, as they need leſs the heat of the Sun. There be Herbs alſo, that have the ſame difference; as the Herb they call *Morſus Diaboli*, which putteth the Root down ſo low, as you cannot pull it up without breaking; which gave occaſion to the name and fable, for that it was ſaid it was ſo wholeſome a Root, *That the Devil when it was gathered, bit it for envy.* And ſome of the *Ancients* do report, that there was a goodly Firr (which they deſired to remove whole) that had a Root under ground eight cubits deep, and ſo the Root came up broken.

654. It hath been obſerved, that a Branch of a Tree being unbarked ſome ſpace at the bottom, and ſo ſet into the Ground, hath grown even of ſuch Trees, as if the Branch were ſet with the Bark on, they would not grow; yet contrariwiſe we ſee, that a Tree pared round in the Body above Ground will die. The cauſe may be, for that the unbarkt part draweth the nouriſhment beſt, but the Bark continueth it onely.

655. *Grapes* will continue freſh and moiſt all Winter long, if you hang them cluſter by cluſter in the Roof of a warm Room, eſpecially, if when you gather the cluſter, you take off with the cluſter ſome of the ſtock.

656. The Reed or Cane is a watry Plant, and groweth not but in the Water. It hath theſe properties, That it is hollow, that it is knuckled, both Stalk and Root, that being dry it is more hard and fragile then other Wood, that it putteth forth no Boughs, though many Stalks out of one Root. It differeth much in greatneſs, the ſmalleſt being fit for thatching of Houſes, and ſtopping the chinks of Ships better then Glew or Pitch. The ſecond bigneſs is uſed for Angle-rods and Staves, and in *China* for beating of offenders upon the Thighs. The differing kindes of them are, the common Reed, the *Caſſia Fiſtula*, and the *Sugar-Reed*. Of all Plants it boweth the eaſieſt, and riſeth again. It ſeemeth, that amongſt Plants which are nouriſhed with mixture of Earth and Water, it draweth moſt nouriſhment from Water; which maketh it the ſmootheſt of all others in Bark, and the holloweſt in Body.

657. The Sap of *Trees*, when they are let Blood, is of differing Natures. Some more watry and clear, as that of Vines, of Beeches, of Pears; ſome thick, as Apples; ſome Gummy, as Cherries; ſome frothy, as Elms; ſome milky, as Figs. In Mulberries, the Sap ſeemeth to be (almoſt) towards the Bark onely; for if you cut the *Tree* a little into the Bark with a Stone, it will come forth, if you pierce it deeper with a tool, it will be dry. The *Trees* which have the moiſteſt Juyces in their Fruit, have commonly the moiſteſt Sap in their Body; for the Vines and Pears are very moiſt, Apples ſomewhat more ſpongy: the Milk of the Fig hath the quality of the Rennet, to gather Cheeſe, and ſo have certain ſour Herbs wherewith they make Cheeſe in Lent.

658. The *Timber* and *Wood* are in ſome *Trees* more clean, in ſome more knotty; and it is a good tryal, to try it by ſpeaking at one end, and laying the Ear at the other: For if it be knotty, the voice will not paſs well. Some have the Veins more varied and Chamloted; as *Oak*, whereof Wainſcot is made; *Maple*, whereof *Trenchers* are made: Some more ſmooth, as *Firr* and *Walnut*; ſome do more eaſily breed Worms and Spiders; ſome more hardly, as it is ſaid of *Iriſh Trees*. Beſides, there be a number of differences

differences that concern their use: As Oak, Cedar, and Chestnut, are the best builders. Some are best for Plough-timber, as Ash; some for Peers, that are sometimes wet and sometimes dry, as Elm; some for Planchers, as Deal; some for Tables, Cupboards and Desks, as Walnuts; some for Ship-timber, as Oaks that grow in moist Grounds, for that maketh the Timber tough, and not apt to rift with Ordnance, wherein English and Irish Timber are thought to excel) some for Masts of Ships, as Firr and Pine, because of their length, straightness, and lightness; some for Pale, as Oak; some for Fuel, as Ash: And so of the rest.

659. The coming of Trees and Plants in certain Regions, and not in others, is sometimes casual; for many have been translated, and have prospered well; as *Damask Roses*, that have not been known in *England* above an hundred years, and now are so common. But the liking of Plants in certain Soyls more then in others, is meerly Natural; as the Firr and Pine love the Mountains; the Poplar, Willow, Sallow, and Alder, love Rivers and moist places; the Ash loveth Coppices, but is best in Standards alone; Juniper loveth Chalk, and so do most Fruit-trees; Sampire groweth but upon Rocks; Reeds and Osiers grow where they are washed with Winter; the Vine loveth sides of Hills turning upon the South-East Sun, &c.

660. The putting forth of certain Herbs, discovereth of what nature the Ground where they put forth is; as wilde Thyme sheweth good Feeding Ground for Cattel; Bettony and Strawberries shew Grounds fit for Wood; Camomile sheweth mellow Grounds fit for Wheat; Mustard-seed growing after the Plough, sheweth a good strong Ground also for Wheat; Burnet sheweth good Meadow, and the like.

661. There are found in divers Countreys, some other Plants that grow out of Trees and Plants, besides Misseltoe: As in *Syria* there is an Herb called *Cassytas*, that groweth out of tall Trees, and windeth it self about the same Tree where it groweth, and sometimes about Thorns. There is a kinde of Polypode that groweth out of Trees, though it windeth not. So likewise an Herb called *Faunos* upon the Wilde Olive; and an Herb called *Hippophaston* upon the Fullers Thorn, which, they say, is good for the Falling-sickness.

662. It hath been observed by some of the *Ancients*, that howsoever cold and Easterly winds are thought to be great enemies to Fruit, yet nevertheless South-winds are also found to do hurt, especially in the Blossoming time, and the more, if showers follow. It seemeth they call forth the moisture too fast. The West winds are the best. It hath been observed also, that green and open Winters do hurt Trees, insomuch, as if two or three such Winters come together, Almond-Trees, and some other Trees will die. The cause is the same with the former, because the Lust of the Earth overspendeth it self; howsoever some other of the *Ancients* have commended warm Winters.

663. *Snows* lying long cause a fruitful year. For first, they keep in the strength of the Earth: Secondly, they water the Earth better then Rain; for in Snow the Earth doth (as it were) suck the Water as out of the Teat: Thirdly, the moisture of Snow is the finest moisture, for it is the Froth of the Cloudy Waters.

664. *Showers*, if they come a little before the ripening of Fruits, do good to all succulent and moist Fruits, as *Vines*, *Olives*, *Pomegranates*; yet it is rather for plenty then for goodness, for the best Wines are in the dryest Vintages.

Small ſhowers are likewiſe good for Corn, ſo as parching heats come not upon them. Generally, Night-ſhowers are better then Day ſhowers; for that the Sun followeth not to faſt upon them: And we ſee, even in watering by the Hand, it is beſt in Summer time to water in the Evening.

665. The differences of *Earths*, and the tryals of them, are worthy to be diligently enquired. The Earth that with ſhowers doth eaſily ſoften, is commended; and yet ſome Earth of that kinde will be very dry and hard before the ſhowers. The Earth that caſteth up from the Plough a great clod, is not ſo good as that which caſteth up a ſmaller clod. The Earth that putteth forth Moſs eaſily, and may be called *Mouldy*, is not good. The Earth that ſmelleth well upon the Digging, or Ploughing, is commended; as containing the Juyce of Vegetables almoſt already prepared. It is thought by ſome, that the ends of low Rain-bows fall more upon one kinde of Earth then upon another: As it may well be, for that Earth is moſt roſcide; and therefore it is commended for a ſign of a good Earth. The poorneſs of the Herbs (it is plain) ſheweth the poorneſs of the Earth, and eſpecially, if they be in colour more dark: But if the Herbs ſhew withered or blaſted at the top, it ſheweth the Earth to be very cold; and ſo doth the Moſſineſs of Trees. The Earth whereof the Graſs is ſoon parched with the Sun and toaſted, is commonly forced Earth, and barren in his own nature. The tender, cheſſom, and mellow Earth is the beſt; being meer Mould, between the two extreams of Clay and Sand, eſpecially, if it be not Loamy and Binding. The Earth that after Rain will ſcarce be Ploughed, is commonly fruitful; for it is cleaving, and full of Juyce.

666. It is ſtrange, which is obſerved by ſome of the *Ancients*, that Duſt helpeth the fruitfulneſs of Trees, and of Vines by name; inſomuch, as they caſt Duſt upon them of purpoſe. It ſhould ſeem that that powdring, when a ſhower cometh, maketh a kinde of ſoyling to the Tree, being Earth and Water finely laid on. And they note, that Countreys where the Fields and Ways are duſty, bear the beſt Vines.

667. It is commended by the *Ancients* for an excellent help to Trees, to lay the Stalks and Leaves of *Lupines* about the Roots, or to Plough them into the Ground, where you will ſow Corn. The burning alſo of the cuttings of Vines, and caſting them upon Land, doth much good. And it was generally received of old, that dunging of Grounds when the Weſt-wind bloweth, and in the decreaſe of the Moon, doth greatly help; the Earth (as it ſeemeth) being then more thirſty, and open to receive the Dung.

668. The Graffing of Vines upon Vines (as I take it) is not now in uſe. The *Ancients* had it, and that three ways; the firſt was *Inſition*, which is the ordinary manner of Graffing: The ſecond was *Terebration*, through the middle of the Stock, and putting in the Cions there: And the third was Paring of two Vines that grow together to the Marrow, and binding them cloſe.

669. The Diſeaſes and ill Accidents of Corn, are worthy to be enquired, and would be more worthy to be enquired, if it were in Mens power to help them; whereas many of them are not to be remedied. The Mildew is one of the greateſt; which (out of queſtion) cometh by cloſeneſs of Air; and therefore in Hills, or large Champain Grounds, it ſeldom cometh, ſuch as is with us *York*'s Woald. This cannot be remedied, otherwiſe then that in Countreys of ſmall encloſure the Grounds be turned into larger Fields: Which I have known to do good in ſome Farms.

Another

Another Diſeaſe is the putting forth of Wilde Oats, whereinto Corn oftentimes (eſpecially Barley) doth degenerate. It hapneth chiefly from the weakneſs of the Grain that is ſown; for if it be either too old or mouldy, it will bring forth wilde Oats. Another diſeaſe is the ſatiety of the Ground; for if you ſow one Ground ſtill with the ſame Corn (I mean not the ſame Corn that grew upon the ſame Ground, but the ſame kinde of Grain, as Wheat, Barley, &c.) it will proſper but poorly; therefore beſides the reſting of the Ground, you muſt vary the Seed. Another ill Accident is from the Winds, which hurt at two times; at the flowring by ſhaking off the Flowers, and at the full ripening by ſhaking out the Corn. Another ill Accident is Drought at the ſpindling of the Corn, which with us is rare, but in hotter Countreys common, inſomuch as the word *Calamitas* was firſt derived from *Calamus*, when the Corn could not get out of the ſtalk. Another ill Accident is Over-wet at ſowing time, which with us breedeth much Dearth, inſomuch as the Corn never cometh up; and (many times) they are forced to re-ſow Summer-Corn, where they ſowed Winter-Corn. Another ill Accident is bitter Froſts, continued without Snow, eſpecially in the beginning of the Winter, after the Seed is new ſown. Another Diſeaſe is Worms, which ſometimes breed in the Root, and happen upon hot Suns and ſhowers immediately after the ſowing; and another Worm breedeth in the Ear it ſelf, eſpecially when hot Suns break often out of Clouds. Another Diſeaſe is Weeds; and they are ſuch, as either choak and over-ſhadow the Corn, and bear it down, or ſtarve the Corn, and deceive it of nouriſhment. Another Diſeaſe is, over-rankneſs of the Corn, which they uſe to remedy by Mowing it after it is come up, or putting Sheep into it. Another ill Accident is, laying of Corn with great Rains near or in Harveſt. Another ill Accident is, if the Seed happen to have touched Oyl, or any thing that is fat; for thoſe ſubſtances have an antipathy with nouriſhment of Water.

The remedies of the Diſeaſes of Corn have been obſerved as followeth. 670.
The Steeping of the Grain before Sowing, a little time in Wine, is thought a preſervative; the Mingling of Seed-Corn with Aſhes, is thought to be good; the Sowing at the wane of the Moon, is thought to make the Corn ſound. It hath not been practiſed, but it is thought to be of uſe to make ſome Miſſellane in Corn; as if you ſow a few Beans with Wheat, your Wheat will be the better. It hath been obſerved, that the ſowing of Corn with Houſleek doth good. Though Grain that toucheth Oyl or Fat receiveth hurt; yet the ſteeping of it in the Dregs of Oyl, when it beginneth to putrefie, (which they call *Amurca*) is thought to aſſure it againſt Worms. It is reported alſo, that if Corn be moved, it will make the Grain longer, but emptier, and having more of the Husk.

It hath been noted, that Seed of a year old is the beſt, and of two or 671.
three years is worſe; and that which is more old is quite barren, though (no doubt) ſome Seed and Grain laſt better then others. The Corn which in the Vanning lieth loweſt is the beſt; and the Corn which broken or bitten, retaineth a little yellowneſs, is better then that which is very white.

It hath been obſerved, that of all Roots of Herbs, the Root of Sorrel 672.
goeth the furtheſt into the Earth, inſomuch as it hath been known to go three cubits deep; and that it is the Root that continueth fit (longeſt) to be ſet again, of any Root that groweth. It is a cold and acide Herb, that (as it ſeemeth) loveth the Earth, and is not much drawn by the Sun.

673. It hath been observed, that some Herbs like best being watered with Salt-water; as *Radish*, *Beet*, *Rue*, *Penny royal*. This tryal would be extended to some other Herbs; especially such as are strong, as *Tarragon*, *Mustard-seed*, *Rocket*, and the like.

674. It is strange, that it is generally received, how some poysonous Beasts affect odorate and wholsome Herbs; as, that the *Snake* loveth Fennel, that the *Toad* will be much under Sage, that *Frogs* will be in Cinquefoil. It may be it is rather the Shade, or other Coverture, that they take liking in, then the virtue of the Herb.

675. It were a matter of great profit, (save that I doubt it is too conjectural to venture upon) if one could discern what Corn, Herbs, or Fruits, are like to be in Plenty or Scarcity, by some Signs and Prognosticks in the beginning of the year: For as for those that are like to be in *Plenty*, they may be bargained for upon the Ground; as the old relation was of *Thales*, who to shew how easie it was for a Philosopher to be rich, when he foretaw a great plenty of Olives, made a Monopoly of them. And for *Scarcity*, Men may make profit in keeping better the old store. Long continuance of Snow is believed to make a fruitful year of Corn; an early Winter, or a very late Winter, a barren year of Corn; an open and serene Winter, an ill year of Fruit. These we have partly touched before; but other Prognosticks of like nature are diligently to be enquired.

676. There seem to be in some Plants singularities, wherein they differ from all other. The Olive hath the oyly part onely on the outside, whereas all other Fruits have it in the Nut or Kernel. The Firr hath (in effect) no Stone, Nut, nor Kernel; except you will count the little Grains, Kernels. The Pomegranate and Pine-Apple have onely, amongst Fruits, Grains, distinct in several Cells. No Herbs have curled Leaves, but Cabbage and Cabbage-Lettuce. None have double Leaves, one belonging to the Stalk, another to the Fruit or Seed, but the Artichoak. No Flower hath that kinde of spred that the Wood-bine hath. This may be a large Field of Contemplation; for it sheweth, that in the Frame of Nature there is, in the producing of some Species, a composition of Matter, which hapneth oft, and may be much diversified; in others, such as hapneth rarely, and admitteth little variety. For so it is likewise in Beasts; Dogs have a resemblance with Wolves and Foxes, Horses with Asses, Kine with Buffles, Hares with Coneys, &c. And so in Birds; Kites and Kestrels have a resemblance with Hawks; Common Doves with Ring-Doves and Turtles; Black-Birds with Thrushes and Mavisses; Crows with Ravens, Daws, and Choughs, &c. But Elephants and Swine amongst Beasts, and the Bird of Paradise, and the Peacock amongst Birds, and some few others, have scarce any other Species that have affinity with them.

We leave the Description of *Plants* and their Virtues to *Herbals*, and other like Books of *Natural History*, wherein Mens diligence hath been great, even to Curiosity. For our *Experiments* are onely such, as do ever ascend a degree to the deriving of Causes, and extracting of Axioms, which we are not ignorant, but that some, both of the *Ancient* and *Modern Writers* have also labored; but their Causes and Axioms are so full of Imagination, and so infected with the old received *Theories*, as they are meer Inquinations of Experience, and concoct it not.

It

677 Experiment Solitary, touching *Healing of Wounds.*

IT hath been observed by some of the *Ancients*, that Skins, especially of *Rams* newly pulled off, aed applied to the Wounds of Stripes, do keep them from swelling and exulcerating, and likewise heal them, and close them up; and that the Whites of Eggs do the same. The cause is, a temperate Conglutination; for both Bodies are clammy and viscous, and do bridle the Deflux of Humors to the hurts, without penning them in too much.

678. Experiment Solitary, touching *Fat diffused in Flesh.*

YOu may turn (almost) all Flesh into a fatty substance, if you take Flesh and cut it into pieces, and put the pieces into a Glass covered with Parchment, and so let the Glass stand six or seven hours in boyling Water. It may be an experiment of profit, for making of Fat or Grease for many uses: But then it must be of such Flesh as is not edible; as *Horses, Dogs, Bears, Foxes, Badgers, &c.*

679. Experiment Solitary, touching *Ripening of Drink before the time.*

IT is reported by one of the *Ancients*, that new Wine put into Vessels well stopped, and the Vessels let down into the Sea, will accelerate very much the making of them ripe and potable; the same would be tryed in Wort.

680. Experiment Solitary, touching *Pilosity and Plumage.*

BEasts are more Hairy then Men; and Savage Men more then Civil; and the Plumage of Birds exceedeth the Pilosity of Beasts. The cause of the smoothness in Men, is not any abundance of Heat and Moisture, though that indeed causeth Pilosity; but there is requisite to Pilosity, not so much Heat and Moisture, as Excrementitious Heat and Moisture; (for whatsoever assimilateth goeth not into the Hair) and Excrementitious Moisture aboundeth most in Beasts, and Men that are more savage. Much the same Reason is there of the Plumage of Birds; for Birds assimilate less, and excern more then Beasts, for their Excrements are ever aliquid, and their Flesh (generally) more dry; beside, they have not Instruments for Urine, and so all the Excrementitious Moisture goeth into the Feathers: And therefore it is no marvel though Birds be commonly better Meat then Beasts, because their flesh doth assimilate more finely, and se-cerneth more subtilly. Again, the Head of Man hath Hair upon the first Birth, which no other part of the Body hath. The cause may be want of Perspiration; for much of the matter of Hair, in the other parts of the Body goeth forth by insensible Perspiration. And besides, the Skull being of a more solid substance, nourisheth and assimilateth less, and excerneth more; and so likewise doth the Chin. We see also that Hair cometh not upon the Palms of the Hands, nor Soals of the Feet, which are parts more perspirable. And Children likewise are not Hairy, for that their Skins are more perspirable.

681. Experiment Solitary, touching the *Quickness of Motion in Birds.*

BIrds are of swifter motion then Beasts; for the flight of many Birds is swifter then the race of any Beasts. The cause is, for that the Spirits in Birds are in greater proportion, in comparison of the bulk of their Body, then in Beasts. For as for the reason that some give, that they are partly carried, whereas Beasts go, that is nothing; for by that reason, swimming should be swifter then running: And that kinde of carriage also, is not without labor of the Wing.

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682. Experiment Solitary, touching the *Different clearneſs of the Sea.*

THe *Sea* is clearer when the North-wind bloweth, then when the South-wind. The cauſe is, for that *Salt-water* hath a little Oylineſs in the Surface thereof, as appeareth in very hot days: And again, for that the Southern-wind relaxeth the Water ſomewhat; as no Water boyling, is ſo clear as cold Water.

683. Experiment Solitary, touching the *Different Heats of Fire and Boiling Water.*

FIre burneth *Wood*, making it firſt Luminous, then black and brittle, and laſtly, broken and incinerate; ſcalding Water doth none of theſe. The cauſe is, for that by Fire the Spirit of the Body is firſt refined, and then emitted; whereof the refining or attenuation cauſeth the light, and the emiſſion; firſt the fragility, and after the diſſolution into Aſhes, neither doth any other Body enter. But in Water, the Spirit of the Body is not refined ſo much; and beſides, part of the Water entreth, which doth increaſe the Spirit, and in a degree extinguiſh it; therefore we ſee that hot Water will quench Fire. And again, we ſee that in Bodies wherein the Water doth not much enter, but onely the heat paſſeth, hot Water worketh the effects of Fire: As in Eggs boiled and roaſted, (into which the Water entreth not at all) there is ſcarce difference to be diſcerned; but in Fruit and Fleſh, whereinto the Water entreth in ſome part, there is much more difference.

684. Experiment Solitary, touching the *Qualification of Heat by Moiſture.*

THe bottom of a Veſſel of boyling Water (as hath been obſerved) is not very much heated, ſo as men may put their hand under the Veſſel, and remove it. The cauſe is, for that the moiſture of Water, as it quencheth Coals where it entreth, ſo it doth allay heat where it toucheth. And therefore note well, that moiſture, although it doth not paſs through Bodies without Communication of ſome ſubſtance (as heat and cold do) yet it worketh manifeſt effects; not by entrance of the Body, but by qualifying of the heat and cold, as we ſee in this inſtance. And we ſee likewiſe, that the water of things diſtilled in water, (which they call the *Bath*) differeth not much from the water of things diſtilled by Fire. We ſee alſo, that Pewter-Diſhes with Water in them will not melt eaſily, but without it they will. Nay, we ſee more, that Butter or Oyl, which in themſelves are inflamable, yet by the virtue of their moiſture will do the like.

685. Experiment Solitary, touching *Yawning.*

IT hath been noted by the *Ancients*, that it is dangerous to pick ones Ear whileſt he Yawneth. The cauſe is, for that in Yawning, the inner Parchment of the Ear is extended by the drawing in of the Spirit and Breath; for in Yawning and Sighing both, the Spirit is firſt ſtrongly drawn in, and then ſtrongly expelled.

686. Experiment Solitary, touching the *Hiccough.*

IT hath been obſerved by the *Ancients*, that Sneezing doth ceaſe the Hiccough. The cauſe is, for that the Motion of the Hiccough is a lifting up of the Stomach; which Sneezing doth ſomewhat depreſs, and divert the motion another way. For firſt, we ſee that the Hiccough cometh of fulneſs of Meat, (eſpecially in Children) which cauſeth an extenſion of the Stomach: We ſee alſo, it is cauſed by acide Meats or Drinks, which is by the pricking of the Stomach. And this motion is ceaſed, either by Diverſion, or by Detention of the Spirits: Diverſion, as in Sneezing; Detention, as we ſee holding of the Breath doth help ſomewhat to ceaſe the Hiccough, and putting a Man into an earneſt ſtudy doth the like, as is commonly uſed: And Vinegar put to the Noſtrils or Gargarized doth it alſo; for that it is Aſtringent, and inhibiteth the motion of the Spirit.

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LOoking against the Sun doth induce Sneezing. The cause is, not the heating of the Nostrils; for then the holding up of the Nostrils against the Sun, though one wink, would do it, but the drawing down of the moisture of the Brain: For it will make the Eyes run with water, and the drawing of moisture to the Eyes, doth draw it to the Nostrils by Motion of Consent, and so followeth Sneezing. As contrariwise, the Tickling of the Nostrils within doth draw the moisture to the Nostrils, and to the Eyes by consent, for they also will water. But yet it hath been observed, that if one be about to sneeze, the rubbing of the Eyes till they run with water, will prevent it. Whereof the cause is, for that the humor which was descending to the Nostrils, is diverted to the Eyes.

687. Experiment Solitary, touching *Sneezing*.

THe Teeth are more by cold drink, or the like, affected, then the other parts. The cause is double; the one, for that the resistance of Bone to cold, is greater then of Flesh; for that the Flesh shrinketh, but the Bone resisteth, whereby the Cold becometh more eager. The other is, for that the Teeth are parts without Blood, whereas Blood helpeth to qualifie the cold. And therefore we see, that the Sinews are much affected with Cold, for that they are parts without Blood. So the Bones in sharp Colds wax brittle; and therefore it hath been seen, that all contusions of Bones in hard weather, are more difficult to cure.

688 Experiment Solitary, touching *Tenderness of the Teeth*.

IT hath been noted, that the Tongue receiveth more easily tokens of Diseases then the other parts; as of heats within, which appear most in the blackness of the Tongue. Again, Pied Cattel are spotted in their Tongues, &c. The cause is (no doubt) the tenderness of the part, which thereby receiveth more easily all alterations then any other parts of the Flesh.

689. Experiment Solitary, touching the *Tongue*.

WHen the Mouth is out of taste, it maketh things taste sometimes salt, chiefly bitter, and sometimes loathsome, but never sweet. The cause is, the corrupting of the moisture about the Tongue, which many times turneth bitter, and salt, and loathsome, but sweet never; for the rest are degrees of corruption.

690. Experiment Solitary, touching the *Taste*.

IT was observed in the *Great Plague* of the last year, that there were seen in divers Ditches, and low Grounds about *London*, many Toads that had Tails two or three inches long at the least, whereas Toads (usually) have no Tails at all; which argueth a great disposition to putrefaction in the Soil and Air. It is reported likewise, that Roots (such as *Carrots* and *Parsnips*) are more sweet and luscious in infectious years then in other years.

691. Experiment Solitary, touching *Some Prognostiks of Pestilential Seasons*.

WIse *Physicians* should with all diligence inquire what Simples Nature yieldeth, that have extream subtile parts without any Mordication or Acrimony; for they undermine that which is hard, they open that which is stopped and shut, and they expel that which is offensive gently; without too much perturbation. Of this kinde are *Elder-flowers*, which therefore are proper for the Stone; of this kinde is the *Dwarf-pine*, which is proper for the Jaundies; of this kinde is *Harts-horn*, which is proper for Agues and Infections; of this kinde is *Piony*, which is proper for Stoppings in the Head; of this kinde is *Fumitory* which is proper for the Spleen; and

692. Experiment Solitary, touching *Special Simples for Medicines*.

and a number of others. Generally, divers Creatures bred of Putrefaction, though they be somewhat loathsome to take, are of this kinde; as *Earth-worms*, *Timber-sows*, *Snails*, *&c.* And I conceive, that the *Trochiscs* of *Vipers*, (which are so much magnified) and the flesh of Snakes some ways condited and corrected (which of late are grown into some credit) are of the same nature. So the parts of Beasts putrefied (as *Castoreum* and *Musk*, which have extream subtil parts) are to be placed amongst them. We see also, that putrefaction of Plants (as *Agarick* and *Jews-Ear*) are of greatest vertue. The cause is, for that putrefaction is the subtilest of all motions in the parts of Bodies, And since we cannot take down the lives of Living Creatures (which some of the *Paracelsians* say, if they could be taken down, would make us Immortal;) the next is, for subtilty of operation to take Bodies putrefied, such as may be safely taken.

693. Experiments in Consort, touching *Venus*.

IT hath been observed by the *Ancients*, that much use of *Venus* doth dim the sight, and yet *Eunuchs*, which are unable to generate, are (nevertheless) also dim-sighted. The cause of dimness of sight in the former, is the expence of Spirits; in the latter, the over-moisture of the Brain; for the over-moisture of the Brain doth thicken the Spirits visual, and obstructeth their passages, as we see by the decay in the sight in Age, where also the diminution of the Spirits concurreth as another cause. We see also, that blindness cometh by Rheums and Cataracts Now in *Eunuchs* there are all the notes of moisture; as the swelling of their Thighs, the looseness of their Belly, the smoothness of their skin, &c.

694. The pleasure in the Act of *Venus*, is the greatest of the pleasures of the Senses; the matching of it with Itch is improper, though that also be pleasing to the touch, but the causes are profound. First, all the Organs of the Senses qualifie the motions of the Spirits, and make so many several species of motions, and pleasures or displeasures thereupon, as there be diversities of Organs. The Instruments of *Sight*, *Hearing*, *Taste*, and *Smell*, are of several frame, and so are the parts for Generation; therefore *Scaliger* doth well to make the pleasure of Generation a *sixth Sense*. And if there were any other differing Organs, and qualified Perforations for the Spirits to pass, there would be more then the *Five Senses*: Neither do we well know, whether some Beasts and Birds have not *Senses* that we know not, and the very Sent of Dogs is almost a sense by it self. Secondly, the Pleasures of the Touch are greater and deeper then those of the other *Senses*, as we see in *Warming* upon *Cold*, or *Refrigeration* upon *Heat*: For as the Pains of the Touch are greater then the offences of other Senses, so likewise are the Pleasures. It is true, that the affecting of the Spirits immediately, and (as it were) without an Organ, is of the greatest pleasure; which is but in two things, *Sweet smells* and *Wine*, and the like *Sweet vapors*. For Smells, we see their great and sudden effect in fetching Men again when they swown; for Drink, it is certain, that the pleasure of Drunkenness is next the pleasure of *Venus*; and great Joyes (likewise) make the Spirits move and touch themselves; and the pleasure of *Venus* is somewhat of the same kinde.

695. It hath been always observed, that Men are more inclined to *Venus* in the Winter, and Women in the Summer. The cause is, for that the Spirits in a Body more hot and dry, (as the Spirits of Men are) by the Summer are more exhaled and dissipated, and in the Winter more condensed and kept entire; but in Bodies that are cold and moist, (as Womens are) the Summer doth

doth cheriſh the Spirits, and calleth them forth, the Winter doth dull them. Furthermore, the Abſtinence or Intermiſſion of the uſe of *Venus*, in moiſt and well habituate Bodies, breedeth a number of Diſeaſes; and eſpecially dangerous impoſthumations. The reaſon is evident, for that it is a principal evacuation, eſpecially of the Spirits; for of the Spirits, there is ſcarce any evacuation, but in *Venus* and exerciſe. And therefore the omiſſion of either of them breedeth all diſeaſes of Repletion.

Experiments in Conſort, touching the *Inſecta*.

THe nature of Vivification is very worthy the enquiry; and as the Nature of things is commonly better perceived in ſmall then in great, and in unperfect then in perfect, and in parts then in whole; ſo the Nature of Vivification is beſt enquired in Creatures bred of Putrefaction. The contemplation whereof hath many excellent Fruits. Firſt, in diſcloſing the original of Vivification. Secondly, in diſcloſing the original of Figuration. Thirdly, in diſcloſing many things in the nature of perfect Creatures, which in them lie more hidden. And fourthly, in traducing by way of operation, ſome obſervations in the *Inſecta*, to work effects upon perfect Creatures. Note, that the word *Inſecta* agreeth not with the matter, but we ever uſe it for brevities ſake, intending by it Creatures bred of Putrefaction.

696. The *Inſecta* are found to breed out of ſeveral matters: Some breed of Mud or Dung; as the *Earth-worms*, *Eels*, *Snakes*, *&c.* For they are both Putrefactions: For Water in Mud do putrefie, as not able to preſerve it ſelf; and for Dung, all Excrements are the refuſe and putrefactions of nouriſhment. Some breed in Wood, both growing and cut down. *Quære*, in what Woods moſt, and at what ſeaſons. We ſee that the Worms with many feet, which round themſelves into Balls, are bred chiefly under Logs of *Timber*, but not in the *Timber*, and they are ſaid to be found alſo (many times) in Gardens where no Logs are. But it ſeemeth their Generation requireth a coverture both from Sun, and Rain or Dew, as the *Timber* is; and therefore they are not venemous, but (contrariwiſe) are held by the Phyſitians to clarifie the Blood. It is obſerved, that *Cimices* are found in the holes of Bed-ſides. Some breed in the Hair of Living Creatures; as *Lice* and *Tikes*, which are bred by the ſweat cloſe kept, and ſomewhat airified by the Hair. The Excrements of Living Creatures do not onely breed *Inſecta* when they are excerned, but alſo while they are in the Body; as in Worms, whereto Children are moſt ſubject, and are chiefly in the Guts. And it hath been lately obſerved by Phyſitians, that in many *Peſtilent Diſeaſes* there are Worms found in the upper parts of the Body, where Excrements are not, but onely humors putrefied. *Fleas* breed principally of Straw or Mats, where there hath been a little moiſture, or the Chamber and Bed-ſtraw kept cloſe, and not aired. It is received, that they are killed by ſtrewing Wormwood in the Rooms. And it is truly obſerved, that bitter things are apt rather to kill then engender Putrefaction, and they be things that are fat or ſweet that are apteſt to putrefie. There is a Worm that breedeth in Meal of the ſhape of a large white Maggot, which is given as a great dainty to Nightingales. The Moth breedeth upon Cloth, and other Lanifices, eſpecially if they be laid up dankiſh and wet. It delighteth to be about the flame of a Candle. There is a Worm called a *Wevil*, bred under Ground, and that feedeth upon Roots, as Parſnips, Carrots, &c. Some breed in Waters, eſpecially ſhaded, but they muſt be by ſtanding Waters; as the Water-Spider that hath ſix Legs. The Fly called the *Gad flie* breedeth of ſomewhat that ſwimeth upon the top of the Water, and

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is most about Ponds. There is a Worm that breedeth of the Dregs of Wine decayed, which afterwards (as is observed by some of the *Ancients*) turneth into a *Gnat*. It hath been observed by the *Ancients*, that there is a Worm that breedeth in old Snow, and is of colour reddish, and dull of motion, and dieth soon after it cometh out of Snow; which should shew that Snow hath in it a secret warmth, for else it could hardly vivifie. And the reason of the dying of the Worm may be the sudden exhaling of that little Spirit, as soon as it cometh out of the cold, which had shut it in. For as Butter-flies quicken with heat, which were benummed with cold; so Spirits may exhale with heat, which were preserved in cold. It is affirmed, both by the *Ancient* and *Modern* observation, that in Furnaces of Copper and Brass, where Chalcites is (which is Vitriol) often cast in to mend the working, there riseth suddenly a Fly which sometimes moveth, as if it took hold on the Walls of the Furnace; sometimes is seen moving in the fire below, and dieth presently as soon as it is out of the Furnace. Which is a noble instance, and worthy to be weighed; for it sheweth that as well violent heat of fire, as the gentle heat of Living Creatures will vivifie, if it have matter proportionable. Now the great axiom of Vivification is, that there must be heat to dilate the Spirit of the Body, an Active Spirit to be dilated, matter viscous or tenacious to hold in the Spirit, and that matter to be put forth and figured. Now a Spirit dilated by so ardent a fire as that of the Furnace, as soon as ever it cooleth never so little, congealeth presently. And (no doubt) this action is furthered by the Chalcites, which hath a Spirit that will put forth and germinate, as we see in Chymical Tryals. Briefly, most things putrefied bring forth *Insecta* of several names, but we will not take upon us now to enumerate them all.

697. The *Insecta* have been noted by the Ancients to feed little: But this hath not been diligently observed; for Grashoppers eat up the Green of whole Countreys, and Silk-worms devour Leaves swiftly, and Ants make great provision. It is true, that Creatures that sleep and rest much, eat little, as Dormice and Bats, &c. they are all without Blood; which may be, for that the Juyce of their Bodies is almost all one; not Blood, and Flesh, and Skin, and Bone, as in perfect Creatures: The integral parts have extream variety, but the similar parts little. It is true, that they have (some of them) Diaphragm, and an Intestine; and they have all Skins, which in most of the *Insecta*, are cast often. They are not (generally) of long life; yet Bees have been known to live seven years; and Snakes are thought, the rather for the casting of their spoil, to live till they be old; and Eels, which many times breed of putrefaction, will live and grow very long; and those that enterchange from Worms to Flies in the Summer, and from Flies to Worms in the Winter, have been kept in Boxes four years at the least; yet there are certain Flies that are called *Ephemera* that live but a day. The cause is, the exility of the Spirit, or perhaps the absence of the Sun; for that if they were brought in, or kept close, they might live longer. Many of the *Insecta* (as Butter-flies and other Flies) revive easily, when they seem dead, being brought to the Sun or Fire. The cause whereof is, the diffusion of the Vital Spirit, and the easie dilating of it by a little heat. They stir a good while after their heads are off, or that they be cut in pieces; which is caused also, for that their Vital Spirits are more diffused throughout all their parts, and less confined to Organs then in perfect Creatures.

698. The *Insecta* have voluntary Motion, and therefore imagination. And whereas some of the *Ancients* have said, that their Motion is indeterminate, and their imagination indefinite, it is negligently observed; for Ants go right forwards.

forwards to their Hills; and *Bees* do (admirably) know the way from a Floury Heath, two or three miles off to their Hives. It may be *Gnats* and *Flies* have their Imagination more mutable and giddy, as ſmall *Birds* likewiſe have. It is ſaid by ſome of the Ancients, that they have onely the *Senſe of Feeling*, which is manifeſtly untrue; for if they go forth right to a place, they muſt needs have *Sight:* Beſides, they delight more in one Flower or Herb, then in another, and therefore have taſte. And *Bees* are called with ſound upon Braſs, and therefore they have hearing. Which ſheweth likewiſe, that though their Spirits be diffuſed, yet there is a Seat of their Senſes in their Head.

Other obſervations concerning the Inſecta, *together with the Enumeration of them, we refer to that place where we mean to handle the Title of* Animals *in general.*

699. Experiment Solitary, touching *Leaping.*

A Man leapeth better with weights in his hands, then without. The cauſe is, for that the weight (if it be proportionable) ſtrengthneth the Sinews, by contracting them; for otherwiſe, where no contraction is needful, weight hindreth. As we ſee in *Horſe Races*, Men are curious to foreſee that there be not the leaſt weight upon the one Horſe more then upon the other. In Leaping with Weights, the Arms are firſt caſt backwards, and then forwards, with ſo much the greater force; for the hands go backward before they take their raiſe. *Quære*, if the contrary motion of the Spirits, immediately before the Motion we intend, doth not cauſe the Spirits as it were to break forth with more force; as Breath alſo drawn, and kept in, cometh forth more forcibly: And in caſting of any thing, the Arms, to make a greater ſwing, are firſt caſt backward.

700. Experiment Solitary, touching the *Pleaſures and Diſpleaſures of the Senſes, eſpecially of Hearing.*

OF *Muſical Tones* and unequal *Sounds*, we have ſpoken before, but touch the pleaſure and diſpleaſure of the Senſes not ſo fully. Harſh *Sounds*, as of a *Saw* when it is ſharpned, Grinding of one Stone againſt another, ſqueaking or ſcrieching noiſes, make a ſhivering or horror in the Body, and ſet the Teeth on edge. The cauſe is, for that the objects of the Ear do affect the Spirits (immediately) moſt with pleaſure and offence. We ſee there is no colour that affecteth the Eye much with diſpleaſure. There be ſights that are horrible, becauſe they excite the memory of things that are odious or fearful; but the ſame things painted, do little affect. As for *Smells*, *Taſtes*, and *Touches*, they be things that do affect by a Participation or Impulſion of the body of the Object. So it is *Sound* alone that doth immediately and incorporeally affect moſt. This is moſt manifeſt in *Muſick*, and *Concords*, and *Diſcords* in *Muſick:* For all *Sounds*, whether they be ſharp or flat, if they be ſweet, have a roundneſs and equality; and if they be harſh, are unequal: For a *Diſcord* it ſelf, is but a harſhneſs of divers ſounds meeting. It is true, that inequality, not ſtaid upon, but paſſing, is rather an increaſe of ſweetneſs; as in the Purling of a Wreathed String, and in the raucity of a *Trumpet*, and in the *Nightingale-Pipe* of a *Regal*; and in a *Diſcord* ſtraight falling upon a *Concord:* But if you ſtay upon it, it is offenſive. And therefore there be theſe three degrees of pleaſing and diſpleaſing in Sounds: *Sweet ſounds*, *Diſcords*, and *Harſh ſounds*, which we call by divers names, as *Scrieching*, or *Grating*, ſuch as we now ſpeak of. As for the ſetting of the Teeth on edge, we plainly ſee what an intercourſe there is between the Teeth, and the Organ of the Hearing, by the taking of the end of a Bow between the Teeth, and ſtriking upon the String.

NATURAL HISTORY.

Century VIII.

THere be *Minerals* and *Foßiles* in great variety, but of *Veins* of *Earth Medicinal* but few. The chief are, *Terra Lemnia*, *Terra Sigillata communis*, and *Bolus Arminus*; whereof *Terra Lemnia* is the chief. The Vertues of them are for Curing of *Wounds*, Stanching of *Blood*, Stopping of *Fluxes* and *Rheums*, and Arresting the Spreding of *Poyson*, *Infection*, and *Putrefaction*: And they have of all other *Simples* the perfectest and purest quality of *Drying*, with little or no mixture of any other quality. Yet it is true, that the *Bole Arminick* is the most cold of them, and that *Terra Lemnia* is the most hot; for which cause the Island *Lemnos* where it is digged, was in the old *Fabulous Ages* consecrated to *Vulcan*.

701. Experiment Solitary, touching *Veins of Medicinal Earth.*

ABout the Bottom of the *Sereights* are gathered great quantities of *Sponges*, which are gathered from the sides of *Rocks*, being as it were a large, but tough *Moss*. It is the more to be noted, because that there be but few Substances, Plant-like, that grow deep within the Sea, for they are gathered sometime Fifteen fathom deep: And when they are laid on Shore, they seem to be of great Bulk; but crushed together, will be transported in a very small room.

702. Experiment Solitary, touching the *Growth of Sponges.*

IT seemeth that *Fish* that are used to the Salt-water, do nevertheless delight more in fresh. We see that *Salmons* and *Smelts* love to get into Rivers, though it be against the Stream. At the Haven of *Constantinople* you shall have great quantities of *Fish* that come from the *Euxine Sea*, that when they come into the Fresh-water, do inebriate and turn up their Bellies, so as you may take them with your hand. I doubt there hath not been sufficient Ex-

703. Experiment Solitary, touching *Sea-Fish put in Fresh waters.*

periment made of putting *Sea fish* into Fresh-water, Ponds, and Pools. It is a thing of great use and pleasure; for so you may have them new at some good distance from the Sea: And besides, it may be the Fish will eat the pleasanter, and may fall to breed. And it is said, that *Coltheſter* Oysters, which are put into Pits, where the Sea goeth and cometh, (but yet so that there is a Fresh-water coming also to them when the Sea voideth) become by that means fatter, and more grown.

704. Experiment Solitary, touching *Attraction by Similitude of Substance.*

THe *Turkish Bow* giveth a very forcible Shoot, insomuch as it hath been known, that the *Arrow* hath pierced a Steel Target, or a piece of Brass of two Inches thick: But that which is more strange, the *Arrow*, if it be headed with Wood, hath been known to pierce through a piece of Wood of eight Inches thick. And it is certain, that we had in use at one time, for Sea-fight, short *Arrows*, which they called *Sprights*, without any other Heads, save Wood sharpned; which were discharged out of Muskets, and would pierce through the sides of Ships, where a Bullet would not pierce. But this dependeth upon one of the greatest secrets in all Nature; which is, that *Similitude* of *Substance* will cause Attraction, where the Body is wholly freed from the Motion of Gravity: For if that were taken away, *Lead* would draw *Lead*, and *Gold* would draw *Gold*, and *Iron* would draw *Iron* without the help of the *Load-stone*. But this same Motion of Weight or Gravity (which is a meer Motion of Matter, and hath no affinity with the Form or Kinde) doth kill the other Motion, except it self be killed by a violent Motion; and in these instances of Arrows, for then the Motion of Attraction by Similitude of Substance beginneth to shew it self. But we shall handle this point of *Nature* fully in due place.

705. Experiment Solitary, touching *Certain drinks in Turkey.*

THey have in *Turky*, and the *East*, certain *Confections*, which they call *Serves*, which are like to *Candid Conserves*, and are made of *Sugar* and *Lemmons*, or *Sugar* and *Citrons*, or *Sugar* and *Violets*, and some other Flowers; and some mixture of *Amber* for the more delicate persons: And those they dissolve in Water, and thereof make their Drink, because they are forbidden Wine by their Law. But I do much marvel, that no *Englishman*, or *Dutchman*, or *German*, doth set up Brewing in *Constantinople*, considering they have such quantity of Barley. For as for the general sort of Men, frugality may be the cause of Drinking Water; for that it is no small saving to pay nothing for ones drink: But the better sort might well be at the cost. And yet I wonder the less at it, because I see *France*, *Italy*, or *Spain*, have not taken into use Beer or Ale; which (perhaps) if they did, would better both their Healths and their Complexions. It is likely it would be matter of great gain to any that should begin it in *Turkey*.

706. Experiments in Consort, touching *Sweat.*

IN *Bathing* in hot water, sweat (nevertheless) cometh not in the parts under the Water. The cause is, first, for that sweat is a kinde of Colliquation. And that kinde of Colliquation is not made either by an over-dry Heat, or an over-moist Heat. For over-moisture doth somewhat extinguish the Heat; as we see, that even hot water quencheth Fire; and over-dry Heat shutteth the Pores. And therefore Men will sooner sweat covered before the Sun or Fire, then if they stood naked: And Earthen Bottles filled with hot water, do provoke in Bed a Sweat more daintily then Brick-bats hot. Secondly, Hot water doth cause Evaporation from the Skin; so as it spendeth the matter in those parts under the Water, before it issueth in Sweat,

Sweat. Again, Sweat cometh more plentifully, if the Heat be increased by degrees, then if it be greatest at first, or equal. The cause is, for that the Pores are better opened by a gentle Heat, then by a more violent; and by their opening the Sweat, issueth more abundantly. And therefore *Physicians* may do well, when they provoke Sweat in Bed by Bottles, with a Decoction of *Sudorifick Herbs* in *Hot Water*, to make two degrees of Heat in the Bottles, and to lay in the Bed the less-heated first, and after half an hour the more-heated.

707. *Sweat* is salt in taste. The cause is, for that that part of the Nourishment which is fresh and sweet, turneth into Blood and Flesh; and the Sweat is onely that part which is separate and excerned. Blood also raw, hath some saltness more then Flesh; because the Assimilation into Flesh, is not without a little and subtile excretion from the Blood.

708. *Sweat* cometh forth more out of the upper parts of the Body then the lower. The reason is, because those parts are more repleniſhed with Spirits, and the Spirits are they that put forth Sweat; besides, they are less fleshy, and Sweat issueth (chiefly) out of the parts that are less fleshy and more dry, as the Forehead and Brest.

709. Men sweat more in sleep then waking, and yet sleep doth rather stay other Fluxions, then cause them; as *Rheums*, *Loosness* of the *Body*, *&c.* The cause is, for that in *Sleep* the Heat and Spirits do naturally move inwards, and there rest. But when they are collected once within, the Heat becometh more violent and irritate, and thereby expelleth *Sweat*.

710. *Cold Sweats* are (many times) Mortal and near *Death*, and always ill and suspected; as in great *Fears*, *Hypochondriacal Passions*, *&c.* The cause is, for that *Cold Sweats* come by a relaxation or forsaking of the *Spirits*, whereby the Moisture of the Body, which Heat did keep firm in the parts, severeth and issueth out.

711. In those *Diseases* which cannot be discharged by *Sweat*, *Sweat* is ill, and rather to be stayed; as in *Diseases* of the *Lungs*, and *Fluxes* of the *Belly*; but in those *Diseases* which are expelled by *Sweat*, it easeth and lightneth; as in *Agues*, *Pestilences*, *&c.* The cause is, for that *Sweat* in the latter sort is partly Critical, and sendeth forth the *Matter* that offendeth: But in the former, it either proceedeth from the Labor of the *Spirits*, which sheweth them oppressed; or from Motion of *Consent*, when *Nature* not able to expel the *Disease* where it is seated, moveth to an Expulsion indifferent over all the *Body*.

712. Experiment Solitary, touching the *Gloworm*.

THe Nature of the *Gloworm* is hitherto not well observed. Thus much we see, that they breed chiefly in the hottest Moneths of *Summer*; and that they breed not in *Champaign*, but in *Bushes* and *Hedges*. Whereby it may be conceived, that the *Spirit* of them is very fine, and not to be refined but by *Summer heats*. And again, that by reason of the fineness, it doth easily exhale. In *Italy*, and the Hotter Countreys, there is a Flie they call *Lucciole*, that shineth as the *Gloworm* doth, and it may be is the *Flying-Gloworm*; but that Flie is chiefly upon *Fens* and *Marishes*. But yet the two former observations hold, for they are not seen but in the heat of *Summer*; and *Sedge*, or other Green of the *Fens* give as good shade as Bushes. It may be the *Gloworms* of the Cold Countreys ripen not so far as to be winged.

713. Experiments in Consort, touching the *Impressions* which the *Passions of the Minde* make upon the *Body*.

THe Passions of the *Minde* work upon the Body the impressions following. *Fear*, causeth *Paleness*, *Trembling*, the *Standing* of the *Hair* up-

right, Starting, and Scrieching. The Paleneſs is cauſed, for that the Blood runneth inward to ſuccor the Heart. The Trembling is cauſed, for that through the flight of the Spirits inward, the outward parts are deſtituted, and not ſuſtained. Standing upright of the Hair is cauſed, for that by ſhutting of the Pores of the Skin, the Hair that lyeth aſloap muſt needs riſe. Starting is both an apprehenſion of the thing feared, (and in that kinde it is a motion of ſhrinking;) and likewiſe an Inquiſition in the beginning what the matter ſhould be, (and in that kinde it is a motion of Erection;) and therefore when a Man would liſten ſuddenly to any thing, he ſtarteth; for the ſtarting is an Erection of the Spirits to attend. Scrieching is an appetite of expelling that which ſuddenly ſtriketh the Spirits. For it muſt be noted, that many Motions, though they be unprofitable to expel that which hurteth, yet they are Offers of Nature, and cauſe Motions by Conſent; as in Groaning, or Crying upon Pain.

714. Grief and Pain, cauſe Sighing, Sobbing, Groaning, Screaming, and Roaring, Tears, Diſtorting of the Face, Grinding of the Teeth, Sweating. Sighing is cauſed by the drawing in of a greater quantity of Breath to refreſh the Heart that laboreth; like a great draught when one is thirſty. Sobbing is the ſame thing ſtronger. Groaning, and Screaming, and Roaring, are cauſed by an appetite of Expulſion, as hath been ſaid; for when the Spirits cannot expel the thing that hurteth in their ſtrife to do it, by Motion of Conſent they expel the Voice. And this is when the Spirits yield, and give over to reſiſt; for if one do conſtantly reſiſt Pain, he will not groan. Tears are cauſed by a Contraction of the Spirits of the Brain; which Contraction by conſequence aſtringeth the Moiſture of the Brain, and thereby ſendeth Tears into the Eyes. And this Contraction or Compreſſion cauſeth alſo Wringing of the Hands; for Wringing is a Geſture of Expreſſion of Moiſture. The Diſtorting of the Face is cauſed by a Contention, firſt, to bear and reſiſt, and then to expel; which maketh the Parts knit firſt, and afterwards open. Grinding of the Teeth is cauſed (likewiſe) by a Gathering and Serring of the Spirits together to reſiſt; which maketh the Teeth alſo to ſet hard one againſt another. Sweating is alſo a Compound Motion by the Labor of the Spirits, firſt to reſiſt, and then to expel.

715. Joy cauſeth a Chearfulneſs and Vigor in the Eyes, Singing, Leaping, Dancing, and ſometimes Tears. All theſe are the effects of the Dilatation and coming forth of the Spirits into the outward parts, which maketh them more lively and ſtirring. We know it hath been ſeen, that Exceſſive ſudden Joy hath cauſed preſent Death, while the Spirits did ſpred ſo much as they could not retire again. As for Tears, they are the effects of Compreſſion of the Moiſture of the Brain, upon Dilatation of the Spirits. For Compreſſion of the Spirits worketh an Expreſſion of the Moiſture of the Brain by conſent, as hath been ſaid in Grief: But then in Joy it worketh it diverſly, *viz.* By Propulſion of the Moiſture, when the Spirits dilate, and occupy more room.

716. Anger cauſeth Paleneſs in ſome, and the going and coming of the colour in others; alſo Trembling in ſome, Swelling, Foaming at the Mouth, Stamping, Bending of the Fiſt. Paleneſs, and Going, and Coming of the Colour, are cauſed by the Burning of the Spirits about the Heart; which to refreſh themſelves, call in more Spirits from the outward parts. And if the Paleneſs be alone, without ſending forth the colour again, it is commonly joyned with ſome fear: But in many there is no Paleneſs at all, but contrariwiſe Redneſs about the Cheeks and Gils; which is by the ſending forth of the Spirits,

Spirits, in an appetite to Revenge. Trembling in Anger is likewise by a calling in of the Spirits, and is commonly when Anger is joyned with Fear. Swelling is caused both by a Dilatation of the Spirits by over-heating, and by a Liquefaction or Boiling of the Humors thereupon. Foaming at the Mouth is from the same cause, being an Ebullition. Stamping and Bending of the Fist are caused by an Imagination of the Act of Revenge.

717. Light Displeasure or Dislike causeth shaking of the Head, Frowning, and Knitting of the Brows. These effects arise from the same cause that Trembling and Horror do; namely, from the Retiring of the Spirits, but in a less degree. For the Shaking of the Head, is but a slow and definite Trembling; and is a Gesture of slight refusal: And we see also, that a dislike causeth often that Gesture of the Hand, which we use when we refuse a thing, or warn it away. The Frowning and Knitting of the Brows, is a Gathering or Serring of the Spirits, to resist in some measure. And we see also, this Knitting of the Brows will follow upon earnest Studying, or Cogitation of any thing, though it be without dislike.

718. Shame causeth Blushing, and casting down of the Eyes. Blushing is the Resort of Blood to the Face, which in the Passion of Shame, is the part that laboreth most. And although the Blushing will be seen in the whole Breast, if it be naked, yet that is but in passage to the Face. As for the casting down of the Eyes, it proceedeth of the Reverence a Man beareth to other Men, whereby, when he is ashamed, he cannot endure to look firmly upon others: And we see, that Blushing and the Casting down of the Eyes both, are more when we come before many; *Ore Pompeii quid mollius? Nunquam non coram pluribus erubuit*; and likewise, when we come before *Great* or *Reverend Persons*.

719. Pity causeth sometimes Tears, and a Flexion or Cast of the Eye aside. Tears come from the cause, that they do in Grief: For Pity is but Grief in anothers behalf. The Cast of the Eye, is a Gesture of Aversion or Lothness to behold the object of Pity.

720. Wonder causeth Astonishment, or an Immovable Posture of the Body, Casting up of the Eyes to Heaven, and Lifting up of the Hands. For Astonishment, it is caused by the Fixing of the Minde upon one object of Cogitation, whereby it doth not spatiate and transcur as it useth: For in Wonder the Spirits flie not, as in Fear; but onely settle, and are made less apt to move. As for the Casting up of the Eyes, and Lifting up of the Hands, it is a kinde of Appeal to the Deity, which is the Author, by Power and Providence of strange Wonders.

721. Laughing causeth a Dilatation of the Mouth and Lips; a continued Expulsion of the Breath, with the loud Noise, which maketh the Interjection of Laughing; Shaking of the Breast and Sides; Running of the Eyes with Water, if it be violent and continued. Wherein first it is to be understood, that Laughing is scarce (properly) a Passion, but hath his Source from the Intellect; for in Laughing, there ever precedeth a conceit of somewhat ridiculous. And therefore it is proper to Man. Secondly, that the cause of Laughing, is but a light touch of the Spirits, and not so deep an Impression as in other Passions. And therefore (that which hath no Affinity with the Passions of the Minde) it is moved, and that in great vehemency, onely by Tickling some parts of the Body. And we see, that Men even in a grieved state of Minde, yet cannot sometimes forbear Laughing. Thirdly, it is ever joyned with some degree of Delight: And therefore Exhilaration hath some Affinity with Joy, though it be much Lighter Motion. *Res severa est verum Gaudium.*

Fourthly,

Fourthly, That the object of it is *Deformity*, *Absurdity*, *Shrewd turns*, and the like. Now to speak of the causes of the effects before-mentioned, whereunto these general-Notes give some light. For the Dilatation of the *Mouth* and *Lips*, continued Expulsion of the *Breath* and *Voice*, and Shaking of the *Brests* and *Sides*, they proceed (all) from the Dilatation of the *Spirits*, especially being sudden. So likewise the *Running* of the *Eyes* with Water, (as hath been formerly touched, where we spake of the *Tears* of *Joy* and *Grief*) is an effect of Dilatation of the *Spirits*. And for *Suddenness*, it is a great part of the *Matter*: For we see that any *Shrewd turn* that lighteth upon another, or any *Deformity*, *&c.* moveth *Laughter* in the instant, which after a little time it doth not. So we cannot *Laugh* at any thing after it is stale, but whilest it is new. And even in *Tickling*, if you tickle the sides, and give warning, or give a hard or continued touch, it doth not move *Laughter* so much.

722. *Lust* causeth a *Flagrancy* in the *Eys*, and *Priapism*. The cause of both these is, for that in *Lust* the *Sight* and the *Touch*, are the things desired; and therefore the *Spirits* resort to those parts which are most affected. And note well in general, (for that great use may be made of the observation) that (evermore) the *Spirits* in all *Passions* resort most to the parts that labor most, or are most affected. As in the last, which hath been mentioned, they resort to the *Eyes* and *Venereous parts*; in *Fear* and *Anger* to the *Heart*; in *Shame* to the *Face*; and in *Light dislikes* to the *Head*.

723. Experiments in Consort, touching *Drunkenness*.

IT hath been observed by the *Ancients*, and is yet believed, That the *Sperm* of *Drunken-men* is unfruitful. The cause is, for that it is over-moistned, and wanteth Spissitude. And we have a merry saying, *That they that go drunk to Bed, get Daughters.*

724. *Drunken-men* are taken with a plain Defect or Destitution in *Voluntary Motion*; they reel, they tremble, they cannot stand, nor speak strongly. The cause is, for that the Spirits of the Wine oppress the Spirits Animal, and occupate part of the place where they are, and so make them weak to move; and therefore *Drunken-men* are apt to fall asleep. And *Opiates* and *Stupefactives* (as *Poppy*, *Henbane*, *Hemlock*, *&c.*) induce a kinde of *Drunkenness* by the grosness of their *Vapor*, as Wine doth by the quantity of the *Vapor*. Besides, they rob the Spirits Animal of their *Matter* whereby they are nourished; for the Spirits of the Wine, prey upon it as well as they, and so they make the Spirits less supple and apt to move.

725. *Drunken-men* imagine every thing turneth round; they imagine also, that things come upon them; they see not well things afar off; those things that they see near hand, they see out of their place; and (sometimes) they see things double. The cause of the imagination that things turn round is, for that the Spirits themselves turn, being compressed by the Vapor of the Wine; (for any Liquid Body upon Compression turneth, as we see in Water:) And it is all one to the sight, whether the *Visual Spirits* move, or the Object moveth, or the *Medium* moveth; and we see, that long turning round breedeth the same imagination. The cause of the imagination that things come upon them is, for that the *Spirits Visual* themselves draw back, which maketh the Object seem to come on; and besides, when they see things turn round and move, Fear maketh them think they come upon them. The cause that they cannot see things afar off, is the weakness of the Spirits; for in every *Megrim* or *Vertigo*, there is an Obtenebration joyned with a semblance of Turning round, which we see also in the lighter sort of *Swoonings*.

The

The cause of seeing things out of their place, is the refraction of the Spirits visual; for the vapor is as an unequal *Medium*, and it is as the sight of things out of place in Water. The cause of seeing things double, is the swift and unquiet motion of the Spirits (being oppressed) to and fro; for (as was said before) the motion of the Spirits visual, and the motion of the object make the same appearances; and for the swift motion of the object, we see that if you fillip a *Lute* string, it sheweth double or trebble.

726. Men are sooner Drunk with small draughts then with great. And again, Wine sugared, inebriateth less then Wine pure. The cause of the former is, for that the Wine descendeth not so fast to the Bottom of the Stomack; but maketh longer stay in the upper part of the Stomack, and sendeth Vapors faster to the Head, and therefore inebriateth sooner. And for the same reason, Sops in Wine (quantity for quantity) inebriate more then Wine of it self. The cause of the latter is, for that the Sugar doth inspissate the Spirits of the Wine, and maketh them not so easie to resolve into Vapor. Nay further, it is thought to be some remedy against inebriating, if Wine sugared be taken after Wine pure. And the same effect is wrought, either by Oyl or Milk taken upon much Drinking.

727. Experiment Solitary, touching the *Help or hurt of Wine, though Moderately used.*

THe use of Wine in dry and consumed Bodies is hurtful, in moist and full Bodies it is good. The cause is, for that the Spirits of the Wine do prey upon the Dew or radical moisture (as they term it) of the Body, and so deceive the Animal Spirits. But where there is moisture enough, or superfluous, there Wine helpeth to digest and desiccate the moisture.

728. Experiment Solitary, touching *Caterpillers.*

THe *Caterpiller* is one of the most general of Worms, and breedeth of Dew and Leaves; for we see infinite number of *Caterpillers* which breed upon Trees and Hedges, by which the Leaves of the Trees or Hedges are in great part consumed; as well by their breeding out of the Leaf, as by their feeding upon the Leaf. They breed in the Spring chiefly, because then there is both Dew and Leaf. And they breed commonly when the East Winds have much blown: The cause whereof is, the dryness of that Wind; for to all Vivification upon Putrefaction, it is requisite the matter be not too moist: And therefore we see they have *Cobwebs* about them, which is a sign of a slimy dryness; as we see upon the Ground, whereupon by Dew and Sun *Cobwebs* breed all over. We see also the Green *Caterpiller* breedeth in the inward parts of *Roses*, especially not blown where the Dew sticketh: But especially *Caterpillers*, both the greatest and the most, breed upon *Cabbages*, which have a fat Leaf, and apt to putrifie. The *Caterpiller* toward the end of Summer waxeth volatile, and turneth to a *Butterflie*, or perhaps some other Flie. There is a *Caterpiller* that hath a Fur or Down upon him, and seemeth to have affinity with the *Silk-worm*.

729. Experiment Solitary, touching the *Flies Cantharides.*

THe *Flies Cantharides*, are bred of a *Worm* or *Caterpiller*, but peculiar to certain Fruit-trees; as are the Fig-tree, the Pine-tree, and the Wilde Bryar; all which bear sweet Fruit, and Fruit that hath a kinde of secret biting or sharpness. For the Fig hath a Milk in it that is sweet and corrosive; the Pine-Apple hath a Kernel that is strong and absterssive; the Fruit of the Bryar is said to make Children, or those that eat them, scabbed. And therefore no marvel though Cantharides have such a Corrosive and Cauterizing quality; for there is not one other of the *Insecta*, but is bred of a duller matter. The Body of the Cantharides is bright coloured; and it may be,

be, that the delicate coloured Dragon Flies may have likewise some Corrosive quality.

730. Experiments in Consort, touching *Lassitude.*

Lassitude is remedied by Bathing or Anointing with Oyl and warm Water. The cause is, for that all *Lassitude* is a kinde of Contusion and Compression of the Parts; and Bathing and Anointing give a Relaxion or Emollition: And the mixture of Oyl and Water is better then either of them alone, because Water entreth better into the Pores, and Oyl after entry softneth better. It is found also, that the taking of *Tobacco* doth help and discharge *Lassitude.* The reason whereof is partly, because by chearing or comforting of the Spirits, it openeth the Parts compressed or contused: And chiefly, because it refresheth the Spirits by the Opiate Vertue thereof, and so dischargeth Wearines, as Sleep likewise doth.

731. *Thighs.*

In going up a Hill the *Knees* will be most weary; in going down a Hill, The cause is, for that in the Lift of the Feet, when a man goeth up the Hill, the weight of the Body beareth most upon the *Knees*; and in going down the Hill, upon the Thighs.

732. Experiment Solitary, touching the *Casting of the Skin and Shell in some Creatures.*

The casting of the *Skin,* is by the Ancients compared to the breaking of the *Secundine* or *Call,* but not rightly; for that were to make every casting of the Skin a new Birth: And besides, the *Secundine* is but a general Cover, not shaped according to the Parts; but the Skin is shaped according to the Parts. The Creatures that cast their Skin are, the *Snake*, the *Viper*, the *Grashopper*, the *Lizard*, the *Silk-worm*, *&c.* Those that cast their Shell are, the *Lobster*, the *Crab*, the *Cra-fish*, the *Hodmandod* or *Dodman*, the *Tortoise*, *&c.* The old Skins are found, but the old Shells never: So as it is like they scale off, and crumble away by degrees. And they are known by the extream tenderness and softness of the new Shell; and somewhat by the freshness of the colour of it. The cause of the casting and Skin and Shell should seem to be the great quantity of matter in those Creatures, that is fit to make Skin or Shell: And again, the loosness of the Skin or Shell, that sticketh not close to the Flesh. For it is certain, that it is the new Skin or Shell that putteth off the old. So we see that in *Deer*, it is the young Horn that putteth off the old. And in Birds, the young Feathers put off the old; and so Birds that have much matter for their Beak, cast their Beaks, the new Beak putting off the old.

733. Experiments in Consort, touching the *Postures of the Body.*

Lying not Erect but Hollow, which is in the making of the Bed, or with the *Legs* gathered up, which is in the posture of the Body, is the more wholesome. The reason is, the better comforting of the Stomack, which is by that less pensile; and we see, that in weak Stomacks, the laying up of the Legs high, and the Knees almost to the Mouth, helpeth and comforteth. We see also, that *Gally-slaves*, notwithstanding their misery otherwise, are commonly fat and fleshy; and the reason is, because the Stomack is supported somewhat in sitting, and is pensile in standing or going. And therefore for Prolongation of Life, it is good to chuse those Exercises where the Limbs move more then the Stomack and Belly; as in Rowing and in Sawing, being set.

734. *Megrims* and *Giddiness* are rather when we *Rise*, after long sitting, then while we sit. The cause is, for that the Vapors which were gathered by sitting, by the sudden *Motion* flie more up into the *Head.*

735. *Leaning* upon any Part maketh it Num, and, as we call it, *Asleep.*

The

The cause is, for that the Compression of the Parts suffereth not the Spirits to have free access; and therefore, when we come out of it, we feel a stinging or pricking, which is the re-entrance of the Spirits.

736. Experiment Solitary, touching *Pestilential Years.*

IT hath been noted, That those Years are pestilential and unwholsome, when there are great numbers of Frogs, Flies, Locusts, &c. The cause is plain; for that those Creatures being ingendred of Putrefaction, when they abound, shew a general disposition of the Year, and constitution of the Air to Diseases of Putrefaction. And the same Prognostick (as hath been said before) holdeth, if you finde Worms in Oak-Apples. For the Constitution of the Air appeareth more subtilly in any of these things, then to the sense of Man.

737. Experiment Solitary, touching the *Prognosticks of Hard Winters.*

IT is an observation amongst Country people, that Years of store of *Haws* and *Heps*, do commonly portend cold Winters; and they ascribe it to *Gods* Providence, that (as the *Scripture* saith) reacheth even to the falling of a Sparrow; and much more is like to reach to the Preservation of Birds in such Seasons. The Natural cause also may be the want of Heat, and abundance of Moisture in the Summer precedent, which putteth forth those Fruits, and must needs leave great quantity of cold Vapors not dissipate, which causeth the cold of the Winter following.

738. Experiment Solitary, touching *Medicines that Condence and Relieve the Spirits.*

THey have in *Turkey* a Drink called *Coffee*, made of a Berry of the same name, as black as Soot, and of a strong sent, but not aromatical, which they take, beaten into powder, in Water as hot as they can drink it: And they take it, and sit at it in their *Coffee-Houses*, which are like our Taverns. This Drink comforteth the Brain and Heart, and helpeth Digestion. Certainly this Berry *Coffee*, the Root and Leaf *Betel*, the Leaf *Tobacco*, and the Teare of *Poppy*, (*Opium*) of which, the *Turks* are great takers (supposing it expelleth all fear; do all condence the Spirits, and make them strong and aleger. But it seemeth they are taken after several manners; for *Coffee* and *Opium* are taken down, *Tobacco* but in Smoak, and *Betel* is but champed in the Mouth with a little Lime. It is like, there are more of them, if they were well found out, and well corrected. *Quare*, of *Henbane-seed*, of *Mandrake*, of *Saffron*, Root and Flower, of *Folium Indum*, of *Ambergreece*, of the *Assyrian Amomum*, if it may be had; and of the *Scarlet Powder* which they call *Kermez*; and (generally) of all such things as do inebriate and provoke sleep. Note, that *Tobacco* is not taken in Root or Seed, which are more forcible ever then Leaves.

739. Experiment Solitary, touching *Paintings of the Body.*

THe *Turks* have a black Powder made of a Mineral called *Alcohole*, which with a fine long Pencil they lay under their Eye-lids, which doth colour them black, whereby the White of the Eye is set off more white. With the same Powder they colour also the Hairs of their Eye-lids, and of their Eye-brows, which they draw into embowed Arches. You shall finde that *Xenophon* maketh mention, that the *Medes* used to paint their Eyes. The *Turks* use with the same Tincture to colour the Hair of their Heads and Beards black: And divers with us that are grown Gray, and yet would appear young, finde means to make their Hair black, by combing it (as they say) with a Leaden Comb, or the like. As for the *Chineses*, who are of an ill Complexion, (being *Olivaster*) they paint their Cheeks Scarlet, especially their *King* and *Grandees*. Generally, *Barbarous People* that go naked, do not onely paint them-

themselves, but they pounce and raise their skin, that the Painting may not be taken forth, and make it into Works; So do the *West-Indians*; and so did the ancient *Picts* and *Britons*. So that it seemeth Men would have the colours of *Birds Feathers*, if they could tell how, or at least they will have gay Skins in stead of gay Cloaths.

740. Experiment Solitary, touching the *Use of Bathing and Anointing.*

IT is strange that the use of *Bathing* as a part of *Diet* is left. With the *Romans* and the *Grecians* it was as usual as Eating or Sleeping; and so is it amongst the *Turks* at this day; whereas with us it remaineth but as a part of Physick. I am of opinion, that the use of it as it was with the *Romans*, was hurtful to health; for that it made the Body soft and easie to waste. For the *Turks* it is more proper, because their drinking Water, and feeding upon Rice, and other Food of small nourishment, maketh their Bodies so solid and hard, as you need not fear that *Bathing* should make them frothy. Besides, the *Turks* are great sitters, and seldom walk; whereby they sweat less, and need *Bathing* more. But yet certain it is, that *Bathing*, and especially *Anointing*, may be so used, as it may be a great help to Health, and Prolongation of Life. But hereof we shall speak in due place, when we come to handle *Experiments Medicinal.*

741. Experiment Solitary, touching *Chamoletting of Paper.*

THe *Turks* have a pretty Art of *Chamoletting* of *Paper*, which is not with us in use. They take divers Oyled Colours, and put them severally (in drops) upon Water, and stir the Water lightly, and then wet their Paper (being of some thickness) with it; and the Paper will be waved and veined like *Chamolet* or *Marble.*

742. Experiment Solitary, touching *Cuttle-Ink.*

IT is somewhat strange, that the Blood of all Birds, and Beasts, and Fishes, should be of a Red colour, and onely the Blood of the Cuttle should be as black as Ink. A man would think that the cause should be the high Concoction of that Blood; for we see in ordinary Puddings, that the Boyling turneth the Blood to be black; and the Cuttle is accounted a delicate Meat, and is much in request.

743. Experiment Solitary, touching *Encrease of Weight in Earth.*

IT is reported of credit, That if you take *Earth* from Land adjoyning to the River of *Nile*, and preserve it in that manner, that it neither come to be wet nor wasted, and weigh it daily, it will not alter weight until the Seventeenth of *June*, which is the day when the River beginneth to rise, and then it will grow more and more ponderous till the River cometh to his height. Which if it be true, it cannot be caused but by the Air, which then beginneth to condense; and so turneth within that small Mould into a degree of Moisture, which produceth weight. So it hath been observed, that *Tobacco* cut and weighed, and then dryed by the Fire, loseth weight; and after being laid in the open Air, recovereth weight again. And it should seem, that as soon as ever the River beginneth to increase, the whole Body of the Air thereabouts suffereth a change: For (that which is more strange) it is credibly affirmed, that upon that very day, when the River first riseth, great Plagues in *Cairo* use suddenly to break up.

744. Experiments in Consort, touching *Sleep.*

THose that are very cold, and especially in their *Feet*, cannot get to *Sleep*. The cause may be, for that in Sleep is required a free respiration, which cold doth shut in and hinder: For we see, that in great Colds, one can scarce draw

draw his Breath. Another cauſe may be, for that Cold calleth the Spirits to ſuccor; and therefore they cannot ſo well cloſe, and go together in the Head, which is ever requiſite to Sleep. And for the ſame cauſe, Pain and noiſe hinder ſleep, and darkneſs (contrariwiſe) furthereth ſleep.

745. Some noiſes (whereof we ſpake in the 112 *Experiment*) help Sleep; as the blowing of the Wind, the trickling of Water, humming of Bees, ſoft ſinging, reading, &c. The cauſe is, for that they move in the Spirits a gentle attention; and whatſoever moveth attention, without too much labor, ſtilleth the natural and diſcurſive motions of the Spirits.

746. Sleep nouriſheth, or at leaſt preſerveth, Bodies a long time, without other nouriſhment. Beaſts that ſleep in Winter, (as it is noted of wilde Bears) during their ſleep wax very fat, though they eat nothing. Bats have been found in Ovens, and other hollow cloſe places, matted one upon another; and therefore it is likely that they ſleep in the VVinter time, and eat nothing. *Quare* whether Bees do not ſleep all VVinter, and ſpare their Honey. Butter-flies, and other Flies, do not onely ſleep, but lie as dead all VVinter; and yet with a little heat of Sun or Fire revive again. A Dormouſe, both VVinter and Summer will ſleep ſome days together, and eat nothing.

Experiments in Conſort, touching *Teeth and hard Subſtances in the Bodies of Living Creatures.*

TO reſtore Teeth in Age, were *Magnale Naturæ*; it may be thought of; but howſoever, the nature of the Teeth deſerveth to be enquired of, as well as the other parts of Living Creatures Bodies.

747. There be five parts in the *Bodies* of *Living Creatures* that are of hard ſubſtances; the *Skull*, the *Teeth*, the *Bones*, the *Horns*, and the *Nails*. The greateſt quantity of hard ſubſtance continued, is towards the Head; for there is the Skull of one entire Bone, there are the Teeth, there are Maxillary Bones, there is the hard Bone that is the Inſtrument of Hearing, and thence iſſue the Horns. So that the building of Living Creatures Bodies is like the building of a Timber-houſe, where the VValls and other parts have Columns and Beams; but the Roof is in the better ſort of Houſes, all Tile, or Lead, or Stone. As for *Birds*, they have three other hard ſubſtances proper to them; the *Bill*, which is of the like matter with the Teeth, for no Birds have Teeth; the Shell of the Egg, and their Quills; for as for their Spur, it is but a Nail. But no *Living Creatures* that have Shells very hard (as *Oyſters*, *Cockles*, *Muſtles*, *Shalops*, *Crabs*, *Lobſters*, *Craw-fish*, *Shrimps*, and eſpecially the *Tortoiſe*) have *Bones* within them, but onely little *Griſtles*.

748. *Bones*, after full growth, continue at a ſtay, and ſo doth the *Skull*. *Horns*, in ſome Creatures, are caſt and renewed: Teeth ſtand at a ſtay, except their wearing. As for *Nails*, they grow continually, and *Bills* and *Beaks* will overgrow, and ſometimes be caſt, as in *Eagles* and *Parrots*.

749. Moſt of the hard ſubſtances flie to the extreams of the Body; as Skull, Horns, Teeth, Nails, and Beaks; onely the Bones are more inward, and clad with Fleſh. As for the Entrails, they are all without Bones, ſave that a Bone is ſometimes found in the *Heart* of a *Stag*, and it may be in ſome other Creatures.

750. The *Skull* hath *Brains*, as a kinde of *Marrow* within it. The *Back-bone* hath one kinde of *Marrow*, which hath an affinity with the Brain; and other Bones of the Body have another. The *Jaw-bones* have no *Marrow* ſevered, but a little *Pulp* of *Marrow* diffuſed. Teeth likewiſe are thought to have a kinde of *Marrow* diffuſed, which cauſeth the Senſe and Pain: But it

is rather Sinew; for Marrow hath no Senſe, no more then Blood. Horn is alike throughout, and ſo is the Nail.

751. None other of the hard ſubſtances have Senſe, but the Teeth; and the Teeth have Senſe, not onely of Pain, but of Cold.

But we will leave the *Enquiries* of other *Hard Subſtances* unto their ſeveral places, and now enquire onely of the *Teeth*.

752. The *Teeth* are in Men of three kindes, *Sharp*, as the *Fore-teeth*; *Broad*, as the *Back-teeth*, which we call the *Molar-teeth*, or *Grinders*; and *Pointed-teeth*, or *Canine*, which are between both. But there have been ſome Men that have had their *Teeth* undivided, as of one whole *Bone*, with ſome little mark in the place of the Diviſion, as *Pyrrhus* had. Some Creatures have over-long or out-growing *Teeth*, which we call *Fangs* or *Tuſks*; as *Boars*, *Pikes*, *Salmons*, and *Dogs*, though leſs. Some *Living Creatures* have *Teeth* againſt *Teeth*, as *Men* and *Horſes*; and ſome have *Teeth*, eſpecially their *Maſter-teeth*, indented one within another like *Saws*, as *Lions*; and ſo again have *Dogs*. Some *Fiſhes* have divers Rows of *Teeth* in the *Roofs* of their *Mouths*; as *Pikes*, *Salmons*, *Trouts*, *&c.* and many more in Salt-waters. *Snakes* and other *Serpents* have venemous *Teeth*, which are ſometimes miſtaken for their *Sting*.

753. No Beaſt that hath *Horns* hath upper-teeth; and no Beaſt that hath Teeth above, wanteth them below. But yet if they be of the ſame kinde, it followeth not, that if the hard matter goeth not into upper-teeth, it will go into *Horns*; nor yet *è converſo*, for *Does* that have no *Horns*, have no upper-teeth.

754. *Horſes* have, at three years old, a Tooth put forth which they call the *Colts-tooth*; and at four years old, there cometh the *Mark-tooth*, which hath a hole ſo big as you may lay a Peaſe within it; and that weareth ſhorter and ſhorter every year, till that at eight years old the Tooth is ſmooth, and the hole gone; and then they ſay, That *the Mark is out of the Horſes Mouth*.

755. The Teeth of Men breed firſt; when the Childe is about a year and half old, and then they caſt them, and new come about ſeven years old. But divers have Backward-teeth come forth at twenty, yea, ſome at thirty, and forty. *Quare* of the manner of the coming of them forth. They tell a tale of the old Counteſs of *Deſmond*, who lived till ſhe was Sevenſcore years old, that ſhe did Dentire twice or thrice, caſting her old Teeth, and others coming in their place.

756. Teeth are much hurt by Sweet-meats, and by Painting with *Mercury*, and by things over-hot, and by things over-cold, and by Rheums. And the pain of the Teeth, is one of the ſharpeſt of pains.

757. Concerning Teeth, theſe things are to be conſidered. 1. The preſerving of them. 2. The keeping of them white. 3. The drawing of them with leaſt pain. 4. The ſtaying and eaſing of the Tooth-ach. 5. The binding in of Artificial Teeth, where Teeth have been ſtrucken out. 6. And laſt of all, that great one, of reſtoring Teeth in Age. The inſtances that give any likelihood of reſtoring Teeth in Age, are, The late coming of Teeth in ſome, and the renewing of the Beaks in Birds, which are commaterial with Teeth. *Quare* therefore more particularly how that cometh. And again, the renewing of Horns. But yet that hath not been known to have been provoked by Art; therefore let tryal be made, whether Horns may be procured to grow in Beaſts that are not horned, and how; and whether they may be procured to come larger then uſual, as to make an Ox or a Deer

have

have a greater Head of Horns; and whether the Head of a Deer, that by age is more spitted, may be brought again to be more branched. For these tryals and the like will shew, Whether by art such hard matter can be called and provoked. It may be tryed also, whether Birds may not have something done to them when they are young, whereby they may be made to have greater or longer Bills, or greater and longer Talons: And whether Children may not have some Wash, or something to make their Teeth better and stronger. *Coral* is in use as an help to the Teeth of Children.

758. Experiments in Consort, touching the *Generation and Bearing of Living Creatures in the Womb.*

SOme Living Creatures generate but at certain seasons of the year; as *Deer, Sheep, Wilde Coneys, &c.* and most sorts of *Birds* and *Fishes*: Others at any time of the year, as *Men*; and all Domestick Creatures, as *Horses, Hogs, Dogs, Cats, &c.* The cause of Generation at all seasons, seemeth to be Fulness; for Generation is from Redundance. This Fulness ariseth from two causes, Either from the Nature of the Creature, if it be Hot, and Moist, and Sanguine, or from Plenty of Food. For the first, *Men, Horses, Dogs, &c.* which breed at all seasons, are full of Heat and Moisture; *Doves* are the fullest of Heat and Moisture amongst *Birds*, and therefore breed often, the *Tame Dove* almost continually. But *Deer* are a Melancholick dry Creature, as appeareth by their fearfulness, and the hardness of their Flesh. *Sheep* are a cold Creature, as appeareth by their mildness, and for that they seldom drink. Most sorts of *Birds* are of a dry substance in comparison of *Beasts*; *Fishes* are cold. For the second cause, Fulness of Food, *Men, Kine, Swine, Dogs, &c.* feed full. And we see, that those Creatures which, being Wilde, generate seldom, being tame, generate often; which is from warmth and fulness of food. We finde that the time of going to *Rut* of *Deer* is in *September*, for that they need the whole Summers Feed and Grass to make them fit for Generation; and if Rain come early about the middle of *September*, they go to Rut somewhat the sooner; if Drought, somewhat the later. So Sheep, in respect of their small heat, generate about the same time, or somewhat before. But for the most part, Creatures that generate at certain seasons generate in the Spring; as Birds and Fishes: For that the end of the Winter, and the heat and comfort of the Spring prepareth them. There is also another reason why some Creatures generate at certain seasons, and that is the Relation of their time of Bearing to the time of Generation; for no Creature goeth to generate whilest the Female is full, nor whilest she is busie in sitting, or rearing her young; and therefore it is found by experience, that if you take the Eggs or Young-ones out of the Nests of Birds, they will fall to generate again three or four times one after another.

759.

Of Living Creatures, some are longer time in the Womb, and some shorter. Women go commonly nine Moneths, the Cow and the Ewe about six Moneths, Does go about nine Moneths, Mares eleven Moneths, Bitches nine Weeks; Elephants are said to go two years, for the received Tradition of ten years is fabulous. For Birds there is double enquiry; the distance between the treading or coupling, and the laying of the Egg; and again, between the Egg laid, and the disclosing or hatching. And amongst Birds there is less diversity of time then amongst other Creatures, yet some there is; for the Hen sitteth but three weeks, the Turky-hen, Goose and Duck, a moneth. *Quare* of others. The cause of the great difference of times amongst Living Creatures is, either from the nature of the Kind,

or from the constitution of the Womb. For the former, those that are longer in coming to their maturity or growth, are longer in the Womb; as is chiefly seen in Men; and so Elephants, which are long in the Womb, are long time in coming to their full growth. But in most other Kinds, the constitution of the Womb (that is, the hardness or dryness thereof) is concurrent with the former cause. For the Colt hath about four years of growth, and so the Fawn, and so the Calf; but Whelps, which come to their growth (commonly) within three quarters of a year, are but nine weeks in the Womb. As for Birds; as there is less diversity amongst them in the time of their bringing forth, so there is less diversity in the time of their growth, most of them coming to their growth within a twelve-moneth.

760. Some Creatures bring forth many young ones at a Burthen; as Bitches, Hares, Coneys, &c. some (ordinarily) but one; as Women, Lionesses, &c. This may be caused, either by the quantity of Sperm required to the producing one of that Kind; which if less be required, may admit greater number; if more, fewer: Or by the Partitions and Cells of the Womb, which may sever the Sperm.

761. Experiments in Consort, touching *Species visible.* THere is no doubt but Light by Refraction will shew greater, as well as things coloured; for like as a shilling in the bottom of the Water will shew greater, so will a Candle in a Lanthorn in the bottom of the Water. I have heard of a practice, that Glo worms in Glasses were put in the Water to make the Fish come. But I am not yet informed, whether when a *Diver* diveth, having his eyes open, and swimmeth upon his back, whether (I say) he seeth things in the Air, greater or less. For it is manifest, that when the eye standeth in the finer *medium*, and the object is in the grosser, things shew greater; but contrariwise, when the eye is placed in the grosser *medium*, and the object in the finer, how it worketh I know not.

762. It would be well boulted out, whether great Refractions may not be made upon Reflexions, as well as upon direct beams. For example, we see, that take an empty Bason, put an *Angel* of *Gold*, or what you will into it; then go so far from the Bason till you cannot see the Angel, because it is not in a right Line; then fill the Bason with Water, and you shall see it out of his place, because of the Reflexion. To proceed therefore, put a Looking-glass into a Bason of Water; I suppose you shall not see the Image in a right Line, or at equal Angles, but aside. I know not whether this *Experiment* may not be extended so, as you might see the Image, and not the Glass; which for beauty and strangeness were a fine proof, for then you shall see the Image like a Spirit in the Air. As for example, if there be a Cistern or Pool of Water, you shall place over against it a picture of the Devil, or what you will, so as you do not see the Water, then put a Looking glass in the Water: Now if you can see the Devils picture aside, not seeing the Water, it will look like a Devil indeed. They have an old tale in *Oxford*, That Fryer *Bacon* walked between two Steeples; which was thought to be done by Glasses, when he walked upon the Ground.

763. Experiments in Consort, touching the *Impulsion and Percussion.* A Weighty Body put into Motion, is more easily impelled then at first when it resteth. The cause is, partly because Motion doth discuss the Torpour of solid Bodies, which beside their Motion of Gravity, have in them a Natural Appetite not to move at all; and partly, because a Body that resteth doth get, by the resistance of the Body upon which it resteth, a stronger compression

compreſſion of parts then it hath of it ſelf, and therefore needeth more force to be put in motion. For if a weighty Body be penſile, and hang but by a thred, the percuſſion will make an impulſion very near as eaſily as if it were already in motion.

764. A Body over-great or over-ſmall, will not be thrown ſo far as a Body of a middle ſize; ſo that (it ſeemeth) there muſt be a commenſuration or proportion between the Body moved, and the force, to make it move well. The cauſe is, becauſe to the Impulſion there is requiſite the force of the Body that moveth, and the reſiſtance of the Body that is moved; and if the Body be too great, it yieldeth too little; and if it be too ſmall, it reſiſteth too little.

765. It is common experience, that no weight will preſs or cut ſo ſtrong being laid upon a Body, as falling or ſtrucken from above. It may be the Air hath ſome part in furthering the percuſſion: But the chief cauſe I take to be, for that the parts of the Body moved, have by impulſion, or by the motion of gravity continued, a compreſſion in them as well downwards, as they have when they are thrown or ſhot through the Air forwards. I conceive alſo, that the quick looſe of that motion preventeth the reſiſtance of the Body below; and priority of the force (always) is of great efficacy, as appeareth in infinite inſtances.

766. Experiment Solitary, touching *Titillation*.

Tickling is moſt in the *Soles* of the *Feet*, and under the *Arm-holes*, and on the *Sides*. The cauſe is, the thinneſs of the Skin in thoſe parts, joyned with the rareneſs of being touched there; for all *Tickling* is a light motion of the Spirits, which the thinneſs of the Skin, and ſuddenneſs and rareneſs of touch do further: For we ſee a Feather or a Ruſh drawn along the Lip or Cheek, doth tickle; whereas a thing more obtuſe, or a touch more hard, doth not. And for ſuddenneſs, we ſee no man can tickle himſelf: We ſee alſo, that the Palm of the Hand, though it hath as thin a Skin as the other parts mentioned, yet is not tickliſh, becauſe it is accuſtomed to be touched. *Tickling* alſo cauſeth *Laughter*. The cauſe may be the emiſſion of the Spirits, and ſo of the Breath, by a flight from *Titillation*; for upon *Tickling*, we ſee there is ever a ſtarting or ſhrinking away of the part to avoid it; and we ſee alſo, that if you tickle the Noſtrils with a Feather or Straw, it procureth *Sneezing*, which is a ſudden emiſſion of the Spirits, that do likewiſe expel the moiſture. And *Tickling* is ever painful, and not well endured.

767. Experiment Solitary, touching the *Scarcity of Rain in Egypt*.

IT is ſtrange, that the River of *Nilus* overflowing, as it doth the Countrey of *Egypt*, there ſhould be nevertheleſs little or no Rain in that Countrey. The cauſe muſt be, either in the Nature of the Water, or in the Nature of the Air, or of both. In the Water, it may be aſcribed either unto the long race of the Water; for ſwift-running Waters vapor not ſo much as ſtanding Waters, or elſe to the concoction of the Water; for Waters well concocted, vapor not ſo much as Waters raw, no more then Waters upon the fire do vapor ſo much, after ſome time of boyling, as at the firſt. And it is true, that the Water of *Nilus* is ſweeter then other Waters in taſte; and it is excellent good for the *Stone*, and Hypochondriacal Melancholy, which ſheweth it is lenifying; and it runneth through a Countrey of a hot Climate, and flat, without ſhade either of Woods or Hills, whereby the Sun muſt needs have great power to concoct it. As for the Air (from whence I conceive this want of Showers cometh chiefly) the cauſe muſt be,

for that the Air is of it self thin and thirsty, and as soon as ever it getteth any moisture from the Water, it imbibeth, and dissipateth it in the whole Body of the Air, and suffereth it not to remain in Vapor, whereby it might breed Rain.

761. Experiment Solitary, touching *Clarification.*

IT hath been touched in the Title of Perlocations, (namely, such as are inwards) that the Whites of Eggs and Milk do clarifie; and it is certain, that in *Egypt* they prepare and clarifie the Water of *Nile*, by putting it into great Jars of Stone, and stirring it about with a few stamped Almonds, wherewith they also besmear the Mouth of the Vessel; and so draw it off, after it hath rested some time. It were good to try this Clarifying with Almonds in new Beer or Must, to hasten and perfect the Clarifying.

769. Experiment Solitary, touching *Plants without Leaves.*

THere be scarce to be found any Vegetables that have Branches and no Leaves, except you allow Coral for one. But there is also in the Desarts of S. *Macario* in *Egypt*, a Plant which is long, Leafless, brown of colour, and branched like Coral, save that it closeth at the top. This being set in Water within House, spredeth and displayeth strangely; and the people thereabout have a superstitious belief, that in the Labor of Women it helpeth to the easie Deliverance.

770. Experiment Solitary, touching the *Materials of Glass.*

THe *Crystalline Venice-Glass* is reported to be a mixture, in equal portions, of Stones brought from *Pavia*, by the River *Ticinum*, and the Ashes of a Weed called by the *Arabs*, *Kall*, which is gathered in a Desart between *Alexandria* and *Rosetta*; and is by the *Egyptians* used first for Fuel, and then they crush the Ashes into lumps like a Stone, and so sell them to the *Venetians* for their Glass-works.

771. Experiment Solitary, touching *Prohibition of Putrefaction, and the long Conservation of Bodies.*

IT is strange, and well to be noted, how long Carcasses have continued uncorrupt, and in their former Dimensions; as appeareth in the *Mummies* of *Egypt*, having lasted, as is conceived (some of them) three thousand years. It is true, they finde means to draw forth the Brains, and to take forth the Entrails, which are the parts apest to corrupt. But that is nothing to the wonder; for we see what a soft and corruptible substance the Flesh of all the other parts of the Body is. But it should seem, that according to our observation and axiom, in our hundredth *Experiments*, *Putrefaction*, which we conceive to be so natural a Period of Bodies, is but an accident, and that Matter maketh not that haste to Corruption that is conceived; and therefore Bodies in shining Amber, in Quick-silver, in Balms, (whereof we now speak) in Wax, in Honey, in Gums, and (it may be) in Conservatories of Snow, &c. are preserved very long. It need not go for repetition, if we resume again that which we said in the aforesaid *Experiments* concerning *Annihilation*, namely, That if you provide against three causes of *Putrefaction*, *Bodies* will not corrupt. The first is, that the Air be excluded; for that undermineth the Body, and conspireth with the Spirit of the Body to dissolve it. The second is, that the Body adjacent and ambient be not Commaterial, but meerly Heterogeneal towards the Body that is to be preserved; for if nothing can be received by the one, nothing can issue from the other; such are Quick-silver and White Amber to Herbs and Flies, and such Bodies. The third is, that the Body to be preserved be not of that gross that it may corrupt within it self, although no part of it issue into the Body adjacent; and therefore it must be rather thin

and

and ſmall then of Bulk. There is a fourth Remedy alſo; which is, That if the Body to be preſerved, be of bulk, as a Corps is, then the Body that incloſeth it muſt have a virtue to draw forth and dry the moiſture of the inward Body; for elſe the Putrefaction will play within, though nothing iſſue forth. I remember *Livy* doth relate; that there were found at a time two Coffins of Lead in a Tomb, whereof the one contained the Body of King *Numa*, it being ſome Four hundred years after his death; and the other, his Books of Sacred Rites and Ceremonies, and the Diſcipline of the Pontiffs: And that in the Coffin that had the Body, there was nothing (at all) to be ſeen but a little light Cinders about the ſides; but in the Coffin that had the Books, they were found as freſh as if they had been but newly written, being written in Parchment, and covered over with Watch-candles of Wax three or four fold. By this it ſeemeth, that the *Romans* in *Numa*'s time were not ſo good Embalmers as the *Egyptians* were; which was the cauſe that the Body was utterly conſumed. But I finde in *Plutarch* and others, that when *Auguſtus Cæſar* viſited the Sepulchre of *Alexander* the Great in *Alexandria*, he found the Body to keep his Dimenſion; but withal, that notwithſtanding all the Embalming (which no doubt was of the beſt) the Body was ſo tender, as *Cæſar* touching but the Noſe of it, defaced it. Which maketh me finde it very ſtrange, that the *Egyptian Mummies* ſhould be reported to be as hard as Stone-pitch: For I finde no difference but one, which indeed may be very material; namely, that the ancient *Egyptian Mummies* were ſhrowded in a number of folds of Linnen, beſmeared with Gums, in manner of Sear-cloth; which it doth not appear, was practiſed upon the Body of *Alexander*.

772. Experiment Solitary, touching the *Abundance of Nitre in certain Sea-ſhores.*

NEar the Caſtle of *Cathe*, and by the Wells *Aſſan*, in the Land of *Idumæa*, a great part of the way, you would think the Sea were near hand, though it be a good diſtance of: And it is nothing, but the ſhining of the *Nitre* upon the *Sea-ſands*; ſuch abundance of *Nitre* the Shores there do put forth.

773. Experiment Solitary, touching *Bodies that are borne up by Water.*

THe *Dead-Sea*, which vomiteth up *Bitumen*, is of that Craſſitude, as Living Bodies, bound hand and foot, and caſt into it, have been borne up and not ſunk: Which ſheweth, that all ſinking into Water, is but an overweight of the Body put into the Water, in reſpect of the Water; ſo that you may make Water ſo ſtrong and heavy of *Quick-ſilver*, (perhaps) or the like, as may bear up Iron; of which I ſee no uſe, but Impoſture. We ſee alſo, that all Metals, except Gold, for the ſame reaſon ſwim upon Quick ſilver.

774. Experiment Solitary, touching *Fuel that conſumeth little or nothing.*

IT is reported, that at the Foot of a Hill near the *Mare mortuum*, there is a Black Stone (whereof *Pilgrims* make Fires) which burneth like a Coal and diminiſheth not, but onely waxeth brighter and whiter. That it ſhould do ſo, is not ſtrange; for we ſee Iron red hot burneth and conſumeth not. But the ſtrangeneſs is, that it ſhould continue any time ſo; for Iron, as ſoon as it is out of the Fire, deadeth ſtraight-ways. Certainly, it were a thing of great uſe and profit, if you could finde out Fuel that would burn hot, and yet laſt long: Neither am I altogether incredulous, but there may be ſuch Candles as (they ſay) are made of *Salamanders* Wool, being a kinde of Mineral which whiteneth alſo in the burning, and conſumeth not. The Queſtion is this. Flame muſt be made of ſomewhat; and commonly it

is made of ſome tangible Body which hath weight; but it is not impoſſible, perhaps, that it ſhould be made of Spirit or Vapor in a Body, (which Spirit or Vapor hath no weight) ſuch as is the matter of *Ignis fatuus*. But then you will ſay, that that Vapor alſo can laſt but a ſhort time. To that it may be anſwered, That by the help of Oyl and Wax, and other Candle-ſtuff, the flame may continue, and the wick not burnt.

775. Experiment Solitary, *Oeconomical touching cheap Fewel.*

Sea-coal laſt longer then *Char-coal*; and *Char-coal* of *Roots*, being coaled into great pieces, laſt longer then ordinary *Char-coal*. *Turf*, and *Peat*, and *Cow-ſheards* are cheap Fewels, and laſt long. *Small-coal* or *Char-coal* poured upon *Char-coal* make them laſt longer. *Sedge* is a cheap Fewel to Brew or Bake with, the rather, becauſe it is good for nothing elſe. Tryal would be made of ſome mixture of *Sea-coal* with *Earth*, or *Chalk*; for if that mixture be, as the *Sea-coal-men* uſe it privily, to make the Bulk of the *Coal* greater, it is deceit; but if it be uſed purpoſely, and be made known, it is ſaving.

776. Experiment Solitary, touching the *Gathering of Wind for Freſhneß.*

IT is at this day in uſe in *Gaza*, to couch *Pot-sherds* or *Veſſels* of *Earth* in their *Walls*, to gather the Wind from the top, and to paſs it down in Spouts into Rooms. It is a device for freſhneſs in great Heats. And it is ſaid, there are ſome Rooms in *Italy* and *Spain* for freſhneſs, and gathering the Winds and Air in the Heats of Summer; but they be but Pennings of the Winds, and enlarging them again, and making them reverberate, and go round in Circles, rather then this device of Spouts in the Wall.

777. Experiment Solitary, touching the *Tryals of Airs.*

THere would be uſed much diligence in the choice of ſome Bodies and Places (as it were) for the taſting of Air, to diſcover the wholeſomeneſs or unwholeſomneſs as well of Seaſons, as of the Seats of Dwellings. It is certain, that there be ſome Houſes wherein Confitures and Pies, will gather Mould more then in others; and I am perſwaded, that a piece of raw Fleſh or Fiſh, will ſooner corrupt in ſome Airs then in others. They be noble *Experiments* that can make this diſcovery; for they ſerve for a Natural Divination of Seaſons, better then the Aſtronomers can by their Figures; and again, they teach men where to chuſe their dwelling for their better health.

778. Experiment Solitary, touching *Increaſing of Milk in Milk-Beaſts.*

THere is a kinde of *Stone* about *Bethlehem* which they grinde to powder, and put into Water, whereof Cattel drink, which maketh them give more Milk. Surely, there would be ſome better Tryals made of Mixtures of Water in Ponds for Cattel, to make them more Milch, or to fatten them, or to keep them from *Murrain*. It may be, *Chalk* and *Nitre* are of the beſt.

779. Experiment Solitary, touching *Sand of the Nature of Glaß.*

IT is reported, that in the Valley near the Mountain *Carmel* in *Judea*, there is a Sand, which of all other, hath moſt affinity with Glaſs, inſomuch, as other Minerals laid in it, turn to a glaſſie ſubſtance without the fire; and again, Glaſs put into it, turneth into the Mother-ſand. The thing is very ſtrange, if it be true; and it is likelieſt to be cauſed by ſome natural Furnace of Heat in the Earth, and yet they do not ſpeak of any Eruption of Flames It were good to try in Glaſs-works, whether the crude Materials of Glaſs mingled with Glaſs, already made and remoulten, do not facilitate the making of Glaſs with leſs heat.

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780. Experiment Solitary, touching the *Growth of Coral.*

IN the Sea, upon the *South-West* of *Sicily*, much Coral is found. It is a Submarine Plant, it hath no leaves, it brancheth onely when it is under Water; it is soft, and green of colour; but being brought into the Air, it becometh hard, and shining red, as we see. It is said also to have a white Berry, but we finde it not brought over with the Coral: Belike it is cast away as nothing worth. Idquire better of it, for the discovery of the Nature of the Plant.

781. Experiment Solitary, touching the *Gathering of Manna.*

THe *Manna* of *Calabria* is the best, and in most plenty. They gather it from the Leaf of the *Mulberry-tree*; but not of such *Mulberry-trees* as grow in the Valleys: And *Manna* falleth upon the Leaves by night, as other Dews do. It should seem, that before those Dews come upon Trees in the Valleys, they dissipate and cannot hold out. It should seem also, the Mulberry-leaf it self hath some coagulating virtue, which inspissateth the Dew; for that it is not found upon other Trees: And we see by the Silk worm, which feedeth upon that Leaf, what a dainty smooth Juice it hath; and the Leaves also (especially of the Black Mulberry) are somewhat bristly, which may help to preserve the Dew. Certainly, it were not amiss to observe a little better the Dews that fall upon Trees or Herbs growing on *Mountains*; for it may be, many Dews fall that spend before they come to the Valleys. And I suppose, that he that would gather the best *May* Dew for Medicine, should gather it from the Hills.

782. Experiment Solitary, touching the *Correcting of Wine.*

IT is said, they have a manner to prepare their *Greek Wines*, to keep them from Fuming and Inebriating, by adding some *Sulphur* or *Allum*; whereof the one is Unctuous, and the other is Astringent. And certain it is, that those two Natures do repress the Fumes. This *Experiment* would be transferred unto other Wine and Strong-Beer, by putting in some like Substances while they work; which may make them both to Fume less, and to inflame less.

783. Experiment Solitary, touching the *Materials of Wildfire.*

IT is conceived by some, (not improbably) that the reason why Wildfires (whereof the principal ingredient is *Bitumen*) do not quench with Water, is, for that the first concretion of *Bitumen*, is a mixture of a fiery and watry substance; so is not *Sulphur*. This appeareth, for that in the place near *Puteoli*, which they call the *Court of Vulcan*, you shall hear under the Earth a horrible thundring of Fire and Water conflicting together; and there break forth also Spouts of boiling Water. Now that place yieldeth great quantities of *Bitumen*; whereas *Ætna*, and *Vesuvius*, and the like, which consist upon *Sulphur*, shoot forth Smoak, and Ashes, and Pumice, but no Water. It is reported also, that *Bitumen* mingled with Lime, and put under Water, will make, as it were, an artificial Rock, the substance becometh so hard.

784. Experiment Solitary, touching *Plaister growing as hard as Marble.*

THere is a Cement compounded of Flower, Whites of Eggs, and Stone powdred, that becometh hard as Marble, wherewith *Piscina Mirabilis*, near *Cuma*, is said to have the Walls plaistered. And it is certain, and tried, that the Powder of Load-stone and Flint, by the addition of Whites of Eggs and Gum-dragon, made into Paste, will in a few days harden to the hardness of a Stone.

785. Experiment Solitary, touching *Judgment of the Cure in some Ulcers and Hurts.*

IT hath been noted by the *Antients*, that in full or impure Bodies, Ulcers or Hurts in the Legs are hard to cure, and in the Head more easie. The cause is, for that Ulcers or Hurts in the Legs require Desiccation, which by the defluxion of Humors to the lower parts is hindred, whereas Hurts and Ulcers in the Head require it not; but, contrariwise, Dryness maketh them more apt to Consolidate. And in Modern observation, the like difference hath been found between French-men and English men; whereof the ones Constitution is more dry, and the others more moist: And therefore a Hurt of the Head is harder to cure in a French-man, and of the Leg in an English-man.

786. Experiment Solitary, touching the *Healthfulness or Unhealthfulness of the Southern Wind.*

IT hath been noted by the *Ancients*, that *Southern Winds* blowing much without Rain, do cause a *Fevorous Disposition* of the *Year*; but with Rain, not. The cause is, for that *Southern Winds* do of themselves qualifie the Air to be apt to cause *Fevers*; but when Showers are joyned, they do refrigerate in part, and check the soultry Heat of the Southern Wind. Therefore this holdeth not in the Sea-coasts, because the vapor of the Sea without Showers doth refresh.

787. Experiment Solitary, touching *Wounds.*

IT hath been noted by the *Ancients*, that Wounds which are made with Brass, heal more easily then Wounds made with Iron. The cause is, for that Brass hath in it self a Sanative virtue, and so in the very instant helpeth somewhat; but Iron is Corrosive, and not Sanative. And therefore it were good that the Instruments which are used by Chirurgions about Wounds were rather of Brass then Iron.

788. Experiment Solitary, touching *Mortification by Cold.*

IN the cold Countreys, when Mens Noses and Ears are mortified, and (as it were) Gangrened with cold, if they come to a Fire, they rot off presently. The cause is, for that the few Spirits that remain in those parts are suddenly drawn forth, and so Putrefaction is made compleat. But Snow put upon them helpeth, for that it preserveth those Spirits that remain till they can revive; and besides, Snow hath in it a secret warmth; as the *Monk* proved out of the Text, *Qui dat Nivem sicut Lanam, Gelu sicut Cineres spargit*; whereby he did infer, that Snow did warm like Wool, and Frost did fret like Ashes. Warm Water also doth good, because by little and little it openeth the pores, without any sudden working upon the Spirits. This *Experiment* may be transferred unto the cure of *Gangrenes*, either coming of themselves, or induced by too much applying of *Opiates*; wherein you must beware of dry Heat, and resort to things that are Refrigerant, with an inward warmth and virtue of cherishing.

789. Experiment Solitary, touching *Weight.*

WEigh Iron and *Aqua-fortis* severally, then dissolve the Iron in the *Aqua-fortis*, and weigh the Dissolution; and you shall finde it to bear as good weight as the Bodies did severally, notwithstanding a good deal of waste by a thick vapor that issueth during the working; which sheweth, that the opening of a Body doth increase the weight. This was tryed once or twice, but I know not whether there were any Error in the Tryal.

790. Experiment Solitary, touching the *Superation of Bodies.*

TAke of *Aqua-fortis* two Ounces, of *Quick-silver* two Drachms, (for that charge the *Aqua fortis* will bear) the Dissolution will not bear a Flint as big as a *Nutmeg*; yet (no doubt) the increasing of the weight of Water

Water will increase his power of bearing; as we see Broyn, when it is salt enough, will bear an Egg. And I remember well a Physitian, that used to give some Mineral Baths for the Gout &c. And the Body when it was put into the Bath, could not get down so easily as in ordinary Water. But it seemeth, the weight of the Quicksilver, more then the weight of a Stone, doth not compense the weight of a Stone, more then the weight of the *Aqua-fortis*.

791. Experiment Solitary, touching the *Flying of unequal Bodies in the Air.*

LEt there be a Body of unequal weight, (as of Wood and Lead, or Bone and Lead;) if you throw it from you with the light end forward, it will turn, and the weightier end will recover to be forwards, unless the Body be over-long. The cause is, for that the more Dense Body hath a more violent pressure of the parts from the first impulsion; which is the cause (though heretofore not found out, as hath been often said) of all Violent Motions: And when the hinder part moveth swifter (for that it less endureth pressure of parts) then the forward part can make way for it, it must needs be that the Body turn over; for (turned) it can more easily draw forward the lighter part. *Galilæus* noteth it well, That if an open Trough, wherein Water is, be driven faster then the Water can follow, the Water gathereth upon an heap towards the hinder end, where the motion began; which he supposeth (holding confidently the motion of the Earth) to be the cause of the Ebbing and Flowing of the Ocean, because the Earth over-runneth the Water. Which Theory though it be false, yet the first *Experiment* is true; as for the inequality of the pressure of parts, it appeareth manifestly in this, That if you take a body of Stone or Iron, and another of Wood, of the same magnitude and shape, and throw them with equal force, you cannot possibly throw the Wood so far as the Stone or Iron.

792. Experiment Solitary, touching *Water, that it may be the Medium of Sounds.*

IT is certain (as it hath been formerly in part touched) that Water may be the *Medium* of Sounds. If you dash a Stone against a Stone in the bottom of the Water, it makes a Sound; so a long Pole struck upon Gravel, in the bottom of the Water, maketh a Sound. Nay, if you should think that the Sound cometh up by the Pole, and not by the Water, you shall finde that an Anchor let down by a Rope maketh a Sonnd; and yet the Rope is no solid Body, whereby the Sound can ascend.

793. Experiment Solitary, *of the Flight of the Spirits upon odious Objects.*

ALl objects of the Senses which are very offensive, do cause the Spirits to retire; and upon their flight, the parts are (in some degree) destitute, and so there is induced in them a trepidation and horror. For Sounds, we see, that the grating of a Saw, or any very harsh noise, will set the Teeth on edge, and make all the Body shiver. For Tastes, we see, that in the taking of a Potion, or Pills, the Head and the Neck shake. For odious smells, the like effect followeth, which is less perceived, because there is a remedy at hand, by stopping of the Nose. But in Horses, that can use no such help, we see the smell of a Carrion, especially of a dead Horse, maketh them flie away, and take on almost, as if they were mad. For Feeling, if you come out of the Sun suddenly into a shade, there followeth a chilness or shivering in all the Body. And even in Sight, which hath (in effect) no odious object, coming into sudden darkness, induceth an offer to shiver.

794. Experiment Solitary, touching the *Super-Reflexion of Echoes.*

THere is in the City of *Ticinum* in *Italy*, a Church that hath Windows onely from above; it is in Length an hundred Feet, in Bredth twenty Feet, and in Height near fifty, having a Door in the midst. It reporteth, the

the voice twelve or thirteen times. If you ſtand by the cloſe end-wall over againſt the Door, the Echo fadeth and dieth by little and little, as the Echo at *Pont-Charenton* doth, and the voice ſoundeth as if it came from above the Door; and if you ſtand at the lower end, or on either ſide of the Door, the Echo holdeth; but if you ſtand in the Door, or in the midſt juſt over againſt the Door, not. Note, that all Echoes ſound better againſt old Walls then new, becauſe they are more dry and hollow.

795. Experiment Solitary, touching the *force of Imagination, Imitating that of the Senſe.*

THoſe effects which are wrought by the percuſſion of the Senſe, and by things in Fact, are produced likewiſe in ſome degree by the Imagination: Therefore if a man ſee another eat ſour or acide things, which ſet the Teeth on edge, this object tainteth the Imagination; ſo that he that ſeeth the thing done by another, hath his own Teeth alſo ſet on edge. So if a man ſee another turn ſwiftly and long, or if he look upon Wheels that turn, himſelf waxeth Turn-ſick. So if a man be upon a high place, without Rails, or good hold, except he be uſed to it, he is ready to fall; for imagining a fall, it putteth his ſpirits into the very action of a fall. So many upon the ſeeing of others Bleed, or Strangled, or Tortured, themſelves are ready to faint, as if they bled, or were in ſtrife.

796. Experiment Solitary, touching *Preſervation of Bodies.*

TAke a *Stock-Gilliflower*, and tie it gently upon a ſtick, and put them both both into a Stoop-glaſs full of Quick-ſilver, ſo that the Flower be covered; then lay a little weight upon the top of the Glaſs, that may keep the ſtick down; and look upon them after four or five days, and you ſhall finde the Flower freſh, and the Stalk harder and leſs flexible then it was. If you compare it with another Flower, gathered at the ſame time, it will be the more manifeſt. This ſheweth, that *Bodies* do preſerve excellently in *Quick-ſilver*; and not preſerve onely, but by the coldneſs of the *Quick-ſilver*, indurate. For the freſhneſs of the Flower may be meerly Conſervation, (which is the more to be obſerved, becauſe the *Quick-ſilver* preſſeth the *Flower*) but the ſtifneſs of the Stalk cannot be without Induration from the cold (as it ſeemeth) of the *Quick ſilver.*

797. Experiment Solitary, touching the *Growth or Multiplying of Metals.*

IT is reported by ſome of the *Ancients*, That in *Cyprus* there is a kinde of Iron, that being cut into little pieces, and put into the ground, if it be well watered, will encreaſe into greater pieces. This is certain, and known of old, that Lead will multiply and encreaſe; as hath been ſeen in old *Statues* of Stone, which have been put in *Cellars*, the Feet of them being bound with *Leaden bands*; where (after a time) there appeared, that the Lead did ſwell, inſomuch, as it hanged upon the Stone like Warts.

798. Experiment Solitary, touching the *Drowning of the more Baſe Metal, in the more Precious.*

I Call that drowning of Metals, when the baſer Metal is ſo incorporate with the more rich, as it can by no means be ſeparated again; which is a kinde of Verſion, though falſe; as if *Silver* ſhould be inſeparably incorporated with *Gold*, or *Copper* and *Lead* with *Silver*. The *Ancient Electrum* had in it a fifth of *Silver* to the *Gold*, and made a Compound Metal, as fit for moſt uſes as *Gold*, and more reſplendent, and more qualified in ſome other properties; but then that was eaſily ſeparated. This to do privily, or to make the Compound paſs for the rich Metal ſimple, is an adulteration or counterfeiting; but if it be done avowedly and without diſguiſing, it may be a great ſaving of the richer Metal. I remember to have heard of a man ſkilful in Metals, that a fifteenth part of *Silver* incorporate with

Gold

799. Experiment Solitary, touching *Fixation of Bodies.*

Gold is the onely Substance which hath nothing in it Volatile, and yet melteth without much difficulty. The Melting sheweth, that it is not jejune or scarce in Spirit. So that the fixing of it is not want of Spirit to flie out, but the equal spreding of the Tangible parts, and the close coacervation of them; whereby they have the less appetite, and no means (at all) to issue forth. It were good therefore to try whether Glass Re-molten, do lose any weight; for the parts in Glass are evenly spred, but they are not so close as in Gold; as we see by the easie admission of Light, Heat, and Cold, and by the smalness of the weight. There be other Bodies fixed, which have little or no Spirit, so as there is nothing to flie out; as we see in the Stuff, whereof Coppels are made, which they put into Furnaces, upon which Fire worketh not. So that there are three causes of Fixation; the *Even-spreding* both of the *Spirits* and *Tangible parts*; the *Closeness* of the *Tangible parts*; and the *Jejuneness* or *Extream Comminution* of *Spirits*: Of which three, the two first may be joyned with a *Nature Liquefiable*, the last not.

800. Experiment Solitary, touching the *Restless Nature of Things in themselves, and their Desire to Change.*

IT is a profound *Contemplation in Nature*, to consider of the Emptiness (as we may call it) or Insatisfaction of several Bodies, and of their appetite to take in others. Air taketh in Lights, and Sounds, and Smells, and Vapors: And it is most manifest, that it doth it with a kinde of Thirst, as not satisfied with his own former Consistence; for else it would never receive them in so suddenly and easily. *Water* and all *Liquors* do hastily receive dry and more Terrestrial Bodies proportionable; and Dry Bodies, on the other side, drink in Waters and Liquors: So that (as it was well said by one of the *Ancients*, of Earthy and Watry Substances) one is a Glue to another. *Parchments, Skins, Cloth, &c.* drink in Liquors; though themselves be entire Bodies, and not comminuted, as *Sand* and *Ashes*, nor apparently porous. *Metals* themselves do receive in readily *Strong-Waters*, and *Strong-Waters* likewise do readily pierce into *Metals* and *Stones*; and that *Strong-Water* will touch upon *Gold*, that will not touch upon *Silver*, and *è converso*. And *Gold*, which seemeth by the weight to be the closest and most solid Body, doth greedily drink in *Quick-silver*. And it seemeth, that this Reception of other Bodies is not violent; for it is (many times) reciprocal, and, as it were, with consent. Of the cause of this, and to what Axiom it may be referred, consider attentively; for as for the pretty assertion, That *Matter* is like a *Common Strumpet* that desireth all *Forms*, it is but a Wandring Notion. Onely *Flame* doth not content it self to take in any other Body; but either to overcome, and turn another Body into it self, as by victory, or it self to die and go out.

NATURAL HISTORY

Century IX.

IT is certain, That all *Bodies* whatsoever, though they have no Sense, yet they have Perception: For when one *Body* is applied to another, there is a kinde of Election, to embrace that which is agreeable, and to exclude or expel that which is ingrate: And whether the *Body* be alterant or altered, evermore a Perception precedeth Operation; for else all *Bodies* would be alike one to another. And sometimes this Perception in some kinde of *Bodies* is far more subtil then the Sense; so that the Sense is but a dull thing in comparison of it. We see a *Weather-glass* will finde the least difference of the Weather in Heat or Cold, when Men finde it not. And this Perception also is sometimes at distance, as well as upon the touch; as when the *Load-stone* draweth Iron, or Flame fireth *Naphtha* of *Babylon* a great distance off. It is therefore a subject of a very *Noble Enquiry*, to enquire of the more *subtil Perceptions*; for it is another Key to open *Nature*, as well as the *Sense*, and sometimes better: And besides, it is a principal means of *Natural Divination*; for that which in these Perceptions appeareth early, in the great effects cometh long after. It is true also, that it serveth to discover that which is hid, as well as to foretel that which is to come, as it is in many *subtil Tryals*: As to try whether *Seeds* be old or new, the *Sense* cannot inform; but if you boil them in Water, the new Seeds will sprout sooner. And so of Water, the taste will not discover the best Water; but the speedy consuming of it, and many other means which we have heretofore set down, will discover it. So in all *Physiognomy*, the *Lineaments* of the *Body* will discover those Natural Inclinations of the Minde, which Dissimulation will conceal, or Discipline will suppress. We shall therefore now handle onely those two *Perceptions* which pertain to *Natural Divination* and *Discovery*, leaving the handling of

Experiments in Consort, touching *Perception in Bodies Insensible, tending to Natural Divination or Subtil Tryals.*

Perception in other things to be disposed elsewhere. Now it is true, that *Divination* is attained by other *means*; as if you know the causes, if you know the *Concomitants*, you may judge of the effect to follow; and the like may be said of *Discovery*. But we tye our selves here to that *Divination* and *Discovery* chiefly, which is caused by an early or subtil *Perception*.

The aptness or propension of Air or Water to corrupt or putrefie, (no doubt) is to be found before it break forth into manifest effects of Diseases, Blasting, or the like. We will therefore set down some Prognosticks of Pestilential and unwholsome years.

801. The Wind blowing much from the South without Rain, and Worms in the Oak-Apple, have been spoken of before. Also the plenty of Frogs, Grashoppers, Flies, and the like Creatures bred of Putrefaction, doth portend Pestilential years.

802. Great and early Heats in the Spring, (and namely in *May*) without Winds, portend the same. And generally so do years with little Wind or Thunder.

803. Great Droughts in Summer, lasting till towards the end of *August*, and some gentle showers upon them, and then some dry weather again, do portend a Pestilent Summer the year following: For about the end of *August*, all the sweetness of the Earth which goeth into *Plants* or *Trees* is exhaled; (and much more if the *August* be dry) so that nothing then can breath forth of the Earth but a gross vapor, which is apt to corrupt the Air; and that vapor by the first showers, if they be gentle, is released, and cometh forth abundantly. Therefore they that come abroad soon after those showers are commonly taken with sickness. And in *Africk* no Body will stir out of doors after the first showers. But if the first showers come vehemently, then they rather wash and fill the Earth, then give it leave to breath forth presently. But if dry weather come again, then it fixeth and continueth the corruption of the Air upon the first showers begun, and maketh it of ill influence even to the next Summer, except a very Frosty Winter discharge it, which seldom succeedeth such Droughts.

804. The lesser Infections of the *Small-Pox*, *Purple Feavers*, *Agues* in the Summer precedent, and hovering all Winter, do portend a great *Pestilence* in the Summer following: For Putrefaction doth not rise to its height at once.

805. It were good to lay a piece of raw Flesh or Fish in the open Air; and if it putrefie quickly, it is a sign of a disposition in the Air to Putrefaction. And because you cannot be informed, whther the Putrefaction be quick or late, except you compare this Experiment with the like Experiment in another year; it were not amiss in the same year, and at the same time, to lay one piece of Flesh or Fish in the open Air, and another of the same kinde and bigness within doors: For I judge, that if a general disposition be in the Air to putrefie, the Flesh or Fish will sooner putrefie abroad, where the Air hath more power then in the House, where it hath less, being many ways corrected. And this Experiment would be made about the end of *March*; for that season is likest to discover what the Winter hath done, and what the Summer following will do upon the Air. And because the Air (no doubt) receiveth great tincture and infusion from the Earth, it were good to try that exposing of Flesh

or

or Fish both upon a Stake of Wood, some height above the Earth, and upon the flat of the Earth.

806. Take *May* Dew, and see whether it putrefie quickly, or no; for that likewise may disclose the quality of the Air, and vapor of the Earth, more or less corrupted.

807. A dry *March*, and a dry *May*, portend a wholesome Summer, if there be a showring *April* between; but otherwise it is a sign of a *Pestilential year*.

808. As the discovery of the disposition of the Air is good for the *Prognosticks* of wholesome and unwholesome years; so it is of much more use for the choice of places to dwell in; at the least for Lodges and Retiring-places for Health, (for Mansion-Houses respect provisions as well as health) wherein the *Experiments* above-mentioned may serve.

809. But for the choice of Places or Seats, it is good to make tryal, not onely of aptness of Air to corrupt, but also of the moisture and dryness of the Air, and the temper of it in heat or cold; for that may concern health diversly. We see that there be some Houses wherein *Sweet Meats* will relent, and *Baked Meats* will mould, more then in others; and *Wainscots* will also sweat more, so that they will almost run with Water: All which (no doubt) are caused chiefly by the moistness of the Air in those Seats. But because it is better to know it before a Man buildeth his House, then to finde it after, take the *Experiments* following.

810. Lay Wool, or a Sponge, or Bread in the place you would try, comparing it with some other places, and see whether it doth not moisten, and make the Wool or Sponge, &c. more ponderous then the other: And if it do, you may judge of that place, as situate in a gross and moist Air.

811. Because it is certain that in some places, either by the Nature of the Earth, or by the situation of Woods and Hills, the Air is more unequal then in others; and inequality of Air is ever an enemy to health: It were good to take two Weather-Glasses, matches in all things, and to set them for the same hours of one day in several places where no shade is nor enclosures; and to mark when you set them, how far the Water cometh; and to compare them when you come again, how the Water standeth then. And if you finde them unequal, you may be sure, that the place where the Water is lowest is in the warmer Air, and the other in the Colder. And the greater the inequality is of the ascent or descent of the Water, the greater is the inequality of the temper of the Air.

812. The *Predictions* likewise of cold and long Winters, and hot and dry Summers, are good to be known, as well for the discovery of the causes, as for divers Provisions. That of *Plenty of Haws*, and *Heps*, and *Bryar-Berries*, hath been spoken of before. If *Wainscot* or *Stone*, that have used to sweat, be more dry in the beginning of Winter, or the drops of the Eavs of Houses come more slowly down then they use, it portendeth a hard and frosty Winter. The cause is, for that it sheweth an inclination of the Air to dry Weather, which in Winter is ever joyned with Frost.

813. Generally a moist and a cool Summer, portendeth a hard Winter. The cause is, for that the vapors of the Earth are not dissipated in the Summer by the Sun; and so they rebound upon the Winter.

814. A hot and dry Summer and Autumn, and especially if the heat and drought extend far into *September*, portendeth an open beginning of Winter, and colds to succeed toward the latter part of the Winter, and the beginning of the Spring. For till then the former heat and drought bear the sway, and the vapors are not sufficiently multiplied.

815. An open and warm Winter portendeth a hot and dry Summer: For the Vapors disperse into the Winter showers; whereas Cold and Frost keepeth them in, and transporteth them into the late Spring and Summer following.

816. *Birds* that use to change Countreys at certain Seasons, if they come earlier, do shew the temperature of Weather according to that Countrey whence they came: As the Winter-Birds, (namely, *Woodcocks, Feldefares, &c.*) if they come earlier, and out of the *Northern Countreys*, with us shew cold Winters. And if it be in the same Countrey, then they shew a temperature of Season, like unto that Season in which they come; as *Swallows, Bats, Cuckoes, &c.* that come towards Summer, if they come early, shew a hot Summer to follow.

817. The *Prognosticks* more immediate of Weather to follow soon after, are more certain then those of Seasons: The Resounding of the Sea upon the Shore, and the Murmur of Winds in the Woods, without apparent Wind, shew Wind to follow. For such Winds, breathing chiefly out of the Earth, are not at the first perceived, except they be pent by Water or Wood. And therefore a Murmur out of Caves likewise portendeth as much.

818. The Upper Regions of the Air, perceive the Collection of the matter of Tempest and Winds before the Air here below. And therefore the obscuring of the smaller Stars, is a sign of Tempests following. And of this kinde you shall finde a number of instances in our *Inquisition de Ventis*.

819. Great Mountains have a Perception of the disposition of the Air to Tempests sooner, then the Valleys or Plains below. And therefore they say in *Wales*; *When certain Hills have their Night-caps on, they mean mischief*. The cause is, for that Tempests which are for the most part bred above in the Middle Region, (as they call it) are soonest perceived to collect in the places next it.

820. The Air and Fire have subtil Perceptions of Wind rising before Men finde it. We see the trembling of a Candle will discover a Wind, that otherwise we do not feel; and the Flexious burning of Flames doth shew the Air beginneth to be unquiet; and so do Coals of fire, by casting off the ashes more then they use. The cause is, for that no Wind at the first, till it hath struck and driven the Air, is apparent to the Sense; but flame is easier to move then Air. And for the Ashes, it is no marvel though Wind unperceived shake them off; for we usually try which way the Wind bloweth, by casting up Grass or Chaff, or such light things into the Air.

821. When Wind expireth from under the Sea, as it causeth some resoundings of the Water, (whereof we spake before) so it causeth some light motions of Bubbles, and white Circles of Froth. The cause is, for that the Wind cannot be perceived by the Sense, until there be an Eruption of a great quantity from under the Water, and so it getteth into a Body, whereas in the first putting up, it cometh in little portions.

822. We spake of the Ashes that Coals cast off, and of Grass and Chaff carried by the Wind; so any light thing that moveth when we find no VVind, sheweth a VVind at hand: As when Feathers or Down of Thistles flie to and fro in the Air.

For *Prognosticks* of VVeather from *Living Creatures*, it is to be noted, That Creatures that live in the open Air (*sub dio*) must needs have a quicker impression from the Air, then Men that live most within doors; and especially Birds who live in the Air freest and clearest, and are aptest by their voice to tell tales what they finde, and likewise by the motion of their flight to express the same.

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VVater-fowls (at *Sea-Gulls*, *Moor-Hens*, *&c.*) when they flock and flie together from the Sea towards the Shores; and contrariwise Land Birds, (as *Crows Swallows*, *&c.* when they flie from the Land to the VVaters, and beat the VVaters with their VVings, do foreshew Rain and VVind. The cause is; Pleasure that both kindes take in the moistness and density of the Air, and so desire to be in motion, and upon the VVing, whither-soever they would otherwise go: For it is no marvel that VVater-fowl do joy most in that Air which is likest VVaters; and Land Birds also (many of them) delight in Bathing and moist Air. For the same reason also, many Birds do prune their Feathers, and Geese do gaggle, and Crows seem to call upon Rain. All which is but the comfort they seem to receive in the relenting of the Air. 823.

The *Heron* when she soareth high, (so as sometimes she is seen to pass over a Cloud) sheweth VVinds: But *Kites* flying aloft, shew fair and dry weather. The cause may be, for that they both mount most into the Air of that temper wherein they delight. And the *Heron*, being a VVater-fowl, taketh pleasure in the Air that is condensed; and besides, being but heavy of VVing, needeth the help of the grosser Air. But the *Kite* affecteth not so much the grossness of the Air, as the cold and freshness thereof; for being a *Bird of Prey*, and therefore hot, she delighteth in the fresh Air, and (many times) flieth against the VVind; as *Trouts* and *Salmons* swim against the stream. And yet it is true also, that all Birds finde an ease in the depth of the Air, as Swimmers do in a deep VVater. And therefore when they are also, they can uphold themselves with their VVings spred, scarce moving them. 824.

Fishes when they play towards the top of the VVater, do commonly foretel Rain. The cause is, for that a Fish hating the dry, will not approach the Air till it groweth moist; and when it is dry will flie it, and swim lower. 825.

Beasts do take comfort (generally) in a moist Air, and it maketh them eat their Meat better; and therefore *Sheep* will get up betimes in the morning to feed against Rain; and Cattle, and Deer, and Coneys will feed hard before Rain; and a *Heifer* will put up his Nose, and snuff in the Air against Rain. 826.

The *Trifoil* against Rain, swelleth in the Stalk, and so standeth more upright; for by wet, Stalks do erect, and Leaves bow down. There is a small Red Flower in the Stubble-fields, which Countrey people call the *VVincopipe*; which, if it open in the Morning, you may be sure of a fair day to follow. 827.

Even in *Men*, *Aches*, and *Hurts*, and *Corns*, do engrieve either towards Rain, or towards Frost; for the one maketh the Humors more to abound, and the other maketh them sharper. So we see both extreams bring the *Gout*. 828.

VVorms, *Vermine*, *&c.* do foreshew (likewise) Rain; for *Earth-worms* will come forth, and *Moles* will cast up more, and *Fleas* bite more against Rain. 829.

Solid Bodies likewise foreshew Rain: As Stones and Wainscot when they swear, and Boxes and Pegs of Wood when they draw and wind hard; though the former be but from an outward cause, for that the Stone or Wainscot turneth and beateth back the Air against it self; but the latter is an inward swelling of the Body of the VVood it self. 830.

Appetite

831. Experiment Solitary, touching the *Nature of Appetite in the Stomack.*

Appetite is moved chiefly by things that are cold and dry. The cause is, for that Cold is a kinde of indigence of Nature, and calleth upon supply, and so is Dryness: And therefore all four things (as *Vinegar, Juyce of Lemmons, Oyl of Vitriol, &c.*) provoke Appetite. And the Disease which they call *Appetitus Caninus*, consisteth in the Matter of an Acide and Glassie Phlegm in the Mouth of the Stomack. *Appetite* is also moved by four things, for that four things induce a contraction in the *Nerves*, placed in the Mouth of the Stomack, which is a great cause of Appetite. As for the cause why Onions, and Salt, and Pepper in Baked Meats move Appetite, it is by Vellication of those Nerves; for Motion whetteth. As for *Wormwood, Olives, Capers*, and others of that kinde, which participate of Bitterness, they move Appetite by Abstersion. So as there be four principal causes of Appetite; the Refrigeration of the Stomack joyned with some Dryness, Contraction, Vellication, and Abstersion; besides Hunger, which is an emptiness; and yet over-fasting doth (many times) cause the Appetite to cease; for that want of Meat maketh the Stomack draw Humors, and such Humors as are light and Cholerick, which quench Appetite most.

832. Experiment Solitary, touching *Sweetness of Odor from the Rainbow.*

It hath been observed by the *Ancients*, that where a *Rainbow* seemeth to hang over, or to touch, there breatheth forth a sweet smell. The cause is, for that this happeneth but in certain matters which have in themselves some Sweetness, which the gentle Dew of the *Rainbow* doth draw forth; and the like do soft Showers, for they also make the Ground sweet: But none are so delicate as the Dew of the *Rainbow* where it falleth. It may be also, that the Water it self hath some Sweetness; for the *Rainbow* consisteth of a Glomeration of small drops, which cannot possibly fall but from the Air that is very low, and therefore may hold the very Sweetness of the Herbs and Flowers as a Distilled Water: For Rain and other Dew that fall from high cannot preserve the smell, being dissipated in the drawing up; neither do we know, whether some Water it self may not have some degree of Sweetness. It is true, that we finde it sensibly in no Pool, River, nor Fountain; but good Earth newly turned up, hath a freshness and good sent; which Water, if it be not too equal, (for equal objects never move the Sense) may also have. Certain it is, that *Bay salt*, which is but a kinde of Water congealed, will sometimes smell like *Violets*.

833. Experiment Solitary, touching *Sweet Smells.*

To sweet Smells, heat is requisite to concoct the Matter, and some Moysture to spred the Breath of them: For heat, we see that Woods and Spices are more odorate in the Hot Countreys, then in the Cold. For Moisture, we see that things too much dryed lose their Sweetness; and Flowers growing smell better in a Morning or Evening, then at Noon. Some sweet smells are destroyed by approach to the Fire; as *Violets, Wall-flowers, Gilliflowers, Pinks*, and generally all Flowers that have cool and delicate Spirits. Some continue both on the fire, and from the fire, as *Rose-water, &c.* Some do scarce come forth, or at least not so pleasantly, as by means of the fire; as *Juniper, Sweet Gums, &c.* and all smells that are enclosed in a fast Body; but (generally) those smells are the most grateful where the degree of heat is small, or where the strength of the smell is allayed; for these things do rather wo the Sense, then satiate it. And therefore the smell of *Violets* and *Roses* exceedeth in sweetness that of Spices; and Gums, and the strongest sort of smells, are best in a west afar off.

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834. Experiment Solitary, touching the *Corporeal Substance of Smells.*

IT is certain, that no ſmell iſſueth but with emiſſion of ſome corporeal ſubſtance; not as it is in Light, and Colours, and Sounds: For we ſee plainly that ſmell doth ſpred nothing that diſtance that the other do. It is true, that ſome Woods of *Orenges*, and *Heaths* of *Roſemary*, will ſmell a great way into the Sea, perhaps twenty Miles; but what is that, ſince a peal of Ordnance will do as much, which moveth in a ſmall compaſs, whereas thoſe Woods and Heaths are of vaſt ſpaces? Beſides, we ſee that ſmells do adhere to hard Bodies; as in perfuming of *Gloves*, *&c.* which ſheweth them corporeal; and do laſt a great while, which Sounds and Light do not.

835. Experiment Solitary, touching *Fetide and Fragrant Odors.*

THe *Excrements* of moſt Creatures ſmell ill, chiefly to the ſame Creature that voideth them: For we ſee, beſides that of Man, that Pigeons and Horſes thrive beſt, if their Houſes and Stables be kept ſweet; and ſo of Cage-Birds; and the Cat burieth that which ſhe voideth. And it holdeth chiefly in thoſe Beaſts which feed upon Fleſh. *Dogs* (almoſt) onely of Beaſts delight in fetide odors; which ſheweth there is ſomewhat in their ſenſe of ſmell differing from the ſmells of other Beaſts. But the cauſe why *Excrements* ſmell ill is manifeſt, for that the Body it ſelf rejecteth them, much more the Spirits: And we ſee, that thoſe *Excrements* that are of the firſt digeſtion ſmell the worſt, as the *Excrements* from the *Belly*; thoſe that are from the ſecond digeſtion, leſs ill, as *Vrine*; and thoſe that are from the third, yet leſs; for Sweat is not ſo bad as the other two, eſpecially of ſome perſons that are full of heat. Likewiſe moſt Putrefactions are of an odious ſmell, for they ſmell either fertile or mouldy. The cauſe may be, for that Putrefaction doth bring forth ſuch a conſiſtence as is moſt contrary to the conſiſtence of the Body whileſt it is ſound, for it is a meer diſſolution of that form. Beſides, there is another reaſon, which is profound: And it is, That the objects that pleaſe any of the ſenſes, have (all) ſome equality, and (as it were) order in their compoſition, but where thoſe are wanting the object is ever ingrate. So mixture of many diſagreeing colours is never unpleaſant to the Eye: Mixture of diſcordant Sounds is unpleaſant to the Ear; mixture or hotch-potch of many taſtes is unpleaſant to the taſte; harſhneſs and ruggedneſs of Bodies is unpleaſant to the touch. Now it is certain, that all Putrefaction, being a diſſolution of the firſt form, is a meer confuſion, and unformed mixture of the part. Nevertheleſs, it is ſtrange, and ſeemeth to croſs the former obſervation, that ſome Putrefactions and Excrements do yield excellent Odors; as *Civit* and *Muſk*, and, as ſome think, *Amber-greece*, for divers take it (though unprobably) to come from the Sperm of Fiſh; and the Moſs we ſpake of from *Apple-trees* is little better then an Excretion. The reaſon may be, for that there paſſeth in the Excrements, and remaineth in the Putrefactions, ſome good ſpirits, eſpecially where they proceed from Creatures that are very hot. But it may be alſo joyned with a further cauſe, which is more ſubtil; and it is, that the Senſes love not to be over-pleaſed, but to have a commixture of ſomewhat that is in it ſelf ingrate. Certainly, we ſee how Diſcords in Muſick, falling upon Concords, make the ſweeteſt ſtrains: And we ſee again what ſtrange taſtes delight the taſte; as *Red-herrings*, *Caviare*, *Parmeſan*, *&c.* And it may be the ſame holdeth in ſmells. For thoſe kinde of ſmells that we have mentioned are all ſtrong, and do pull and vellicate the Senſe. And we finde alſo, that places where men Urine commonly have ſome ſmell of Violets. And Urine, if one hath eaten Nutmeg, hath ſo too.

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The slothful, general, and indefinite Contemplations and Notions of the *Elements*, and their Conjugations of the Influences of *Heaven*, of *Hot*, *Cold*, *Moisture*, *Drought*, *Qualities Active*, *Passive* and the like, have swallowed up the true *Passages*, and *Processes*, and *Affects*, and *Consistencies of Matter*, and *Natural Bodies*. Therefore they are to be set aside, being but notional, and ill limited; and definite axioms are to be drawn out of measured instances, and so assent to be made to the more general axioms by Scale. And of these kindes of *Processes* of *Nature*, and *Characters* of *Matter*, we will now set down some instances.

836. Experiment Solitary, touching the *Causes of Putrefaction.*

ALl Putrefactions come chiefly from the inward Spirits of the Body, and partly also from the *Ambient Body*, be it Air, Liquor, or whatsoever else. And this last, by two means; either by ingress of the substance of the Ambient Body into the Body putrefied, or by excitation and solicitation of the Body putrefied, and the parts thereof, by the Body Ambient. As for the received opinion, that Putrefaction is caused either by Cold, or Peregrine and Preternatural Heat, it is but nugation: For Cold in things inanimate, is the greatest enemy that is to Putrefaction, though it extinguisheth Vivification, which ever consisteth in Spirits attenuate, which the Cold doth congeal and coagulate. And as for the *Peregrine heat*, it is thus far true, That if the proportion of the *Adventive heat*, be greatly predominant to the *Natural heat*, and *Spirits of the Body*, it tendeth to dissolution, or notable alteration. But this is wrought by Emission, or Suppression, or Suffocation of the Native Spirits, and also by the Disordination and Discomposure of the Tangible parts, and other passages of Nature, and not by a conflict of Heats.

837. Experiment Solitary, touching *Bodies unperfectly mixt.*

IN versions or main Alterations of Bodies, there is a *Medium* between the Body, as it is at first, and the Body resulting; which *Medium* is *Corpus imperfectè Mistum*, and is transitory, and not durable; as *Mists Smoaks Vapors*, *Chylus* in the *Stomack*, *Living Creatures* in the first *Vivification*; and the middle action which produceth such *Imperfect Bodies*, is fitly called (by some of the *Ancients*) *Inquination* or *Inconcoction*, which is a kinde of *Putrefaction*; for the parts are in confusion till they settle one way or other.

838. Experiment Solitary, touching *Concoction and Crudity.*

THe word *Concoction* or *Digestion*, is chiefly taken into use from Living Creatures, and their Organs, and from thence extended to Liquors and Fruits, &c. Therefore they speak of Meat concocted, Urine and Excrements concocted; and the Four Digestions (in the Stomack, in the Liver, in the Arteries and Nerves, and in the several parts of the Body) are likewise called *Concoctions*; and they are all made to be the works of *Heat*. All which notions are but ignorant catches of a few things, which are most obvious to Mens observations. The constantest notion of *Concoction* is, that it should signifie the degrees of alteration of one Body into another, from *Crudity* to *Perfect Concoction*, which is the ultimity of that action or process. And while the Body to be converted and altered is too strong for the efficient that should convert or alter it, (whereby it resisteth, and holdeth fast in some degree the first Form or Consistence) it is (all that while) Crude and Inconcoct, and the Process is to be called *Crudity* and *Inconcoction*. It is true, that Concoction is in great part the work of *Heat*; but not the work of *Heat* alone: For all things that further the *Conversion* or *Alteration* (as *Rest*, Mixture of a Body already concocted, &c.) are also means to *Concoction*. And

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there are of Concoction two Periods; the one Assimilation, or absolute Conversion and Subaction; the other Maturation: Whereof, the former is most conspicuous in the Bodies of *Living Creatures*, in which there is an *Absolute Conversion* and *Assimilation* of the *Nourishment* into the Body, and likewise in the Bodies of Plants; and again, in Metals, where there is a full Transmutation. The other (which is Maturation) is seen in Liquors and Fruits; wherein there is not desired, nor pretended, an utter Conversion, but onely an Alteration to that Form which is most sought for Mans use; as in Clarifying of Drinks, Ripening of Fruits, &c. But note, that there be two kindes of *Absolute Conversions*. The one is, when a Body is converted into another Body which was before; as when Nourishment is turned into Flesh: That is it which we call *Assimilation*. The other is, when the *Conversion* is into a Body meerly new, and which was not before; as if *Silver* should be turned to *Gold*, or *Iron* to *Copper*. And this *Conversion* is better called, by distinction sake, *Transmutation*.

839. Experiment Solitary, touching *Alterations which may be called Majors.*

THere are also divers other great alterations of Matter and Bodies, besides those that tend to *Concoction* and *Maturation*; for whatsoever doth so alter a Body, as it returneth not again to that it was, may be called *Alteratio Major*: As when Meat is Boiled, or Rosted, or Fried, &c. or when Bread and Meat are Baked; or when Cheese is made of Curds, or Butter of Cream, or Coals of Wood, or Bricks of Earth; and a number of others. But to apply *Notions Philosophical* to *Plebeian Terms*; or to say, where the *Notions* cannot fitly be reconciled, that there wanteth a *Term* or *Nomenclature* for it, (as the *Ancients* used) they be but shifts of *Ignorance*: For *Knowledge* will be ever a Wandring and Indigested thing, if it be but a commixture of a few *Notions* that are at hand, and occur, and not excited from sufficient number of instances, and those well collated.

The *Consistencies of Bodies* are very divers; *Dense*, *Rare*, *Tangible*, *Pneumatical*; *Volatile*, *Fixed*; *Determinate*, not *Determinate*; *Hard*, *Soft*; *Cleaving*, not *Cleaving*; *Congelable*, not *Congelable*; *Liquefiable*, not *Liquefiable*; *Fragile*, *Tough*; *Flexible*, *Inflexible*; *Tractile*, or to be drawn forth in length, *Intractile*; *Porous*, *Solide*; *Equal* and *Smooth*, *Unequal*; *Venous* and *Fibrous*, and with *Grains*, *Entire*, and divers others. All which to refer to *Heat* and *Cold*, and *Moisture* and *Drought*, is a Compendious and Inutile *Speculation*. But of these see principally our *Abecedarium Naturæ*, and otherwise *sparsum* in this our *Sylva Sylvarum*. Nevertheless, in some good part, we shall handle divers of them now presently.

840. Experiment Solitary, touching *Bodies Liquefiable, and not Liquefiable.*

Liquefiable and *not Liquefiable* proceed from these causes. *Liquefaction* is ever caused by the Detention of the Spirits, which play within the Body, and open it. Therefore such Bodies as are more Turgid of Spirit, or that have their Spirits more streightly imprisoned, or again, that hold them better pleased and content, are *Liquefiable*: For these three *Dispositions of Bodies* do arrest the Emission of the Spirits. An example of the first two Properties is in Metals, and of the last in Grease, Pitch, Sulphur, Butter, Wax, &c. The Disposition not to Liquefie, proceedeth from the easie Emission of the Spirits, whereby the grosser parts contract; and therefore Bodies *jejune* of Spirits, or which part with their Spirits more willingly, are not *Liquefiable*; as Wood, Clay, Freestone, &c. But yet even many of those Bodies that will not melt, or will hardly melt, will notwithstanding soften; as Iron in the Forge,

Forge, and a Stick bathed in hot Ashes, which thereby becometh more Flexible. Moreover, there are some Bodies which do *Liquefie* or dissolve by *Fire*; as *Metals*, *Wax*, *&c.* and other Bodies which dissolve in Water, as *Salt*, *Sugar*, *&c.* The cause of the former proceedeth from the Dilatation of the Spirits by Heat: The cause of the latter proceedeth from the opening of the Tangible Parts, which desire to receive the Liquor. Again, there are some Bodies that dissolve with both; as *Gum*, *&c.* And those be such Bodies as on the one side have good store of Spirit, and on the other side have the Tangible parts indigent of Moisture; for the former helpeth to the dilating of the Spirits by the Fire, and the latter stimulateth the parts to receive the Liquor.

841. Experiment Solitary, touching the *Bodies Fragile and Tough.*

OF Bodies some are Fragile, and some are Tough and not Fragile; and in the breaking, some Fragile Bodies break but where the force is, some shatter and flie in many pieces. Of Fragility, the cause is an impotency to be extended; and therefore Stone is more Fragile then Metal; and so Fictile Earth is more Fragile then Crude Earth, and Dry Wood then Green. And the cause of this unaptness to Extension, is the small quantity of Spirits (for it is the Spirit that furthereth the Extension or Dilatation of Bodies;) and it is ever concomitant with Porosity, and with Driness in the Tangible parts. Contrariwise, Tough Bodies have more Spirits, and fewer Pores, and Moister Tangible parts: Therefore we see, that Parchment or Leather will stretch, Paper will not; Woollen-Cloth will tenter, Linnen scarcely.

842. Experiment Solitary, touching the *Two kindes of Pneumaticals in Bodies.*

ALL solid Bodies consist of Parts of two several *Natures*; *Pneumatical*, and *Tangible*: And it is well to be noted, that the *Pneumatical Substance* is in some Bodies, the Native Spirit of the Body; and in some other, plain Air that is gotten in; as in Bodies desiccate, by Heat, or Age: For in them, when the Native Spirit goeth forth, and the Moisture with it, the Air with time getteth into the Pores. And those Bodies are ever the more Fragile; for the Native Spirit is more Yielding and Extensive (especially to follow the Parts) than Air. The Native Spirits also admit great diversity; as Hot, Cold, Active, Dull, &c. Whence proceed most of the Vertues, and Qualities (as we call them) of Bodies: But the Air intermixt, is without Vertues, and maketh things insipid, and without any extimulation.

843. Experiment Solitary, touching *Concretion and Dissolution of Bodies.*

THE *Concretion of Bodies* is (commonly) solved by the contrary; as Ice, which is congealed by Cold, is dissolved by Heat; Salt and Sugar, which are excocted by Heat, are dissolved by Cold and Moisture. The cause is, for that these operations are rather returns to their former Nature, than alterations; so that the contrary cureth. As for Oyl, it doth neither easily congeal with Cold, nor thicken with Heat. The cause of both Effects, though they be produced by contrary efficients, seemeth to be the same; and that is, because the Spirit of the Oyl, by either means, exhaleth little: For the Cold keepeth it in, and the Heat (except it be vehement) doth not call it forth. As for Cold, though it take hold of the Tangible Parts, yet as to the Spirits, it doth rather make them swell, than congeal them: As when Ice is congealed in a Cup, the Ice will swell instead of contracting, and sometimes rift.

Of

844. Experiment Solitary, touching *Hard and Soft Bodies.*

OF Bodies, some (we see) are hard, and some soft: The hardness is caused (chiefly) by the Jejuneness of the Spirits; and their imparity with the Tangible parts: Both which, if they be in a greater degree, maketh them not onely hard, but fragile, and less enduring of pressure; as *Steel, Stone, Glass, Dry Wood, &c.* Softness cometh (contrariwise) by the greater quantity of Spirits, (which ever helpeth to induce yielding and cession;) and by the more equal spreding of the Tangible parts, which thereby are more sliding, and following; as in *Gold, Lead, Wax, &c.* But note, that soft Bodies (as we use the word) are of two kindes; the one, that easily giveth place to another Body, but altereth not Bulk by rising in other places; and therefore we see that Wax, if you put any thing into it, doth not rise in Bulk, but onely giveth place: For you may not think, that in Printing of Wax, the Wax riseth up at all; but onely the depressed part giveth place, and the other remaineth as it was. The other that altereth Bulk in the Cession, as Water, or other Liquors, if you put a Stone, or any thing into them, they give place (indeed) easily, but then they rise all over; which is a false Cession, for it is in place, and not in Body.

845. Experiment Solitary, touching *Bodies Ductile and Tensile.*

ALl *Bodies Ductile*, and *Tensile*, (as Metals) that will be drawn into Wires; Wool, and Tow that will be drawn into Yarn or Thred; have in them the Appetite of Not discontinuing, strong; which maketh them follow the force that pulleth them out; and yet so, as not discontinue or forsake their own Body. Viscous Bodies (likewise) as *Pitch, Wax, Birdlime, Cheese* toasted, will draw forth and roap. But the difference between Bodies fibrous, and Bodies viscous, is plain: For all Wooll, and Tow, and Cotton, and Silk (especially raw Silk) have, besides their desire of continuance, in regard of the tenuity of their Thred, a greediness of Moisture, and by Moisture to joyn and incorporate with other Thred, especially, if there be a little Wreathing, as appeareth by the twisting of Thred, and the practice of Twirling about of Spindles. And we see also, that Gold and Silver Thred cannot be made without Twisting.

846. Experiment Solitary, touching *Other Passions of Matter, and Characters of Bodies.*

THe differences of impressible, and not impressible; figurable, and not figurable; mouldable, and not mouldable; scissible, and not scissible; and many other Passions of Matter, are Plebeian Notions, applied unto the Instruments and Uses which Men ordinarily practise; but they are all but the effects of some of these causes following, which we will enumerate without applying them, because that would be too long. The first is the Cession, or not Cession of Bodies, into a smaller space, or room, keeping the outward Bulk, and not flying up. The second is, the stronger or weaker Appetite, in Bodies, to continuity, and to flie discontinuity. The third is, the disposition of Bodies, to contract, or not contract; and again, to extend, or not extend. The fourth is, the small quantity, or great quantity of the Pneumatical in Bodies. The fifth is, the nature of the Pneumatical, whether it be Native Spirit of the Body, or common Air. The sixth is, the Nature of the Native Spirits in the Body, whether they be Active, and Eager, or Dull, and Gentle. The seventh is, the emission or detension of the Spirits in Bodies. The eighth is, the dilatation or contraction of the Spirits in Bodies, while they are detained. The nineth is, the collocation of the Spirits in Bodies, whether the collocation be equal or unequal; and again, whether the Spirits be coacervate or diffused. The tenth is, the density or rarity of the Tangible parts.

the eleventh is the Equality or Inequality of the Tangible parts; the twelfth is the Diſgeſtion or Crudity of the Tangible parts; the thirteenth is the Nature of the Matter, whether Sulphureous, or Mercurial, or Watry, or Oily, Dry, and Terreſtrial, or Moiſt and Liquid; which Natures of Sulphureous and Mercurial, ſeem to be Natures Radical and Principal; the fourteenth is the placing of the Tangible parts, in Length or Tranſverſe (as it is in the Warp, and the Woof of Textiles;) more inward or more outward, &c. The fifteenth is the Poroſity or Imporoſity betwixt the Tangible parts, and the greatneſs or ſmallneſs of the Pores; the ſixteenth is the Collocation and poſture of the Pores. There may be more cauſes, but theſe do occur for the preſent.

847. Experiment Solitary, touching *Induration by Sympathy.*

TAke Lead and melt it, and in the midſt of it, when it beginneth to congeal, make a little dint or hole, and put Quick-ſilver wrapped in a piece of Linnen into that hole, and the Quick-ſilver will fix, and run no more, and endure the Hammer. This is a noble inſtance of Induration, by conſent of one Body with another, and Motion of Excitation to imitate; for to aſcribe it onely to the vapor of the Lead, is leſs probable. *Quære*, whether the fixing may be in ſuch a degree, as it will be figured like other Metals? For if ſo, you may make Works of it for ſome purpoſes, ſo they come not near the Fire.

848. Experiment Solitary, touching *Honey and Sugar.*

SUgar hath put down the uſe of Honey, inſomuch, as we have loſt thoſe obſervations and preparations of Honey, which the *Ancients* had, when it was more in price. Firſt, it ſeemeth, that there was in old time Tree-honey, as well as Bee-honey, which was the Year or Blood iſſuing from the Tree; inſomuch, as one of the *Ancients* relateth, that in *Tribeſond*, there was Honey iſſuing from the Box-trees, which made Men mad. Again, in ancient time, there was a kinde of Honey, which either of the own Nature, or by Art, would grow as hard as Sugar, and was not ſo luſhious as ours; they had alſo a Wine of Honey, which they made thus. They cruſhed the Honey into a great quantity of Water, and then ſtrained the liquor, after they boiled it in a Copper to the half; then they poured it into Earthen Veſſels for a ſmall time, and after turned it into Veſſels of Wood, and kept it for many years. They have alſo, at this day in *Ruſſia*, and thoſe Northern Countreys, *Mead Simple*, which (well made and ſeaſoned) is a good wholeſom Drink, and very clear. They uſe alſo in *Wales*, a Compound Drink of *Mead*, with Herbs and Spices. But mean while it were good, in recompence of that we have loſt in Honey, there were brought in uſe a *Sugar-Mead* (for ſo we may call it) though without any mixture at all of Honey; and to brew it, and keep it ſtale, as they uſe *Mead*; for certainly, though it would not be ſo abſterſive, and opening, and ſolutive a Drink as *Mead*; yet it will be more grateful to the Stomack, and more lenitive, and fit to be uſed in ſharp Diſeaſes: For we ſee, that the uſe of Sugar in Beer and Ale, hath good effects in ſuch caſes.

849. Experiment Solitary, touching the *Finer ſort of Baſe Metals.*

IT is reported by the *Ancients*, that there is a kinde of *Steel*, in ſome places, which would poliſh almoſt as white and bright as Silver. And that there was in *India* a kinde of Braſs, which (being poliſhed) could ſcarce be diſcerned from Gold. This was in the Natural Ure, but I am doubtful, whether Men have ſufficiently refined Metals, which we count Baſe: As, whether Iron, Braſs, and Tin, be refined to the height? But when they come

come to such a fineness, as serveth the ordinary use; they try no further.

850. Experiment Solitary, touching *Cements and Quarries.*

THere have been found certain *Cements* under *Earth*, that are very soft, and yet taken forth into the Sun, harden as hard as Marble: There are also ordinary Quarries in *Sommerset-shire*, which in the Quarry cut soft to any bigness, and in the Building prove firm, and hard.

851. Experiment Solitary, touching the *Altering of the Colour of Hairs and Feathers.*

Living Creatures (generally) do change their Hair with Age, turning to be Gray and White; as is seen in *Men*, though some earlier, some later; in *Horses*, that are Dappled and turn White; in *Old Squirrels*, that turn Grisly, and many others. So do some *Birds*; as *Cygnets* from Gray turn White; *Hawks* from Brown turn more White: And some *Birds* there be, that upon their Moulting, do turn Colour; as *Robin-Redbrests*, after their Moulting grow to be Red again by degrees; so do *Gold-Finches* upon the Head. The cause is, for that Moisture doth (chiefly) colour Hair, and Feathers; and Dryness turneth them Gray and White; now Hair in Age waxeth Dryer, so do Feathers. As for Feathers, after Moulting, they are young Feathers, and so all one as the Feathers of young Birds. So the Beard is younger than the Hair of the Head, and doth (for the most part) wax hoary later. Out of this ground, a Man may devise the Means of altering the colour of *Birds*, and the Retardation of Hoary-Hairs. But of this see the *Fifth Experiment.*

852. Experiment Solitary, touching the *Differences of Living Creatures, Male and Female.*

THe difference between *Male* and *Female*, in some *Creatures*, is not to be discerned, otherwise than in the parts of Generation; as in *Horses* and *Mares*, *Dogs* and *Bitches*, *Doves* he and she, and others. But some differ in magnitude, and that diversly: For in most the *Male* is the greater; as in *Man*, *Pheasants*, *Peacocks*, *Turkies*, and the like; and in some few, as in *Hawks*, the *Female*. Some differ in the Hair and Feathers, both in the quantity, crispation, and colours of them; as *He-Lions* are Hirsuite, and have great Mains; the She's are smooth like *Cats*. *Bulls* are more crisp upon the Forehead than *Cows*; the *Peacock*, and *Pheasant-cock*, and *Goldfinch-cock*, have glorious and fine colours; the *Hens* have not. Generally, the he's in *Birds* have the faireſt Feathers. Some differ in divers features; as *Bucks* have Horns, *Does* none; *Rams* have more wreathed Horns than *Ewes*; *Cocks* have great Combs and Spurs, *Hens* little or none; *Boars* have great Fangs, *Sows* much less; the *Turkey-cock* hath great and swelling Gills, the *Hen* hath less; *Men* have generally deeper and stronger voices than *Women*. Some differ in faculty, as the *Cock* amongst *Singing Birds*, are the best singers. The chief cause of all these (no doubt) is, for that the *Males* have more strength of heat than the *Females*; which appeareth manifestly in this, that all young Creatures *Males* are like *Females*; and so are *Eunuchs*, and *Gelt Creatures* of all kindes, liker *Females*. Now heat causeth greatness of growth, generally, where there is moisture enough to work upon: But if there be found in any *Creature* (which is seen rarely) an over-great heat in proportion to the moisture, in them the *Female* is the greater; as in *Hawks* and *Sparrows*. And if the heat be ballanced with the moisture, then there is no difference to be seen between *Male* and *Female*; as in the instances of *Horses* and *Dogs*. We see also, that the Horns of *Oxen* and *Cows*, for the most part, are larger than the *Bulls*, which is caused by abundance of moisture, which in the Horns of the *Bull* faileth. Again, Heat causeth Pilosity, and Crispation; and so likewise Beards in *Men*. It also expelleth

finer moisture, which want of heat cannot expel; and that is the cause of the beauty and variety of Feathers: Again, Heat doth put forth many Excrescences, and much solid matter, which want of Heat cannot do. And this is the cause of Horns, and of the greatness of them; and of the greatness of the Combs, and Spurs of Cocks, Gills of Turkey-Cocks, and Fangs of Boars. Heat also dilateth the Pipes and Organs which causeth the deepness of the Voice. Again, Heat refineth the Spirits, and that causeth the Cock singing Bird to excel the Hen.

853. Experiment Solitary, touching the *Comparative Magnitude of Living Creatures.*

THere be Fishes greater than any Beasts; as the *Whale* is far greater than the *Elephant*. And Beasts are (generally) greater than Birds. For Fishes, the cause may be, that because they live not in the Air, they have not their moisture drawn, and soaked by the Air, and Sun-Beams. Also they rest always, in a manner, and are supported by the Water; whereas Motion and Labor do consume. As for the greatness of Beasts, more than of Birds, it is caused, for that Beasts stay longer time in the Womb than Birds, and there nourish, and grow; whereas in Birds, after the Egg laid, there is no further growth, or nourishment from the Female; for the sitting doth vivifie, and not nourish.

854. Experiment Solitary, touching *Exossation of Fruits.*

WE have partly touched before the Means of producing Fruits, without Coars, or Stones. And this we add further, that the cause must be abundance of moisture; for that the Coar, and Stone, are made of a dry Sap: And we see, that it is possible to make a Tree put forth onely in Blossom without Fruit; as in *Cherries* with double Flowers, much more in Fruit without Stones, or Coars. It is reported, that a Cions of an Apple, grafted upon a Colewort-stalk, sendeth forth a great Apple without a Coar. It is not unlikely, that if the inward Pith of a Tree were taken out, so that the Juyce came onely by the Bark, it would work the effect. For it hath been observed, that in Pollards, if the Water get in on the top, and they become hollow, they put forth the more. We add also, that it is delivered for certain by some, that if the Cions be grafted, the small ends downwards, it will make Fruit have little or no Coars, and Stones.

855. Experiment Solitary, touching the *Melioration of Tobacco.*

TObacco is a thing of great price, if it be in request. For an Acre of it will be worth (as is affirmed) Two hundred pounds by the year towards charge. The charge of making the Ground, and otherwise, is great, but nothing to the profit. But the *English Tobacco* hath small credit, as being too dull and earthy: Nay, the *Virginian Tobacco*, though that be in a hotter climate, can get no credit for the same cause. So that a tryal to make *Tobacco* more Aromatical, and better concocted here in *England*, were a thing of great profit. Some have gone about to do it, by drenching the *English Tobacco*, in a Decoction or Infusion of *Indian Tobacco*. But those are but sophistications and toyes; for nothing that is once perfect, and hath run his race, can receive much amendment; you must ever resort to the beginnings of things for Melioration. The way of Maturation of *Tobacco* must (as in other Plants) be from the Heat, either of the Earth, or of the Sun. We see some leading of this in Musk-Melons, which are sown upon a hot Bed, dunged below, upon a Bank turned upon the South Sun, to give Heat by Reflection; laid upon Tiles, which increaseth the Heat; and covered with Straw, to keep them from Cold; they remove them also, which addeth some Life: And by these helps they become as good in

England,

England, as in *Italy*, or *Provence*. These and the like means may be tried in Tobacco. Enquire also of the steeping of Roots, in some such Liquor, as may give them Vigor to put forth strong.

856 Experiment Solitary, touching *Several Heats working the same Effects.*

HEat of the Sun, for the Maturition of Fruits; yea, and the heat of Vivification of Living Creatures, are both represented and supplied by the heat of Fire; and likewise, the heats of the Sun, and life, are represented one by the other. *Trees*, set upon the Backs of Chimneys, do ripen Fruit sooner. *Vines*, that have been drawn in at the Window of a Kitchin, have sent forth Grapes, ripe a moneth (at least) before others. *Stoves*, at the Back of Walls, bring forth *Oranges* here with us. *Eggs*, as is reported by some, have been hatched in the warmth of an *Oven*. It is reported by the *Ancients*, that the *Estrich* layeth her Eggs under Sand, where the heat of the Sun discloseth them.

857. Experiment Solitary, touching *Swelling and Dilatation in Boyling.*

Barley in the Boyling swelleth not much; *Wheat* swelleth more, *Rize* extreamly; insomuch, as a quarter of a Pint (unboiled) will arise to a Pint boiled. The cause (no doubt) is, for that the more close and compact the Body is, the more it will dilate. Now *Barley* is the most hollow, *Wheat* more solid than that, and *Rize* most solid of all. It may be also, that some Bodies have a kinde of Lentor, and more depertible nature than others; as we see it evident in colouration; for a small quantity of *Saffron*, will tinct more, than a very great quantity of *Brasil*, or *Wine*.

858. Experiment Solitary, touching the *Dulcoration of Fruits.*

Fruit groweth sweet by Rowling or Pressing them gently with the Hand; as *Rowling Pears*, *Damasins*, *&c.* By *Rottenness*; as *Medlars*, *Services*, *Sloes*, *Heps*, *&c.* By *Time*; as *Apples*, *Wardens*, *Pomegranates*, *&c.* By certain special *Maturations*; as by laying them in *Hay*, *Straw*, *&c.* And by *Fire*; as in *Roasting*, *Stewing*, *Baking*, *&c.* The cause of the sweetness by Rowling, and Pressing is, Emollition, which they properly enduce; as in beating of *Stock-fish*, *Flesh*, *&c.* By *Rottenness* is, for that the Spirits of the Fruit, by Putrefaction, gather heat, and thereby digest the harder part: For in all Putrefactions there is a degree of heat. By *Time* and *Keeping* is, because the Spirits of the Body, do ever feed upon the tangible parts, and attenuate them. By several Maturations is, by some degree of heat. And by Fire is, because it is the proper work of Heat to refine, and to incorporate; and all sourness consisteth in some grosness of the Body: And all incorporation doth make the mixture of the Body, more equal, in all the parts, which ever enduceth a milder taste.

859. Experiment Solitary, touching *Flesh Edible, and not Edible.*

OF *Fleshes*, some are edible; some, except it be in Famine, not. As those that are not edible, the cause is, for that they have (commonly) too much bitterness of taste; and therefore those Creatures, which are fierce and cholerick, are not edible; as *Lions*, *Wolves*, *Squirrels*, *Dogs*, *Foxes*, *Horses*, *&c.* As for *Kine*, *Sheep*, *Goats*, *Deer*, *Swine*, *Conneys*, *Hares*, *&c.* We see they are milde, and fearful. Yet it is true, that *Horses* which are Beasts of courage, have been and are eaten by some Nations; as the *Scythians* were called *Hippophagi*; and the *Chineses* eat *Horse-flesh* at this day; and some Gluttons have used to have Colts-flesh baked. In *Birds*, such as are *Carnivora*, and Birds of Prey, are commonly no good Meat; but the reason is, rather the Cholerick Nature of those Birds, than their Feeding upon Flesh; for *Puits*, *Gulls*, *Shovelers*, *Ducks*, do feed upon Flesh, and yet are

good Meat. And we see, that those Birds which are of Prey, or feed upon Flesh, are good Meat, when they are very Young; as *Hawks*, *Rooks*, out of the Nest, *Owls*. Mans flesh is not eaten. The Reasons are three.

First, Because Men in Humanity do abhor it.

Secondly, Because no Living Creature, that dieth of it self, is good to eat; and therefore the *Cannibals* (themselves) eat no Mans flesh, of those that die of themselves, but of such as are slain.

The third is, Because there must be generally) some disparity between the Nourishment, and the Body nourished; and they must not be overnear, or like: Yet we see, that in great weaknesses and Consumptions, Men have been sustained with Womans Milk. And *Picinus* fondly (as I conceive) adviseth, for the Prolongation of Life, that a Vein be opened in the Arm of some wholsome young man, and the blood to be sucked. It is said, that Witches do greedily eat Mans flesh, which if it be true, besides a devillish Appetite in them, it is likely to proceed; for that Mans flesh may send up high and pleasing Vapors, which may stir the Imagination, and Witches felicity is chiefly in Imagination, as hath been said.

860. Experiment Solitary, touching the *Salamander*.

THere is an ancient received Tradition of the *Salamander*, that it liveth in the Fire, and hath force also to extinguish the fire. It must have two things, if it be true, to this operation. The one, a very close skin, whereby flame, which in the midst is not so hot, cannot enter: For we see, that if the Palm of the Hand be anointed thick with White of Eggs, and then *Aquavitæ* be poured upon it, and enflamed, yet one may endure the flame a pretty while. The other is some extream cold and quenching vertue, in the Body of that Creature which choaketh the fire. We see that Milk quencheth Wildfire better than VVater, because it entreth better.

861. Experiment Solitary, touching the *Contrary operations of Time, upon Fruits and Liquors*.

TIme doth change Fruit (as *Apples*, *Pears*, *Pomegranates*, &c.) from more sour to more sweet; but contrariwise, Liquors (even those that are of the Juyce of Fruit) from more sweet to more sour; as, *Wort*, *Must*, *New Verjuyce*, &c. The cause is, the Congregation of the Spirits together; for in both kindes, the Spirit is attenuated by Time; but in the first kinde, it is more diffused, and more mastered by the grosser parts, which the Spirits do but digest: But in Drinks the Spirits do reign, and finding less opposition of the parts, become themselves more strong, which causeth also more strength in the Liquor; such, as if the Spirits be of the hotter sort, the Liquor becometh apt to burn; but in time, it causeth likewise, when the higher Spirits are evaporated more sourness.

862. Experiment Solitary, touching *Blows and Bruises*.

IT hath been observed by the *Ancients*, that Plates of Metal, and especially of Brass, applied presently to a blow, will keep it down from swelling. The cause is Repercussion, without Humectation, or entrance of any Body: For the Plate hath onely a virtual cold, which doth not search into the hurt; whereas all Plaisters and Oynments do enter. Surely, the cause that blows and bruises induce swellings is, for that the Spirits resorting to succor the part that laboreth, draw also the humors with them: For we see, that it is not the repulse, and the return of the humor in the part strucken that causeth it; for that Gouts, and Toothachs cause swelling, where there is no Percussion at all.

The

863. Experiment Solitary, touching the *Orris Root.*

THe nature of the *Orris* Root, is almost singular, for there be few odoriferous Roots; and in those that are in any degree sweet, it is but the same sweetness with the Wood or Leaf: But the *Orris* is not sweet in the Leaf, neither is the Flower any thing so sweet as the Root. The Root seemeth to have a tender dainty heat, which when it cometh above ground to the Sun, and the Air, vanisheth: For it is a great Mollifier, and hath a smell like a Violet.

864 Experiment Solitary, touching the *Compression of Liquors.*

IT hath been observed by the *Ancients* that a great Vessel full, drawn into Bottles; and then the Liquor put again into the Vessel, will not fill the Vessel again, so full as it was, but that it may take in more Liquor; and that this holdeth more in Wine, than in Water. The cause may be trivial, namely, by the expence of the Liquor, in regard some may stick to the sides of the Bottles: But there may be a cause more subtil, which is, that the Liquor in the Vessel, is not so much compressed, as in the Bottle; because in the Vessel, the Liquor meeteth with Liquor chiefly; but in the Bottles, a small quantity of Liquor meeteth with the sides of the Bottles, which compress it so, that it doth not open again.

865. Experiment Solitary, touching the *Working of Water upon Air contiguous.*

WAter being contiguous with Air, cooleth it, but moisteneth it not, except it Vapor. The cause is, for that Heat and Cold have a Virtual Transition, without Communication of substance, but moisture not; and to all madefaction there is required an imbibition: But where the Bodies are of such several Levity, and Gravity, as they mingle not, they can follow no imbibition. And therefore, Oyl likewise lieth at the top of the Water, without commixture: And a drop of Water running swiftly over a Straw or smooth Body, wetteth not.

866. Experiment Solitary, touching the *Nature of Air.*

Starlight Nights, yea, and bright *Moonshine Nights*, are colder than *Cloudy Nights*. The cause is, the drineſs and Fineness of the Air, which thereby becometh more piercing and sharp; and therefore great Continents are colder than Islands. And as for the *Moon*, though it self inclineth the Air to moisture, yet when it shineth bright, it argueth the Air is dry. Also close Air is warmer than open Air, which (it may be) is, for that the true cause of cold, is an expiration from the Globe of the Earth, which in open places is stronger. And again, Air it self, if it be not altered by that expiration, is not without some secret degree of heat; as it is not likewise without some secret degree of Light: For otherwise *Cats*, and *Owls*, could not see in the Night; but that Air hath a little Light, proportionable to the Visual Spirits of those Creatures.

867. Experiments in Consort, touching the *Eyes and Sight.*

THe Eyes do move one and the same way; for when one Eye moveth to the Nostril, the other moveth from the Nostril. The cause is Motion of Consent, which in the Spirits and Parts Spiritual, is strong. But yet use will induce the contrary; for some can squint when they will. And the common Tradition is, that if Children be set upon a Table, with a Candle behinde them, both Eyes will move outwards, as affecting to see the Light, and so induce Squinting.

868.

We see more exquisitely with one Eye shut, than with both open. The cause is, for that the Spirits Visual unite themselves more, and so become stronger.

ſtronger. For you may ſee, by looking in a Glaſs, that when you ſhut one Eye, the Pupil of the other Eye, that is open, dilateth.

869. The Eyes, if the ſight meet not in one Angle, ſee things double. The cauſe is, for that ſeeing two things, and ſeeing one thing twice, worke h the ſame effect: And therefore a little Pellet, held between two Fingers, laid a croſs, ſeemeth double.

870. Pore-blind Men, ſee beſt in the dimmer light; and likewiſe have their ſight ſtronger near hand, than thoſe that are not Poreblind, and can read and write ſmaller Letters. The cauſe is, for that the Spirits Viſual, in thoſe that are Poreblind, are thinner and rarer, than in others; and therefore the greater light diſperſeth them. For the ſame cauſe they need contracting; but being contracted, are more ſtrong than the Viſual Spirits of ordinary eyes are; as when we ſee thorow a Level, the ſight is the ſtronger: And ſo is it, when you gather the Eye-lids ſomewhat cloſe: And it is commonly ſeen in thoſe that are Poreblind, that they do much gather the eye-lids together. But old Men, when they would ſee to read, put the Paper ſomewhat a far off. The cauſe is, for that old Mens Spirits Viſual, contrary to thoſe of Poreblind Men unite not, but when the object is at ſome good diſtance from their Eyes.

871. Men ſee better when their Eyes are over-againſt the Sun or a Candle, if they put their Hand a little before their Eye. The Reaſon is, for that the Glaring of the Sun, or the Candle, doth weaken the Eye; whereas the Light circumfuſed is enough for the Perception. For we ſee, that an over-light maketh the Eyes dazel, inſomuch as perpetual looking againſt the Sun, would cauſe Blindneſs. Again, if Men come out of a great light, into a dark room; and contrariwiſe, if they come out of a dark room into a light room, they ſeem to have a Miſt before their Eyes, and ſee worſe than they ſhall do after they have ſtaid a little while, either in the light, or in the dark. The cauſe is, for that the Spirits Viſual, are upon a ſudden change diſturbed, and put out of order; and till they be recollected, do not perform their Function well. For when they are much dilated by light, they cannot contract ſuddenly; and when they are much contracted by darkneſs, they cannot dilate ſuddenly. And exceſs of both theſe, (that is, of the Dilatation, and Contraction of the Spirits Viſual) if it be long, deſtroyeth the Eye. For as long looking againſt the Sun, or Fire, hurteth the Eye by Dilatation, ſo curious painting in ſmall Volumes, and reading of ſmall Letters, do hurt the Eye by contraction.

872. It hath been obſerved, that in Anger the Eyes wax red; and in Bluſhing, not the Eyes, but the Ears, and the parts behind them. The cauſe is, for that in Anger, the Spirits aſcend and wax eager; which is moſt eaſily ſeen in the Eyes, becauſe they are tranſlucide, though withal it maketh both the Cheeks, and the Gils red; but in Bluſhing, it is true, the Spirits aſcend likewiſe to ſuccor, both the Eyes and the Face, which are the parts that labor: But when they are repulſed by the Eyes, for that the Eyes, in ſhame do put back the Spirits that aſcend to them, as unwilling to look abroad: For no Man, in that paſſion, doth look ſtrongly, but dejectedly; and that repulſion from the Eyes, diverteth the Spirits and heat more to the Ears, and the parts by them.

873. The objects of the Sight, may cauſe a great pleaſure and delight in the Spirits, but no pain or great offence; except it be by Memory, as hath been ſaid. The Glimpſes and Beams of Diamonds that ſtrike the Eye, *Indian Feathers*, that have glorious colours, the coming into a fair Garden, the coming into

into a fair Room richly furniſhed; a beautiful perſon, and the like, do delight and exhilarate the Spirits much. The reaſon, why it holdeth not in the offence is, for that the Sight is moſt ſpiritual of the Senſes; whereby it hath no object groſs enough to offend it. But the cauſe (chiefly) is, for that there be no active objects to offend the Eye. For Harmonical Sounds, and Diſcordant Sounds, are both Active and Poſitive; ſo are ſweet ſmells, and ſtinks; ſo are bitter, and ſweets, in taſtes; ſo are over-hot, and over-cold, in touch; but blackneſs, and darkneſs, are indeed but privatives; and therefore have little or no Activity. Somewhat they do contriſtate, but very little.

874. Experiment Solitary, touching the *Colour of the Sea, or other Water.*

Water of the *Sea*, or otherwiſe, looketh blacker when it is moved, and whiter when it reſteth. The cauſe is, for that by means of the Motion, the Beams of Light paſs not ſtraight, and therefore muſt be darkned; whereas when it reſteth, the Beams do paſs ſtraight. Beſides, ſplendor hath a degree of whiteneſs, eſpecially, if there be a little repercuſſion; for a Looking-Glaſs with the Steel behinde, looketh whiter than Glaſs ſimple. This *Experiment* deſerveth to be driven further, in trying by what means Motion may hinder Sight.

875. Experiment Solitary, touching *Shelfiſh.*

Shell-fish have been by ſome of the *Ancients*, compared and ſorted with the *Inſecta*; but I ſee no reaſon why they ſhould, for they have Male, and Female, as other Fiſh have; neither are they bred of Putrefaction, eſpecially ſuch as do move. Nevertheleſs it is certain, that Oyſters, and Cockles, and Muſſels, which move not, have not diſcriminate Sex. *Quære*, in what time, and how they are bred? It ſeemeth, that Shells of Oyſters are bred where none were before; and it is tryed, that the great Horſe-Muſle, with the fine ſhell, that breedeth in Ponds, hath bred within thirty years: But then, which is ſtrange, it hath been tryed, that they do not onely gape and ſhut as the Oyſters do, but remove from one place to another.

876. Experiment Solitary, touching the *Right-ſide and the Left.*

THe *Senſes* are alike ſtrong, both on the right ſide, and on the left; but the Limbs on the right ſide are ſtronger. The cauſe may be, for that the Brain, which is the Inſtrument of Senſe, is alike on both ſides; but Motion, and habilities of moving, are ſomewhat holpen from the Liver, which lieth on the right-ſide. It may be alſo, for that the Senſes are put in exerciſe, indifferently on both ſides from the time of our Birth; but the Limbs are uſed moſt on the right ſide, whereby cuſtom helpeth: For we ſee, that ſome are left-handed, which are ſuch as have uſed the left-hand moſt.

877. Experiment Solitary, touching *Frictions.*

Frictions make the parts more fleſhy, and full: As we ſee both in Men, and in the Currying of Horſes, &c. The cauſe is, for that they draw greater quantity of Spirits and Blood to the parts; and again, becauſe they draw the Aliment more forcibly from within; and again, becauſe they relax the Pores, and ſo make better paſſage for the Spirits, Blood, and Aliment: Laſtly, becauſe they diſſipate, and diſgeſt any Inutile, or Excrementitious moiſture, which lieth in the Fleſh; all which help Aſſimulation. *Frictions* alſo do, more fill and impinguate the Body, than Exerciſe. The cauſe is, for that in *Frictions*, the inward parts are at reſt; which in exerciſe are beaten (many times) too much: And for the ſame reaſon (as we have noted heretofore) Galliſlaves are fat and fleſhy, becauſe they ſtir the Limbs more, and the inward parts leſs.

All

878. Experiment Solitary, touching *Globes appearing Flat at distance.*

ALl *Globes* a far off, appear flat. The cause is, for that distance, being a secundary object of sight, is not otherwise discerned, than by more or less light; which disparity, when it cannot be discerned, all seemeth one: As it is (generally) in objects not distinctly discerned; for so Letters, if they be so far off, as they cannot be discerned, shew but as duskish Paper; and all Engravings and Embossings (a far off) appear plain.

879. Experiment Solitary, touching *Shadows.*

THe uttermost parts of *Shadows*, seem ever to tremble. The cause is, for that the little Moats which we see in the Sun, do ever stir, though there be no Wind; and therefore those moving, in the meeting of the Light and the Shadow, from the Light to the Shadow, and from the Shadow to the Light, do shew the shadow to move, because the *Medium* moveth.

880. Experiment Solitary, touching the *Rowling and Breaking of the Seas.*

Shallow and *Narrow Seas*, break more than deep and large. The cause is, for that the Impulsion being the same in both; where there is a greater quantity of Water, and likewise space enough, there the Water rouleth, and moveth, both more slowly, and with a sloper rise and fall: But where there is less Water, and less space, and the Water dasheth more against the bottom; there it moveth more swiftly, and more in Precipice: For in the breaking of the Waves, there is ever a Precipice.

881. Experiment Solitary, touching the *Dulcoration of Salt water.*

IT hath been observed by the *Ancients*, that *Salt-water* boiled, or boiled and cooled again, is more potable, than of it self raw; and yet the taste of *Salt*, in Distillations by *Fire*, riseth not: For the Distilled Water will be fresh. The cause may be, for that the Salt part of the Water, doth partly rise into a kinde of Scum on the top, and partly goeth into a Sediment in the bottom; and so is rather a separation, than an evaporation. But it is too gross to rise into a vapor; and so is a bitter taste likewise: For simple distilled Waters of *Wormwood*, and the like, are not bitter.

882. Experiment Solitary, touching the *Return of Saltness in Pits upon the Seashore.*

IT hath been set down before, that *Pits* upon the *Sea-shores* turn into fresh Water, by Percolation of the Salt through the Sand: But it is further noted, by some of the *Ancients*, that in some places of *Africk*, after a time, the Water in such Pits will become brakish again. The cause is, for that after a time, the very Sands, thorow which the *Salt-Water* passeth, become Salt; and so the Strainer it self is tincted with Salt. The remedy therefore is to dig still new Pits, when the old wax brackish; as if you would change your Strainer.

883. Experiment Solitary, touching *Attraction by Similitude of Substance.*

IT hath been observed by the *Ancients*, that *Salt-water* will dissolve *Salt* put into it, in less time, than Fresh Water will dissolve it. The cause may be, for that the Salt in the precedent Water, doth by similitude of Substance, draw the Salt new put in, unto it; whereby it diffuseth in the Liquor more speedily. This is a noble *Experiment*, if it be true; for it sheweth means of more quick and easie Infusions; and it is likewise a good instance of Attraction by Similitude of Substance. Try it with Sugar put into Water, formerly sugred, and into other VVater unsugred.

884. Experiment Solitary, touching *Attraction.*

PUt *Sugar* into *Wine*, part of it above, part under the *Wine*; and you shall finde (that which may seem strange) that the *Sugar* above the *Wine*, will soften and dissolve sooner than that within the Wine. The cause is, for that the

the Wine entreth that part of the Sugar which is under the Wine, by ſimple Infuſion or Spreding; but that part above the Wine is likewiſe forced by Sucking: For all Spongy Bodies expel the Air, and draw in Liquor, if it be contiguous; as we ſee it alſo in Sponges, put part above the Water. It is worthy the inquiry, to ſee how you may make more accurate Infuſions, by help of Attraction.

885. Experiment Solitary, touching *Heat upon Earth.*

WAter in Wells is warmer in Winter than in Summer; and ſo Air in Caves. The cauſe is, for that in the higher parts, under the Earth, there is a degree of ſome heat (as appeareth in ſulphureous Veins, &c.) which ſhut cloſe in (as in Winter) is the more; but if it perſpire (as it doth in Summer) it is the leſs.

886. Experiment Solitary, touching *Flying in the Air.*

IT is reported, that amongſt the *Leucadians*, in ancient time, upon a ſuperſtition, they did uſe to precipitate a Man from a high Cliff into the Sea; tying about him with ſtrings, at ſome diſtance, many great Fowls; and fixing unto his Body divers Feathers ſpred, to break the fall. Certainly many Birds of good Wing (as *Kites*, and the like) would bear up a good weight as they flie; and ſpreding of Feathers thin and cloſe, and in great bredth, will likewiſe bear up a great weight, being even laid without tilting upon the ſides. The further extenſion of this Experiment for Flying, may be thought upon.

887. Experiment Solitary, touching the *Dye of Scarlet.*

THere is in ſome places (namely, in *Cephalonia*) a little Shrub, which they call *Holy Oak*, or *Dwarf Oak*. Upon the Leaves whereof there riſeth a Tumor, like a Bliſter; which they gather, and rub out of it, a certain red duſt, that converteth (after a while) into Worms, which they kill with Wine, (as is reported) when they begin to quicken: With this Duſt they Die Scarlet.

888. Experiment Solitary, touching *Maleficiating.*

IN *Zant*, it is very ordinary, to make Men impotent, to accompany with their Wives. The like is practiſed in *Gaſcony*, where it is called *Nover l' Eguillete*. It is practiſed alvvays upon the Wedding day. And in *Zant*, the Mothers themſelves do it by vvay of prevention, becauſe thereby they hinder other Charms, and can undo their ovvn. It is a thing the *Civil Law* taketh knovvledge of, and therefore is of no light regard.

889. Experiment Solitary, touching the *Riſe of Water by Means of Flame.*

IT is a common Experiment, but the cauſe is miſtaken. Take a Pot, (or better a Glaſs, becauſe therein you may ſee the Motion) and ſet a Candle lighted in the Bottom of a Baſon of Water; and turn the Mouth of the Pot or Glaſs over the Candle, and it vvill make the Water riſe. They aſcribe it to the dravving of heat, vvhich is not true: For it appeareth plainly to be but a Motion of *Nexe*, vvhich they call *Ne detur vacuum*, and it proceedeth thus; The Flame of the Candle as ſoon, as it is covered, being ſuffocated by the cloſe Air, leſſeneth by little and little: During vvhich time, there is ſome little aſcent of Water, but not much; for the Flame occupying leſs and leſs room, as it leſſeneth, the Water ſucceedeth. But upon the inſtant of the Candles going out, there is a ſudden riſe of a great deal of Water; for that that the Body of the Flame filleth no more place, and ſo the Air and Water ſucceed. It vvorketh the ſame effect, if inſtead of Water, you put Flovver, or Sand, into the Baſon: Which ſhevveth, that it is not the Flames dravving the Liquor, as Nouriſhment, as it is ſuppoſed; for all Bodies are alike

alike unto it; as it is ever in motion of *Nexe*; insomuch, as I have seen the Glass, being held by the hand, hath lifted up the Bason, and all: The motion of *Nexe* did so clasp the bottom of the Bason. That *Experiment*, when the Bason was lifted up, was made with Oyl, and not with Water. Nevertheless this this is true, that at the very first setting of the Mouth of the Glass, upon the bottom of the Bason, it draweth up the Water a little, and then standeth at a stay, almost till the Candles going out, as was said. This may shew some Attraction at first; but of this we will speak more, when we handle Attractions by Heat.

Experiments in Consort, touching the *Influences of the Moon.*

OF the Power of the *Celestial Bodies*, and what more secret influences they have, besides the two manifest influences of Heat and Light, we shall speak, when we handle *Experiments* touching the *Celestial Bodies*: Mean while, we will give some Directions for more certain Tryals of the Vertue and Influences of the Moon, which is our nearest Neighbor.

The Influences of the Moon (most observed) are four; the drawing forth of Heat; the Inducing of Putrefaction; the increase of Moisture; the exciting of the Motions of Spirits.

890. For the drawing forth of Heat, we have formerly prescribed to take Water warm, and to set part of it against the Moon-beams, and part of it with a Skreen between; and to see whether that which standeth exposed to the Beams will not cool sooner. But because this is but a small interposition, (though in the Sun we see a small shade doth much) it were good to try it when the Moon shineth, and when the Moon shineth not at all; and with Water warm in a Glass-bottle as well as in a Dish, and with Cinders, and with Iron red-hot, &c.

891. For the inducing of Putrefaction, it were good to try it with Flesh or Fish exposed to the Moon-beams, and again exposed to the Air when the Moon shineth not, for the like time, to see whether will corrupt sooner; and try it also with Capon, or some other fowl laid abroad, to see whether it will mortifie and become tender sooner. Try it also with dead Flies or dead Worms, having a little Water cast upon them, to see whether will putrefie sooner. Try it also with an Apple or Orenge, having holes made in their tops, to see whether will rot or mould sooner. Try it also with *Holland* Cheese, having Wine put into it, whether it will breed Mites sooner or greater.

892. For the increase of Moisture, the opinion received is, that Seeds will grow soonest, and Hair, and Nails, and Hedges, and Herbs, cut, &c. will grow soonest, if they be set or cut in the increase of the Moon: Also, that Brains in Rabits, Wood-cocks, Calves, &c. are fullest in the Full of the Moon; and so of Marrow in the Bones, and so of Oysters and Cockles; which of all the rest are the easiest tried, if you have them in Pits.

893. Take some Seeds or Roots (as Onions, &c.) and set some of them immediately after the Change, and others of the same kinde immediately after the Full: Let them be as like as can be, the Earth also the same as near as may be, and therefore best in Pots: Let the Pots also stand where no Rain or Sun may come to them, lest the difference of the Weather confound the *Experiment*. And then see in what time the Seeds set, in the increase of the Moon, come to a certain height, and how they differ from those that are set in the decrease of the Moon.

It

It is like, that the Brain of Man waxeth moister and fuller upon the Full of the Moon; and therefore it were good for those that have moist Brains, and are great Drinkers, to take fume of *Lignum Aloes*, *Rosemary*, *Frankincense*, *&c.* about the Full of the Moon. It is like also, that the Humors in Mens Bodies increase and decrease, as the Moon doth; and therefore it were good to purge some day or two after the Full, for that then the Humors will not replenish so soon again. 894.

As for the exciting of the motion of the Spirits, you must note, that the growth of Hedges, Herbs, Hair, &c. is caused from the Moon, by exciting of the Spirits, as well as by increase of the moisture. But for Spirits in particular, the great instance is in *Lunacies*. 895.

There may be other secret effects of the influence of the Moon, which are not yet brought into observation. It may be, that if it so fall out, that the Wind be North or North-East, in the Full of the Moon, it increaseth Cold; and if South or South-West, it disposeth the Air for a good while to warmth and rain; which would be observed. 896.

It may be that Children and young Cattel that are brought forth in the Full of the Moon, are stronger and larger then those that are brought forth in the Wane; and those also which are begotten in the Full of the Moon: So that it might be good Husbandry, to put Rams and Bulls to their Females somewhat before the Full of the Moon. It may be also, that the Eggs laid in the Full of the Moon, breed the better Birds; and a number of the like effects, which may be brought into observation. *Quære* also, whether great Thunders and Earth-quakes be not most in the Full of the Moon. 897.

THe turning of Wine to Vinegar, is a kinde of Putrefaction; and in making of Vinegar, they use to set Vessels of Wine over against the Noon Sun, which calleth out the more Oily Spirits, and leaveth the Liquor more sour and hard. We see also, that Burnt-Wine is more hard and astringent then Wine unburnt. It is said, that *Cider* in Navigations under the Line ripeneth, when *Wine* or *Beer* soureth. It were good to set a Rundlet of *Verjuice* over against the Sun in Summer, as they do Vinegar, to see whether it will ripen and sweeten. 898. Experiment Solitary, touching *Vinegar*.

THere be divers Creatures that sleep all Winter; as the *Bear*, the *Hedghog*, the *Bat*, the *Bee*, *&c.* These all wax fat when they sleep, and egest not. The cause of their fattening, during their sleeping time, may be the want of assimilating; for whatsoever assimilateth not to Flesh, turneth either to sweat or fat. These Creatures, for part of their sleeping time, have been observed not to stir at all; and for the other part, to stir, but not to remove, and they get warm and close places to sleep in. When the *Flemmings* wintred in *Nova Zembla*, the *Bears* about the middle of *November* went to sleep; and then the *Foxes* began to come forth, which durst not before. It is noted by some of the *Ancients*, that the She Bear breedeth, and lieth in with her young during that time of Rest, and that a Bear big with young, hath seldom been seen. 899. Experiment Solitary, touching *Creatures that Sleep all Winter*.

SOme *Living Creatures* are procreated by Copulation between Male and Female, some by Putrefaction; and of those which come by Putrefaction, many do (nevertheless) afterwards procreate by Copulation. For the cause of both Generations: First, it is most certain, that the cause of all Vivi- 900. Experiment Solitary, touching the *Generation of Creatures by Copulating, and by Putrefaction*.

fication is a gentle and proportionable heat, working upon a gluttinous and yielding ſubſtance; for the heat doth bring forth Spirit in that ſubſtance, and the ſubſtance being gluttinous, produceth two effects; the one, That the Spirit is detained, and cannot break forth; the other, That the matter being gentle and yielding, is driven forwards by the motion of the Spirits, after ſome ſwelling into ſhape and members. Therefore all Sperm, all Menſtruous ſubſtance, all matter whereof Creatures are produced by Putrefaction, have evermore a Cloſeneſs, Lentor, and Sequacity. It ſeemeth therefore that the Generation by Sperm onely, and by Putrefaction, have two different cauſes. The firſt is, for that Creatures which have a definite and exact ſhape (as thoſe have which are procreated by Copulation) cannot be produced by a weak and caſual heat; nor out of matter, which is not exactly prepared according to the Species. The ſecond is, for that there is a greater time required for Maturation of perfect Creatures; for if the time required in Vivification be of any length, then the Spirit will exhale before the Creature be mature; except it be incloſed in a place where it may have continuance of the heat, acceſs of ſome nouriſhment to maintain it, and cloſeneſs that may keep it from exhaling; and ſuch places, or the Wombs and Matrices of the Females: And therefore all Creatures made of Putrefaction, are of more uncertain ſhape, and are made in ſhorter time, and need not ſo perfect an encloſure, though ſome cloſeneſs be commonly required. As for the Heathen opinion, which was, That upon great mutations of the World, perfect Creatures were firſt ingendred of Concretion, as well as Frogs, and Worms, and Flies, and ſuch like, are now; we know it to be vain: But if any ſuch thing ſhould be admitted, diſcourſing according to ſenſe, it cannot be, except you admit of a *Chaos* firſt, and commixture of Heaven and Earth; for the Frame of the World once in order, cannot effect it by any exceſs or caſualty.

NATURAL HISTORY.

Century X.

THe Philoſophy of *Pythagoras* (which was full of Superſtition) did firſt plant a Monſtrous Imagination, which afterwards was, by the School of *Plato*, and others, watred and nouriſhed. It was, That *the World was one entire perfect Living Creature*; inſomuch, as *Apollonius* of *Tyana*, a *Pythagorean* Prophet, affirmed, That the Ebbing and Flowing of the Sea was the Reſpiration of the World, drawing in Water as Breath, and putting it forth again. They went on, and inferred, That if the World were a Living Creature, it had a Soul and Spirit; which alſo they held, calling it *Spiritus Mundi*, the Spirit or Soul of the World; by which, they did not intend *God*, (for they did admit of a *Deity* beſides) but onely the Soul, or Eſſential Form of the Univerſe. This *Foundation* being laid, they might build upon it what they would; for in a *Living Creature*, though never ſo great (as for example, in a great Whale) the Senſe and the Affects of any one part of the Body inſtantly make a Tranſcurſion throughout the whole Body: So that by this they did inſinuate, that no diſtance of place, nor want or indiſpoſition of Matter, could hinder Magical Operations; but that (for example) we might here in *Europe* have Senſe and Feeling of that which was done in *China*; and likewiſe, we might work any effect without and againſt Matter: And this not holden by the co-operation of Angels or Spirits, but onely by the Unity and Harmony of Nature. There were ſome alſo that ſtaid not here, but went further, and held, That if the Spirit of Man (whom they call the *Microcoſm*) do give a fit touch to the Spirit of the World, by ſtrong Imaginations and Beliefs, it might command Nature; for *Paracelſus*, and ſome darkſome *Authors* of Magick, do aſcribe to Imagination exalted the Power of Miracle-working Faith. With theſe vaſt and bottomleſs Follies Men have been (in part) entertained.

Experiments in Conſort, touching *Tranſmiſſion and Influx of Immateriate Virtues, and the Force of Imagination.*

But we, that hold firm to the Works of God, and to the Sense, which is Gods Lamp, (*Lucerna Dei Spiraculum Hominis*) will enquire with all Sobriety and Severity, whether there be to be found in the Foot-steps of Nature any such Transmission and Influx of Immateriate Virtues; and what the force of Imagination is, either upon the Body Imaginant, or upon another Body: Wherein it will be like that labor of *Hercules* in purging the Stable of *Augeas*, to separate from Superstitious and Magical Arts and Observations, any thing that is clean and pure Natural, and not to be either contemned or condemned. And although we shall have occasion to speak of this in more places then one, yet we will now make some entrance thereinto.

901. Experiments in Consort *Monitory*, touching *Transmission of Spirits, and the Force of Imagination.*

MEn are to be admonished, that they do not withdraw credit from the Operations by Transmission of Spirits and Force of Imagination, because the effects fail sometimes. For as in Infection and Contagion from Body to Body, (as the Plague, and the like) it is most certain, that the Infection is received (many times) by the Body Passive, but yet is by the strength and good disposition thereof repulsed, and wrought out, before it be formed into a Disease; so much more in Impressions from Minde to Minde, or from Spirit to Spirit, the Impression taketh, but is encountred and overcome by the Minde and Spirit, which is Passive, before it work any manifest effect: And therefore they work most upon weak Mindes and Spirits; as those of Women, Sick Persons, Superstitious and fearful Persons, Children, and young Creatures.

Nescio quis teneros oculus mihi fascinat Agnos:

The *Poet* speaketh not of Sheep, but of Lambs. As for the weakness of the Power of them upon Kings and Magistrates, it may be ascribed (besides the main, which is the Protection of God over those that execute his place) to the weakness of the Imagination of the Imaginant; for it is hard for a Witch or a Sorcerer to put on a belief, that they can hurt such persons.

902. Men are to be admonished on the other side, that they do not easily give place and credit to these operations, because they succeed many times: For the cause of this success is (oft) to be truly ascribed unto the force of Affection and Imagination upon the Body Agent, and then by a secondary means it may work upon a diverse Body. As for example, If a man carry a *Planets Seal* or a *Ring*, or some part of a *Beast*, believing strongly that it will help him to obtain his *Love*, or to keep him from danger of hurt in *Fight*, or to prevail in a *Sute*, *&c.* it may make him more active and industrious; and again, more confident and persisting, then otherwise he would be. Now the great effects that may come of Industry and Perseverance (especially in civil business) who knoweth not? For we see audacity doth almost binde and mate the weaker sort of Mindes; and the state of Humane Actions is so variable, that to try things oft, and never to give over, doth wonders: Therefore it were a meer fallacy and mistaking to ascribe that to the Force of Imagination upon another Body, which is but the Force of Imagination upon the proper Body; for there is no doubt but that Imagination and vehement Affection work greatly upon the Body of the Imaginant, as we shall shew in due place.

903. Men are to be admonished, that as they are not to mistake the causes of these Operations, so much less they are to mistake the Fact or Effect, and rashly to take that for done which is not done. And therefore, as divers wise Judges have prescribed and cautioned, Men may not too rashly believe

believe the Confeſſion of Witches, nor yet the evidence againſt them: For the Witches themſelves are Imaginative, and believe oft-times they do that which they do not; and people are credulous in that point, and ready to impute Accidents and Natural operations to Witchcraft. It is worthy the obſerving, that both in ancient and late times, (as in the *Theſſalian* Witches, and the meetings of Witches that have been recorded by ſo many late Confeſſions) the great wonders which they tell of carrying in the Air, transforming themſelves into other Bodies, &c. are ſtill reported to be wrought, not by Incantation or Ceremonies, but by Ointments and Anointing themſelves all over. This may juſtly move a Man to think, that theſe Fables are the effects of Imagination; for it is certain, that Ointments do all (if they be laid on any thing thick) by ſtopping of the Pores, ſhut in the Vapors, and ſend them to the head extreamly. And for the particular Ingredients of thoſe Magical Ointments, it is like they are opiate and ſoporiferous. For Anointing of the Forehead, Neck, Feet, Back-bone, we know is uſed for procuring dead ſleeps. And if any Man ſay, that this effect would be better done by inward potions; anſwer may be made, that the Medicines which go to the Ointments are ſo ſtrong, that if they were uſed inwards, they would kill thoſe that uſe them; and therefore they work potently, though outwards.

We will divide the ſeveral kindes of the operations by tranſmiſſion of Spirits and Imagination, which will give no ſmall light to the *Experiments* that follow. All operations by tranſmiſſion of Spirits and Imagination have this, that they work at diſtance, and not at touch; and they are theſe being diſtinguiſhed.

904. The firſt is, The Tranſmiſſion or Emiſſion of the thinner and more airy parts of Bodies, as in Odors and Infections; and this is, of all the reſt, the moſt corporeal. But you muſt remember withal, that there be a number of thoſe Emiſſions, both unwholeſome and wholeſome, that give no ſmell at all: For the Plague many times when it is taken giveth no ſent at all, and there be many good and healthful Airs, as they appear by Habitation, and other proofs, that differ not in Smell from other Airs. And under this head you may place all Imbibitions of Air, where the ſubſtance is material, odor-like, whereof ſome nevertheleſs are ſtrange, and very ſuddenly diffuſed; as the alteration which the Air receiveth in *Egypt* almoſt immediately upon the riſing of the River of *Nilus*, whereof we have ſpoken.

905. The ſecond is, the Tranſmiſſion or Emiſſion of thoſe things that we call Spiritual Species, as Viſibles and Sounds; the one whereof we have handled, and the other we ſhall handle in due place. Theſe move ſwiftly and at great diſtance, but then they require a *Medium* well diſpoſed, and their Tranſmiſſion is eaſily ſtopped.

906. The third is, the Emiſſions which cauſe Attraction of certain Bodies at diſtance; wherein though the Loadſtone be commonly placed in the firſt rank, yet we think good to except it, and refer it to another Head: But the drawing of *Amber*, and *Jet*, and other *Electrick Bodies*, and the Attraction in *Gold* of the *Spirit* of *Quick-ſilver* at diſtance, and the Attraction of Heat at diſtance, and that of fire to *Naphtha*, and that of ſome Herbs to Water, though at diſtance, and divers others, we ſhall handle; but yet not under this preſent title, but under the title of Attraction in general.

907. The fourth is, the Emission of Spirits, and Immateriate Powers and Virtues, in those things which work by the universal configuration and Sympathy of the World; not by Forms, or Celestial Influxes, (as is vainly taught and received) but by the Primitive Nature of Matter, and the seeds of things. Of this kinde is (as we yet suppose) the working of the Loadstone, which is by consent with the Globe of the Earth; of this kinde is the motion of Gravity, which is by consent of dense Bodies with the Globe of the Earth: Of this kinde is some disposition of Bodies to Rotation, and particularly from East to West; of which kinde, we conceive the Main Float and Refloat of the Sea is, which is by consent of the Universe, as part of the *Diurnal Motion*. These *Immateriate Virtues* have this property differing from others, that the diversity of the *Medium* hindreth them not, but they pass through all *Mediums*, yet at determinate distances. And of these we shall speak, as they are incident to several Titles.

908. The fifth is, the Emission of Spirits; and this is the principal in our intention to handle now in this place, namely, the operation of the Spirits of the minde of Man upon other Spirits; and this is of a double nature; the operation of the Affections, if they be vehement; and the operation of the Imagination, if it be strong. But these two are so coupled, as we shall handle them together; for when an envious or amorous aspect doth infect the Spirits of another, there is joyned both Affection and Imagination.

909. The sixth is, the influxes of the *Heavenly Bodies*, besides those two manifest ones of Heat and Light. But these we will handle, where we handle the *Celestial Bodies* and *Motions*.

910. The seventh is, the operations of *Sympathy*, which the Writers of *Natural Magick* have brought into an *Art* or *Precept*; and it is this, That if you desire to super-induce any Virtue or Disposition upon a Person, you should take the *Living Creature*, in which that Virtue is most eminent and in perfection; of that Creature you must take the parts wherein that Virtue chiefly is collocate. Again, you must take the parts in the time, and act when that Virtue is most in exercise, and then you must apply it to that part of Man, wherein that Virtue chiefly consisteth. As if you would super-induce *Courage* and *Fortitude*, take a *Lion*, or a *Cock*; and take the *Heart*, *Tooth*, or *Paw* of the *Lion*; or the *Heart*, or *Spur* of the *Cock*: Take those parts immediately after the *Lion* or the *Cock* have been in fight, and let them be worn upon a Mans heart or wrist. Of these and such like *Sympathies* we shall speak under this present Title.

911. The eighth and last is, an Emission of Immateriate Virtues, such as we are a little doubtful to propound it is so prodigious, but that it is so constantly avouched by many: And we have set it down as a Law to our selves, to examine things to the bottom; and not to receive upon credit, or reject upon improbabilities, until there hath passed a due examination. This is the *Sympathy* of *Individuals*; for as there is a *Sympathy* of *Species*, so (it may be) there is a *Sympathy* of *Individuals*; that is, that in things, or the parts of things that have been once contiguous or entire, there should remain a transmission of Virtue from the one to the other, as between the Weapon and the Wound. Whereupon is blazed abroad the operation of *Unguentum Tuli*, and so of a piece of Lard, or stick of Elder, &c. That if part of it be consumed or putrefied, it will work upon the other parts severed. Now we will pursue the instances themselves.

The

912. Experiments in Consort, touching Emission of Spirits in Vapor or Exhalation Odorlike

THe *Plague* is many times taken without manifest sense, as hath been said; and they report, that where it is found it hath a scent of the smell of a Mellow Apple, and (as some say) of May-flowers: And it is also received, that smells of Flowers that are Mellow and Lushious, are ill for the *Plague*; as *White Lilies*, *Cowslips*, and *Hyacinths*.

913. The *Plague* is not easily received by such as continually are about them that have the *Plague*, as *Keepers* of the Sick, and Physicians; nor again by such as take *Antidotes*, either inward (as *Mithridate*, *Juniper-berries*, *Rue*, *Leaf*, and *Seed*, *&c.*), or outward (as *Angelica*, *Zedoary*, and the like in the Mouth; *Tar*, *Galbanum*, and the like in Perfume:) Nor again, by old people, and such as are of a dry and cold complexion. On the other side, the *Plague* taketh soonest hold of those that come out of a fresh Air, and of those that are fasting, and of Children; and it is likewise noted to go in a Blood more then to a stranger.

914. The most pernicious Infection, next the *Plague*, is the smell of the Goal, when Prisoners have been long, and close, and nastily kept; whereof we have had in our time, experience twice or thrice, when both the *Judges* that sat upon the Goal, and numbers of those that attended the business, or were present, sickned upon it, and died. Therefore it were good wisdom, that in such cases the Goal were aired before they be brought forth.

915. Out of question, if such foul smells be made by Art, and by the Hand, they consist chiefly of Mans flesh, or sweat, putrefied; for they are not those stinks which the Nostrils straight abhor and expel, that are most pernicious, but such Airs as have some similitude with Mans body, and so insinuate themselves, and betray the Spirits. There may be great danger in using such Compositions in great Meetings of People within Houses; as in *Churches*, at *Arraignments*, at *Plays* and *Solemnities*, and the like: For poysoning of Air is no less dangerous, then poysoning of Water, which hath been used by the *Turks* in the Wars, and was used by *Emanuel Comnenus* towards the Christians, when they passed through his Countrey to the *Holy Land*. And these empoysonments of Air are the more dangerous in Meetings of People, because the much breath of People doth further the reception of the Infection. And therefore when any such thing is feared, it were good those publick places were perfumed before the *Assemblies*.

916. The empoysonment of particular persons by Odors, hath been reported to be in perfumed Gloves, or the like. And it is like they mingle the poyson that is deadly with some smells that are sweet, which also maketh it the sooner received. *Plagues* also have been raised by Anointings of the Chinks of Doors, and the like; not so much by the touch, as for that it is common for men, when they finde any thing wet upon their fingers, to put them to their Nose; which men therefore should take heed how they do. The best is, that these Compositions of Infectious Airs cannot be made without dangers of death to them that make them; but then again, they may have some *Antidotes* to save themselves; so that men ought not to be secure of it.

917. There have been in divers Countreys great *Plagues* by the putrefaction of great swarms of *Grashoppers* and *Locusts*, when they have been dead and cast upon heaps.

918. It hapneth oft in *Mines*, that there are Damps which kill either by Suffocation, or by the poysonous nature of the *Mineral*; and those that deal

deal much in Refining, or other works about Metals and Minerals, have their Brains hurt and ſtupefied by the Metalline Vapors. Amongſt which, it is noted, that the Spirits of Quick-ſilver ever flie to the Skull, Teeth, or Bones; inſomuch, as *Gilders* uſe to have a piece of Gold in their Mouth to draw the Spirits of Quick-ſilver; which Gold afterwards they finde to be whitned. There are alſo certain Lakes and Pits, ſuch as that of *Avernus*, that poyſon Birds (as is ſaid) which flie over them, or Men that ſtay too long about them.

919. The Vapor of Char-coal or Sea-coal in a cloſe room, hath killed many; and it is the more dangerous, becauſe it cometh without any ill ſmell, but ſtealeth on by little and little, inducing onely faintneſs, without any manifeſt ſtrangling. When the *Dutchmen* wintred at *Nova Zembla*, and that they could gather no more ſticks, they fell to make fire of ſome Sea-coal they had, wherewith (at firſt) they were much refreſhed; but a little after they had ſat about the fire, there grew a general ſilence and lothneſs to ſpeak amongſt them; and immediately after, one of the weakeſt of the Company fell down in a ſwoon: Whereupon, they doubting what it was, opened their door to let in Air, and ſo ſaved themſelves. The effect (no doubt) is wrought by the inſpiſſation of the Air, and ſo of the Breath and Spirits. The like enſueth in Rooms newly Plaiſtred, if a fire be made in them; whereof no leſs Man then the Emperor *Jovinianus* died.

920 *Vide the Experiment* 803. Touching the *Infectious Nature* of the Air upon the firſt Showers after long Drought.

921. It hath come to paſs, that ſome *Apothecaries*, upon ſtamping of *Coloquintida*, have been put into a great Scouring by the Vapor onely.

922. It hath been a practice to burn a *Pepper* they call *Guinny-Pepper*, which hath ſuch a ſtrong Spirit, that it provoketh a continual *Sneezing* in thoſe that are in the Room.

923. It is an Ancient Tradition, that *Blear Eyes* infect *Sound Eyes*; and that a *Menſtruous Woman* looking in a Glaſs doth ruſt it: Nay, they have an opinion, which ſeemeth fabulous, That *Menſtruous Women* going over a *Field* or *Garden*, do *Corn* and *Herbs* good by killing the Worms.

924. The Tradition is no leſs ancient, that the *Baſilisk* killeth by aſpect; and that the *Woolf*, if he ſeeth a *Man* firſt, by aſpect ſtriketh a *Man* hoarſe.

925. *Perfumes* convenient do dry and ſtrengthen the Brain, and ſtay Rheums and Defluxions; as we finde in Fume of *Roſemary* dried, and *Lignum Aloes*, and *Calamus* taken at the Mouth and Noſtrils. And no doubt, there be other Perfumes that do moiſten and refreſh, and are fit to be uſed in Burning Agues, Conſumptions, and too much wakefulneſs; ſuch as are *Roſe-Water*, *Vinegar*, *Lemmon-pills*, *Violets*, the Leaves of *Vines* ſprinkled with a little *Roſe-water*, *&c.*

926. They do uſe in ſudden Faintings and Swoonings, to put a Handkerchief with Roſe-water, or a little Vinegar to the Noſe, which gathereth together again the Spirits, which are upon point to reſolve and fall away.

927. *Tobacco* comforteth the Spirits, and diſchargeth wearineſs; which it worketh, partly by opening, but chiefly by the opiate virtue, which condenſeth the Spirits. It were good therefore to try the taking of Fumes by Pipes (as they do in *Tobacco*) of other things, as well to dry and comfort, as for other intentions. I wiſh tryal be made of the drying Fume of *Roſemary* and *Lignum Aloes*, before mentioned in Pipe; and ſo of *Nutmegs* and *Folium Indum*, *&c.*

The

928. The following of the Plough hath been approved for refreshing the Spirits, and procuring Appetite; but to do it in the Ploughing for Wheat or Rye is not so good, because the Earth hath spent her sweet breath in Vegetables put forth in Summer. It is better therefore to do it when you sow Barley. But because Ploughing is tied to Seasons, it is best to take the Air of the Earth new turned up by digging with the Spade, or standing by him that diggeth. *Gentlewomen* may do themselves much good by kneeling upon a Cushion, and Weeding. And these things you may practise in the best Seasons; which is ever the early Spring, before the Earth putteth forth the Vegetables, and in the sweetest Earth you can chuse. It would be done also when the Dew is a little off the Ground, lest the Vapor be too moist. I knew a great Man that lived long, who had a clean Clod of Earth brought to him every morning as he sate in his Bed; and he would hold his head over it a good preety while. I commend also sometimes in digging of new Earth, to pour in some Malmsey or Greek Wine, that the Vapor of the Earth and Wine together may comfort the Spirits the more; provided always it be not taken for a Heathen Sacrifice or Libation to the Earth.

929. They have in *Physick* use of *Pomanders*, and knots of Powders for drying of Rheums, comforting of the Heart, provoking of Sleep, &c. for though those things be not so strong as Perfumes, yet you may have them continually in your hand, whereas Perfumes you can take but at times; and besides, there be divers things that breath better of themselves then when they come to the Fire; as *Nigella Romana*, the Seed of *Melanthium*, *Amomum*, *&c.*

930. There be two things which (inwardly used) do cool and condense the Spirits; and I wish the same to be tried outwardly in Vapors. The one is *Nitre*; which I would have dissolved in Malmsey, or Greek Wine, and so the smell of the Wine taken; or, if you would have it more forcible, pour of it upon a Fire-pan well heated, as they do *Rose-water* and *Vinegar*. The other is, the distilled Water of Wilde Poppey; which I wish to be mingled at half with *Rose-water*, and so taken with some mixture of a few *Cloves* in a Perfuming-pan. The like would be done with the distilled Water of Saffron-Flowers.

931. Smells of *Musk*, and *Amber*, and *Civit*, are thought to further Venereous Appetite; which they may do by the refreshing and calling forth of the Spirits.

932. Incense and Niderous smells (such as were of *Sacrifices*) were thought to intoxicate the Brain, and to dispose men to devotion; which they may do by a kinde of sadness and contristation of the Spirits, and partly also by Heating and Exalting them. We see that amongst the Jews, the principal perfume of the Sanctuary was forbidden all common uses.

933. There be some Perfumes prescribed by the Writers of *Natural Magick*, which procure pleasant Dreams; and some others (as they say) that procure Prophetical Dreams, as the Seeds of *Flax*, *Fleawort*, *&c.*

934. It is certain, that Odors do in a small degree, nourish, especially the Odor of Wine; and we see Men an hungred do love to smell hot Bread. It is related, that *Democritus* when he lay a dying, heard a Woman in the House complain, that she should be kept from being at a Feast and Solemnity (which she much desired to see) because there would be a Corps in the House: Whereupon he caused Loaves of new Bread to be sent for, and opened them, and poured a little Wine into them, and so kept himself alive with the

the Odor of them till the Feast was past. I knew a Gentleman that would fast (sometimes) three or four, yea, five days, without Meat, Bread, or Drink; but the same Man used to have continually a great Wisp of Herbs that he smelled on, and amongst those Herbs some esculent Herbs of strong scent, as *Onions*, *Garlick*, *Leeks*, and the like.

935. They do use for the Accident of the *Mother* to burn Feathers, and other things of ill Odor; and by those ill smells the rising of the Mother is put down.

936. There be Airs which the Physicians advise their Patients to remove unto in *Consumptions*, or upon recovery of long sicknesses, which (commonly) are plain Champaigns, but Grasing, and not over-grown with Heath, or the like; or else Timber-shades, as in Forests, and the like. It is noted also, that Groves of Bays do forbid Pestilent Airs; which was accounted a great cause of the wholesome Air of *Antiochia*. There be also some Soyls that put forth Odorate Herbs of themselves, as *Wilde Thyme*, *Wilde Marjoram*, *Penny-royal*, *Camomile*; and in which, the *Bryar-Roses* smell almost like *Musk-Roses*; which (no doubt) are signs that do discover an excellent Air.

937. It were good for men to think of having healthful Air in their Houses; which will never be, if the Rooms be low-roofed, or full of Windows and Doors; for the one maketh the Air close, and not fresh; and the other, maketh it exceeding unequal, which is a great enemy to health. The Windows also should not be high up to the Roof (which is in use for Beauty and Magnificence) but low. Also Stone-walls are not wholesome; but Timber is more wholesome, and especially Brick; nay, it hath been used by some with great success, to make their Walls thick, aed to put a Lay of Chalk between the Bricks to take away all dampishness.

938. Experiment Solitary, touching the *Emissions of Spiritual Species, which affect the Senses.*

THese Emissions (as we said before) are handled, and ought to be handled by themselves, under their proper Titles; that is, Visibles, and Audibles, each apart: In this place, it shall suffice to give some general Observations common to both. First, they seem to be Incorporeal. Secondly, they work swiftly. Thirdly, they work at large distances. Fourthly, in curious varieties. Fifthly, they are not effective of any thing, nor leave any work behinde them, but are energies meerly; for their working upon mirrors and places of Echo doth not alter any thing in those Bodies; but it is the same Action with the Original, onely repercussed. And as for the shaking of Windows, or rarifying the Air by great noises, and the Heat caused by Burning Glasses, they are rather Concomitants of the Audible and Visible Species, then the effects of them. Sixthly, they seem to be of so tender and weak a Nature, as they affect onely such a Rare and Attenuate Substance as is the Spirit of Living Creatures.

939. Experiments in Consort, touching *Emission of Immateriate Virtues from the Mindes and Spirits of Men, either by Affections; or by Imaginations, or by other Impressions.*

IT is mentioned in some Stories, that where Children have been exposed or taken away young from their Parents, and that afterward they have approached to their Parents presence, the Parents (though they have not known them) have had a secret Joy, or other Alteration thereupon.

940. There was an *Egyptian Soothsayer* that made *Antonius* believe, that his *genius* (which otherwise was brave and confident) was, in the presence of *Octavianus Cæsar*, poor and cowardly; and therefore, he advised him to absent himself (as much as he could) and remove far from him. The *Soothsayer* was thought to be suborned by *Cleopatra*, to make him live in *Egypt*, and other remote

remote places from *Rome*. However, the conceit of a predominant or mastering Spirit of one Man over another is ancient, and received still, even in vulgar opinion.

941. There are conceits, that some Men that are of an ill and melancholly nature, do incline the company into which they come, to be sad and ill disposed; and contrariwise, that others that are of a jovial nature do dispose the company to be merry and chearful: And again, that some Men are lucky to be kept company with, and employed, and others unlucky. Certainly it is agreeable to reason, that there are at the least some light effluxions from Spirit to Spirit when Men are in presence one with another, as well as from Body to Body.

942. It hath been observed, that old Men have loved young company, and been conversant continually with them, have been of long life; their Spirits (as it seemeth) being recreated by such company. Such were the Ancient Sophists and Rhetoricians, which ever had young Auditors and Disciples; as *Gorgias, Protagoras, Isocrates, &c.* who lived till they were an hundred years old; and so likewise did many of the *Grammarians* and *School-masters*: Such as was *Orbilius, &c.*

943. Audacity and confidence doth, in civil businesses, so great effects, as a Man may (reasonably) doubt, that besides the very daring, and earnestness, and persisting, and importunity, there should be some secret binding and stooping of other Mens spirits to such persons.

944. The Affections (no doubt) do make the Spirits more powerful and active, and especially those Affections which draw the Spirits into the Eyes; which are two, Love and Envy, which is called *Oculus Malus*. As for Love, the *Platonists* (some of them) go so far, as to hold, That the Spirit of the Lover doth pass into the Spirits of the person loved, which causeth the desire of return into the Body whence it was emitted, whereupon followeth that appetite of contract and conjunction which is in Lovers. And this is observed likewise, that the Aspects that procure Love, are not gazings, but sudden glances and dartings of the Eye. As for Envy, that emitteth some malign and poisonous Spirits, which take hold of the Spirit of another; and is likewise of greatest force, when the Cast of the Eye is oblique. It hath been noted also, That it is most dangerous, where the envious Eye is cast upon persons in glory, and triumph, and joy. The reason whereof is, for that at such times the Spirits come forth most into the outward parts, and so meet the percussion of the envious eye more at hand; and therefore it hath been noted, That after great triumphs, Men have been ill disposed for some days following. We see the opinion of Fascination is ancient for both effects, of procuring Love, and sickness caused by Envy; and Fascination is ever by the Eye. But yet if there be any such infection from Spirit to Spirit, there is no doubt, but that it worketh by presence, and not by the Eye alone, yet most forcibly by the Eye.

945. Fear and Shame are likewise infective: For we see that the starting of one, will make another ready to start, and when one man is out of countenance in a company, others do likewise blush in his behalf.

Now we will speak of the *Force of Imagination* upon other *Bodies*, and of the means to exalt and strengthen it. Imagination, in this place, I understand to be the representation of an Individual Thought. Imagination is of three kindes; the first, joyned with *Belief* of that which is to come; the second, joyned with *Memory* of that which is past; and the third is, of *Things present*, or as if they were present: For I comprehend in this, Imagination feigned,

feigned, and at pleasure: As if one should imagine such a Man to be in the Vestments of a *Pope*, or to have Wings. I single out for this time that which is with *Faith* or *Belief* of that which is to come. The Inquisition of this Subject in our way (which is by Induction) is wonderful hard, for the things that are reported are full of Fables; and new *Experiments* can hardly be made but with extream Caution, for the Reason which we will after declare.

The *Power of Imagination* is in three kindes. The first, upon the Body of the imaginant, including likewise the Childe in the Mothers Womb. The second is, the power of it upon dead bodies, as Plants, Wood, Stone, Metal, &c. The third is, the power of it upon the Spirits of Men and Living Creatures. And with this last we will onely meddle.

The *Probleme* therefore is, Whether a Man constantly and strongly believing that such a thing shall be, (as that such an one will love him, or that such an one will grant him his request, or that such an one shall recover a sickness, or the like) it doth help any thing to the effecting of the thing it self. And here again we must warily distinguish; for it is not meant (as hath been partly said before) that it should help by making a man more stout, or more industrious; (in which kinde, constant belief doth much) but meerly by a secret operation, or binding, or changing the Spirit of another. And in this it is hard (as we began to say) to make any new experiment; for I cannot command my self to believe what I will, and so no tryal can be made. Nay it is worse, for whatsoever a Man imagineth doubtingly, or with fear, must needs do hurt, if Imagination have any power at all; for a Man representeth that oftner that he feareth, then the contrary.

The help therefore is, for a Man to work by another, in whom he may create belief, and not by himself, until himself have found by experience, that Imagination doth prevail; for then experience worketh in himself Belief, if the Belief that such a thing shall be joyned with a Belief, that his Imagination may procure it.

946. For example, I related one time to a Man that was curious and vain enough in these things, *That I saw a kinde of Jugler that had a Pair of Cards, and would tell a man what Card he thought.* This pretended *Learned Man* told me, it was a mistaking in me. *For* (said he) *it was not the knowledge of the Mans thought (for that is proper to God) but it was the inforcing of a thought upon him, and binding his Imagination by a stronger, that he could think no other Card.* And thereupon he asked me a Question or two, which I thought he did but cunningly, knowing before what used to be the feats of the *Jugler*. *Sir*, (said he) *do you remember whether he told the Card the Man thought himself, or bad another to tell it?* I answered, (as was true) *That he bad another tell it.* Whereunto he said, *So I thought: For* (said he) *himself could not have put on so strong an Imagination, but by telling the other the Card (who believed, that the Jugler was some strange man, and could do strange things) that other man caught a strong Imagination.* I hearkned unto him, thinking for a vanity he spake prettily. Then he asked me another Question: Saith he, *Do you remember whether he bad the Man think the Card first, and afterwards told the other Man in his Ear what he should think; or else, that he did whisper first in the Mans Ear that should tell the Card, telling, That such a Man should think such a Card, and after bad the Man think a Card?* I told him, (as was true) *That he did first whisper the Man in the Ear, that such a Man should think such a Card.* Upon this, the *Learned Man* did much exult and please himself, saying, *Lo, you may see that my opinion is right: For if the Man had thought first, his thought had been fixed; but the other imagining first, bound his thought.* Which though it did somewhat sink with me, yet I made

made it lighter then I thought, and said, *I thought it was confederacy between the Jugler, and the two Servants*; though (indeed) I had no reason so to think, for they were both my Fathers servants, and he had never plaid in the House before. The *Jugler* also did cause a Garter to be held up, and took upon him to know that such an one should point in such a place of the Garter, as it should be near so many Inches to the longer end, and so many to the shorter; and still he did it by first telling the imaginer, and after bidding the actor think.

Having told this Relation, not for the weight thereof, but because it doth handsomly open the nature of the Question, I return to that I said, That *Experiments of Imagination* must be practised by others, and not by a Mans self. For there be three means to fortifie Belief; the first is Experience, the second is Reason, and the third is Authority. And that of these which is far the most potent, is Authority: For Belief upon Reason or Experience will stagger.

947. For Authority, it is of two kindes: Belief in an Art, and Belief in a Man. And for things of Belief in an Art, a Man may exercise them by himself; but for Belief in a Man, it must be by another. Therefore if a Man believe in Astrology, and finde a figure prosperous; or believe in Natural Magick, and that a Ring with such a Stone, or such a piece of a Living Creature carried, will do good, it may help his Imagination; but the Belief in a Man is far the more active. But howsoever all Authority must be out of a Mans self, turned (as was said) either upon an Art, or upon a Man; and where Authority is from one Man to another, there the second must be Ignorant, and not learned, or full of thoughts: And such are (for the most part) all Witches and superstitious persons, whose beliefs, tied to their Teachers and Traditions, are no whit controlled either by Reason or Experience: And upon the same reason, in Magick they use (for the most part) Boys and young People, whose spirits easilieſt take Belief and Imagination.

Now to fortifie Imagination, there be three ways: The Authority whence the Belief is derived; Means to quicken and corroborate the Imagination; and Means to repeat it and refresh it.

948. For the Authority we have already spoken. As for the second, namely, the Means to quicken and corroborate the Imagination, we see what hath been used in Magick; (if there be in those practices any thing that is purely Natural) as Vestments, Characters, Words, Seals, some parts of Plants, or Living Creatures, Stones, choice of the Hour, Gestures and Motions; also Incenses and Odors, choice of Society, which increaseth Imagination, Diets and Preparations for some time before. And for Words, there have been ever used, either barbarous words of no sense, lest they should disturb the Imagination; or words of similitude, that may second and feed the Imagination: And this was ever as well in Heathen Charms, as in Charms of later times. There are used also Scripture words, for that the Belief that Religious Texts and Words have power, may strengthen the Imagination. And for the same reason Hebrew words (which amongst us is counted the holy Tongue, and the words more mystical) are often used.

949. For the refreshing of the Imagination (which was the third Means of Exalting it) we see the practices of Magick; as in Images of Wax, and the like, that should melt by little and little, or some other things buried in Muck, that should putrefie by little and little, or the like: For so oft as the Imaginant doth think of those things, so oft doth he represent to his Imagination the effect of that he desireth.

950. If there be any power in Imagination, it is leſs credible that it ſhould be ſo incorporeal and immateriate a Virtue, as to work at great diſtances, or through all *Mediums*, or upon all Bodies; but that the diſtance muſt be competent; the *Medium* not adverſe, and the Body apt and proportionate. Therefore if there be any operation upon Bodies in abſence by Nature, it is like to be conveyed from Man to Man, as *Fame* is: As if a *Witch* by Imagination ſhould hurt any afar off, it cannot be naturally, but by working upon the Spirit of ſome that cometh to the *Witch*, and from that party upon the Imagination of another, and ſo upon another, till it come to one that hath reſort to the party intended; and ſo by him, to the party intended himſelf. And although they ſpeak, that it ſufficeth to take a Point, or a piece of the Garment, or the Name of the party, or the like; yet there is leſs credit to be given to thoſe things, except it be by working of evil ſpirits.

The *Experiments* which may certainly demonſtrate the power of Imagination upon other Bodies, are few or none; for the *Experiments* of *Witchcraft* are no clear proofs, for that they may be by a tacite operation of malign Spirits; we ſhall therefore be forced in this Inquiry, to reſort to new *Experiments*, wherein we can give onely Directions of Tryals, and not any *Poſitive Experiments*. And if any man think that we ought to have ſtaid till we had made *Experiment* of ſome of them our ſelves, (as we do commonly in other Titles) the truth is, that theſe Effects of Imagination upon other Bodies, have ſo little credit with us, as we ſhall try them at leiſure: But in the mean time we will lead others the way.

951. When you work by the Imagination of another, it is neceſſary that he by whom you work have a precedent opinion of you that you can do ſtrange things, or that you are a Man of Art, as they call it; for elſe the ſimple affirmation to another, that this or that ſhall be, can work but a weak impreſſion in his Imagination.

952. It were good, becauſe you cannot diſcern fully of the ſtrength of Imagination in one Man, more then another, that you did uſe the Imagination of more then one, that ſo you may light upon a ſtrong one. As if a Phyſician ſhould tell three or four of his Patients ſervants that their Maſter ſhall ſurely recover.

953. The Imagination of one that you ſhall uſe (ſuch is the variety of Mens mindes) cannot be always alike conſtant and ſtrong; and if the ſucceſs follow not ſpeedily, it will faint and loſe ſtrength. To remedy this, you muſt pretend to him whoſe Imagination you uſe ſeveral degrees of Means by which to operate: As to preſcribe him, that every three days, if he finde not the ſucceſs apparent, he do uſe another Root, or part of a Beaſt, or Ring, &c. as being of more force; and if that fail, another; and if that, another, till ſeven times. Alſo you muſt preſcribe a good large time for the effect you promiſe; as if you ſhould tell a ſervant of a ſick man, that his Maſter ſhall recover, but it will be fourteen days ere he findeth it apparently, &c. All this to entertain the Imagination, that it waver leſs.

954. It is certain, that potions or things taken into the Body, Incenſes and Perfumes taken at the Noſtrils, and oyntments of ſome parts, do (naturally) work upon the Imagination of him that taketh them. And therefore it muſt needs greatly cooperate with the Imagination of him whom you uſe, if you preſcribe him, before he do uſe the Receit for the Work which he deſireth, that he do take ſuch a Pill, or a ſpoonful of Liquor, or burn ſuch an Incenſe, or anoint his Temples, or the Soles of his Feet, with ſuch an Oyntment or Oyl: And you muſt chuſe for the Compoſition of ſuch Pill, Perfume, or

Oynt-

Oyntment; such Ingredients as do make the Spirits a little more gross or muddy, whereby the Imagination will fix the better.

955. The Body Passive, and to be wrought upon, (I mean not of the Imaginant) is better wrought upon (as hath been partly touched) at some times then at others; As if you should prescribe a servant about a sick person, (whom you have possessed that his Master shall recover) when his Master is fast asleep, to use such a Root, or such a Root. For Imagination is like to work better upon sleeping men, then men awake; as we shall shew when we handle Dreams.

956. We finde in the *Art of Memory*, that *Images visible* work better then other conceits; As if you would remember the word *Philosophy*, you shall more surely do it by imagining that such a Man (for Men are best places) is reading upon *Aristotles* Physicks, then if you should imagine him to say, *I will go study Philosophy*. And therefore this observation would be translated to the subject we now speak of; for the more lustrous the Imagination is, it filleth and fixeth the better. And therefore I conceive, that you shall in that *Experiment* (whereof we spake before) of binding of thoughts, less fail, if you tell one that such an one shall name one of twenty men, then if it were one of twenty Cards. The *Experiments* of binding of thoughts would be diversified and tried to the full: And you are to note, whether it hit for the most part, though not always.

957. It is good to consider upon what things Imagination hath most force: And the rule (as I conceive) is, that it hath most force upon things that have the lightest and easiest motions; and therefore above all upon the Spirits of Men, and in them upon such affections as move lightest: As upon procuring of Love, binding of Lust, which is ever with Imagination upon Men in fear, or Men in irresolution, and the like: Whatsoever is of this kinde would be throughly enquired. Tryals likewise would be made upon Plants, and that diligently: As if you should tell a man that such a Tree would die this year, and will him at these and these times to go unto it, to see how it thriveth. As for inanimate things, it is true, that the motions of shuffling of Cards, or casting of Dice, are very light motions; and there is a folly very useful, That Gamesters imagine, that some that stand by them, bring them ill luck. There would be tryal also made, of holding a Ring by a thred in a Glass, and telling him that holdeth it before, that it shall strike so many times against the side of the Glass, and no more; or of holding a Key between two Mens fingers without a charm; and to tell those that hold it, that at such a name it shall go off their fingers. For these two are extream light motions. And howsoever, I have no opinion of these things, yet so much I conceive to be true, That strong Imagination hath more force upon things living, or that have been living, then things meerly inanimate; and more force likewise upon light and subtil motions, then upon motions vehement or ponderous.

958. It is an usual observation, That if the Body of one murthered be brought before the Murtherer, the wounds will bleed afresh. Some do affirm, That the dead Body, upon the presence of the Murtherer hath opened the eyes; and that there have been such like motions as well where the party murthered hath been strangled or drowned, as where they have been killed by wounds. It may be that this participateth of a miracle, by *Gods* just judgment, who usually brings murthers to light. But if it be Natural, it must be referred to Imagination.

959. The tying of the point upon the day of Marriage, to make Men impo-

tent towards their Wives, which (as we have formerly touched) is so frequent in *Zant* and *Gascony*, if it be Natural, must be referred to the Imagination of him that tieth the Point. I conceive it to have the less affinity with Witchcraft, because not peculiar persons onely, (such as Witches are) but any Body may do it.

960. Experiments in Consort touching the *Secret Virtue of Sympathy and Antipathy.*

THere be many things that work upon the *Spirits of Men* by *Secret Sympathy* and *Antipathy*. The virtues of *Precious Stones* worn, have been anciently and generally received, and curiously assigned to work several effects. So much is true, that *Stones* have in them fine *Spirits*, as appeareth by their splendor: And therefore they may work by consent upon the *Spirits* of *Men*, to comfort and exhilarate them. Those that are the best for that effect, are the *Diamond*, the *Emerald*, the *Jacynth Oriental*, and the *Gold-stone*, which is the *yellow Topaz*. As for their particular Proprieties, there is no credit to be given to them. But it is manifest, that Light above all things, excelleth in comforting the *Spirits* of *Men*; and it is very probable, that Light varied doth the same effect with more novelty. And this is one of the causes why *Precious Stones* comfort. And therefore it were good to have *Tinctes Lanthorns*, or *Tinctes Skreens* of *Glass* coloured into *Green*, *Blue*, *Carnation*, *Crimson*, *Purple*, *&c.* and to use them with Candles in the night. So likewise to have round *Glasses*, not onely of *Glass* coloured through, but with Colours laid between *Crystals*, with handles to hold in ones hand. *Prisms* are also comfortable things. They have of *Paris-work*, *Looking-Glasses*, bordered with broad Borders of small *Crystal*, and great counterfeit *Precious Stones* of all Colours, that are most glorious and pleasant to behold, especially in the night. The *Pictures* of *Indian Feathers* are likewise comfortable and pleasant to behold. So also fair and clear *Pools* do greatly comfort the *Eyes Spirits*, especially when the *Sun* is not glaring but overcast, or when the *Moon* shineth.

961. There be divers sorts of *Bracelets* fit to comfort the *Spirits*; and they be of three Intentions: *Refrigerant*, *Corroborant*, and *Aperient*. For *Refrigerant* I wish them to be of *Pearl*, or of *Coral*, as is used. And it hath been noted that *Coral*, if the party that weareth it be ill disposed, will wax pale; which I believe to be true, because otherwise distemper of heat will make *Coral* lose colour. I commend also *Beads* or little *Plates* of *Lapis Lazuli*, and *Beads* of *Nitre*, either alone, or with some *Cordial mixture*.

962. For *Corroboration* and *Comfortation*, take such *Bodies* as are of Astringent quality without manifest cold. I commend *Bead-Amber*, which is full of Astriction, but yet is unctuous, and not cold, and is conceived to impinguate those that wear such *Beads*. I commend also *Beads* of *Harts-Horn* and *Ivory*, which are of the like nature; also *Orenge-Beads*, also *Beads* of *Lignum Aloes*, macerated first in *Rose-water* and dried.

963. For opening, I commend Beads, or pieces of the Roots of *Carduus Benedictus*, and also of the *Roots* of *Peony* the *Male*, and of *Orras*, and of *Calamus Aromaticus*, and of *Rew*.

964. The Cramp (no doubt) cometh of contraction of Sinews; which is manifest in that it cometh either by cold or driness, as after *Consumptions* and long *Agues*; for Cold and Driness do (both of them) contract and corrugate. We see also, that chafing a little above the place in pain, easeth the Cramp; which is wrought by the Dilatation of the contracted Sinews by heat. There are in use for the prevention of the Cramp, two things: The one, *Rings* of *Sea-Horse Teeth* worn upon the *Fingers*; the other, Bands

of *Green Perwinckle* (the *Herb*) tied about the Calf of the Leg, or the Thigh, &c. where the Cramp useth to come. I do finde this the more strange, because neither of these have any Relaxing Virtue, but rather the contrary. I judge therefore that their working is rather upon the Spirits within the *Nerves* to make them strive less, then upon the Bodily substance of the *Nerves*.

I would have tryal made of two other kindes of Bracelets for comforting the Heart and Spirits. The one of the *Trochisch* of *Vipers* made into little pieces of Beads; for since they do great good inwards (especially for *Pestilent Agues*) it is like they will be effectual outwards, where they may be applied in greater quantity. There would be *Trchischs* likewise made of *Snakes*, whose flesh dried is thought to have a very opening and Cordial Virtue. The other is of Beads made of the Scarlet Powder, which they call *Kermes*, which is the principal Ingredient in their *Cordial-Confection Alkermen*. The Beads would be made up with *Amber-Griece*, and some *Pomander*. 965.

It hath been long received, and confirmed by divers tryals, that the Root of the *Male-Peony* dried, tied to the Neck, doth help the *Falling-sickness*; and likewise the *Incubus*, which we call the *Mare*. The cause of both these *Diseases*, and especially of the *Epilepsie* from the Stomack, is the grosness of the Vapors which rise and enter into the Cells of the Brain: And therefore the working is by extream and subtil Attenuation, which that Simple hath. I judge the like to be in *Castoreum*, *Musk*, *Ren-Seed*, *Agnus Castus Seed*, *&c.* 966.

There is a Stone which they call the *Blood-Stone*, which worn, is thought to be good for them that bleed at the Nose; which (no doubt) is by astriction and cooling of the Spirits. *Quare*, if the Stone taken out of the *Toads* Head, be not of the like virtue, for the *Toad* loveth Shade and Coolness. 967.

Light may be taken from the *Experiment* of the *Horse-tooth Ring*, and the *Garland* of *Perwinckle*, how that those things which asswage the strife of the Spirits, do help diseases, contrary to the Intention desired; for in the curing of the Cramp, the Intention is to relax the Sinews; but the contraction of the Spirits, that they strive less, is the best help: So to procure easie Travails of Women, the Intention is to bring down the Childe; but the help is, to stay the coming down too fast; whereunto they say the *Toad-stone* likewise helpeth. So in *Pestilent Fevers*, the Intention is to expel the Infection by Sweat and Evaporation; but the best means to do it, is by *Nitre*, *Diascordium*, and other cool things, which do for a time arrest the Expulsion, till Nature can do it more quietly. For as one saith prettily, *In the quenching of the flame of a Pestilent Ague, Nature is like People that come to quench the Fire of an House; which are so busie, as one of them letteth another.* Surely it is an excellent Axiome, and of manifold use, that whatsoever appeaseth the contention of Spirits furthereth their action. 968.

The Writers of *Natural Magick* commend the wearing of the spoil of a Snake, for preserving of Health. I doubt it is but a conceit; for that the Snake is thought to renew her youth by casting her spoil. They might as well take the Beak of an Eagle, or a piece of a Harts-horn, because those renew. 969.

It hath been anciently received, (for *Pericles* the *Athenian* used it) and it is yet in use, to wear little Bladders of Quick-silver, or Tablets of Arsenick, as preservatives against the Plague: Not, as they conceive, for any comfort they yield to the Spirits; but for that being poysons themselves, they draw the venome to them from the Spirits. 970.

971. *Vide the Experiments* 95, 96, and 97. touching the several *Sympathies* and *Antipathies* for *Medicinal use*.

972. It is said, that the Guts or Skin of a Woolf being applied to the Belly do cure the Colick. It is true, that the Woolf is a Beast of great Edacity and Digestion; and so it may be the parts of him comfort the Bowels.

973. We see *Scare-crows* are set up to keep Birds from Corn and Fruit. It is reported by some, that the Head of a Woolf, whole, dried and hanged up in a *Dove-house*, will scare away Vermin, such as are *Wrasils*, *Pole-cats*, and the like. It may be the Head of a Dog will do as much; for those Vermin with us, know Dogs better then Wolves.

974. The Brains of some Creatures, (when their Heads are rosted) taken in Wine, are said to strengthen the Memory; as the Brains of Hares, Brains of Hens, Brains of Deer, &c. And it seemeth to be incident to the Brains of those Creatures that are fearful.

975. The Oyntment that Witches use, is reported to be made of the Fat of Children digged out of their Graves; of the Juices of Smallage, Woolfbane, and Cinquefoil, mingled with the Meal of Fine Whear. But I suppose, that the Soporiferous Medicines are likest to do it; which are Henbane, Hemlock, Mandrake, Moonshade, Tobacco, Opium, Saffron, Poplar-leaves, &c.

976. It is reported by some, that the affections of Beasts when they are in strength, do add some virtue unto inanimate things: As that the Skin of a Sheep devoured by a Woolf moveth itching; that a stone bitten by a Dog in anger, being thrown at him, drunk in Powder provoketh Choler.

977. It hath been observed, that the diet of Women with Childe, doth work much upon the Infant. As if the Mother eat Quinces much, and Coriander-seed (the nature of both which, is to repress and stay vapors that ascend to the Brain) it will make the Childe ingenious: And on the contrary side, if the Mother eat (much) Onions or Beans, or such vaporous food, or drink Wine or strong drink immoderately, or fast much, or be given to much musing, (all which send or draw vapors to the Head) it indangereth the Childe to become Lunatick, or of imperfect memory: And I make the same judgment of Tobacco often taken by the Mother.

978. The Writers of *Natural Magick* report, that the Heart of an Ape worn near the Heart, comforteth the Heart, and increaseth audacity. It is true, that the Ape is a merry and bold Beast. And that the same Heart likewise of an Ape applied to the Neck or Head, helpeth the Wit, and is good for the Falling sickness. The Ape also is a witty Beast, and hath a dry Brain; which may be some cause of attenuation of Vapors in the Head. Yet it is said to move Dreams also. It may be the Heart of a Man would do more, but that it is more against Mens mindes to use it; except it be in such as wear the Reliques of Saints.

979. The Flesh of a Hedghog dressed and eaten, is said to be a great dryer. It is true, that the Juice of a Hedghog must needs be harsh and dry, because it putteth forth so many Prickles: For Plants also that are full of Prickles are generally dry; as Bryars, Thorns, Barberries. And therefore the ashes of a Hedghog are said to be a great desiccative of Fistula's.

980. Mummy hath great force in stanching of Blood; which as it may be ascribed to the mixture of Balms that are Glutenous, so it may also partake of a secret propriety, in that the Blood draweth Mans flesh. And it is approved, that the Mosse which groweth upon the Scull of a Dead Man unburied will stanch Blood potently. And so do the dregs or powder of Blood, severed from the Water and dried.

It hath been practiſed to make *White Swallows*, by anointing of the Eggs with Oyl. Which effect may be produced by the ſtopping of the Pores of the Shell, and making the Juice that putteth forth the Feathers afterwards more penurious. And it may be, the anointing of the Eggs will be as effectual as the anointing of the Body. Of which, *Vide the Experiment 93.* 981.

It is reported, that the White of an Egg or Blood mingled with Salt-water, doth gather the ſaltneſs, and maketh the water ſweeter. This may be by Adheſion; as in the *Sixth Experiment* of *Clarification*. It may be alſo, that Blood, and the White of an Egg, (which is the matter of a Living Creature) have ſome Sympathy with Salt; for all Life, hath a Sympathy with Salt. We ſee that Salt laid to a cut finger, healeth it; ſo, as it ſeemeth, Salt draweth Blood, as well as Blood draweth Salt. 982.

It hath been anciently received, that the Sea-Hare hath an antipathy with the Lungs, (if it cometh near the Body) and erodeth them. Whereof the cauſe is conceived to be a quality it hath of heating the Breath and Spirits; as *Cantharides* have upon the watry parts of the Body, as Urine and Hydropical Water. And it is a good rule, That whatſoever hath an operation upon certain kindes of Matters, that in Mans Body worketh moſt upon thoſe parts wherein that kinde of matter aboundeth. 983.

Generally that which is Dead, or Corrupted, or Excerned, hath antipathy with the ſame thing when it is alive, and when it is ſound, and with thoſe parts which do excern: As a Carcaſs of Man is moſt infectious and odious to Man, a Carrion of an Horſe to an Horſe, &c. Purulent matter of Wounds and Ulcers, Carbuncles, Pox, Scabs, Leproſie, to ſound Fleſh; and the Excrements of every Species to that Creature that excerneth them. But the Excrements are leſs pernicious then the corruptions. 984.

It is a common experience, That Dogs know the Dog-killer, when as in times of Infection ſome pety fellow is ſent out to kill the Dogs; and that though they have never ſeen him before, yet they will all come forth, and bark, and flie at him. 985.

The *Relations* touching the Force of Imagination, and the Secret Inſtincts of Nature, are ſo uncertain, as they require a great deal of Examination ere we conclude upon them. I would have it firſt throughly inquired, whether there be any ſecret paſſages of Sympathy between Perſons of near Blood; as *Parents, Children, Brothers, Siſters, Nurſe-children, Husbands, Wives, &c.* There be many reports in *Hiſtory*, that upon the death of Perſons of ſuch nearneſs, Men have had an inward feeling of it. I my ſelf remember, that being in *Paris*, and my Father dying in *London*, two or three days before my Fathers death, I had a dream, which I told to divers *Engliſh Gentlemen*, that my Fathers Houſe in the Countrey was Plaiſtered all over with Black Mortar. There is an opinion abroad, (whether idle, or no I cannot ſay) That loving and kinde Husbands have a ſenſe of their Wives breeding Childe by ſome accident in their own Body. 986.

Next to thoſe that are near in Blood, there may be the like paſſage and inſtincts of Nature between great Friends and Enemies. And ſometimes the revealing is unto another perſon, and not to the party himſelf. I remember *Philippus Comineus* (a grave Writer) reporteth, That the Archbiſhop of *Vienna* (a Reverend Prelat) ſaid (one day) after Maſs to King *Lewis* the Eleventh of *France*, *Sir, Your Mortal Enemy is dead*; what time, *Charles Duke* of *Burgundy* was ſlain at the Battel of *Granſon* againſt the *Switzers*. Some tryal alſo would be made, whether Pact or Agreement do any thing; as if two Friends ſhould agree, That ſuch a day in every Week, they being in far diſtant places, ſhould 987.

should pray one for another, or should put on a *Ring* or *Tablet* one for anothers sake; whether, if one of them should break their Vow and Promise, the other should have any feeling of it in absence.

988. If there be any force in Imaginations and Affections of singular Persons, it is probable the force is much more in the Joynt-Imaginations and Affections of Multitudes; as if a victory should be won or lost in remote parts, Whether is there not some sense thereof in the people whom it concerneth, because of the great joy or grief that many men are possessed with at once? *Pius Quintus*, at the very time when that memorable victory was won by the *Christians* against the *Turks*, at the Naval Battel of *Lepanto*, being then hearing of Causes in the Consistory, brake off suddenly, and said to those about him, *It is now more then time we should give thanks to God for the great Victory he hath granted us against the Turks.* It is true, that Victory had a Sympathy with his Spirit, for it was meerly his work to conclude the League: It may be that *Revelation* was *Divine*. But what shall we say then to a number of Examples amongst the *Grecians* and *Romans*, where the People being in Theatres at Plays, have had news of Victories and Overthrows some few days, before any Messenger could come?

It is true, that that may hold in these things which is the general Root of Superstition; namely, that men observe when things hit, and not when they miss, and commit to Memory the one, and forget and pass over the other. But touching *Divination* and the misgiving of Mindes, we shall speak more when we handle in general the *Nature of Mindes*, and *Souls*, and *Spirits*.

989. We having given formerly some *Rules of Imagination*, and touching the fortifying of the same; we have set down also some few Instances and Directions of the force of Imagination upon *Beasts*, *Birds*, *&c.* upon *Plants*, and upon *Inanimate Bodies*: Wherein you must still observe, that your Tryals be upon Subtil and Light Motions, and not the contrary; for you will sooner by Imagination bind a Bird from Singing then from Eating or Flying; and I leave it to every man to chuse *Experiments* which himself thinketh most commodious, giving now but a few Examples of every of the three kindes.

990. Use some Imaginant (observing the *Rules* formerly prescribed) for binding of a Bird from singing, and the like of a Dog from barking. Try also the Imagination of some, whom you shall accommodate with things to fortifie it in Cock-fights, to make one Cock more hardy, and the other more cowardly. It would be tried also in flying of Hawks, or in coursing of a Deer or Hart with Grey-hounds, or in Horse-races, and the like comparative Motions; for you may sooner by Imagination, quicken or slack a motion, then raise or cease it; as it is easier to make a Dog go slower, then to make him stand still, that he may not run.

991. In *Plants* also you may try the force of Imagination upon the lighter sort of Motions; as upon the sudden fading or lively coming up of Herbs; or upon their bending one way or other, or upon their closing and opening, &c.

992. For Inanimate things, you may try the force of Imagination upon staying the working of Beer, when the Barm is put in; or upon the coming of Butter or Cheese, after the Churning, or the Rennet be put in.

993. It is an ancient *Tradition*, every where alleaged, for example of secret Proprieties and Influxes, That the *Torpedo Marina*, if it be touched with a long stick, doth stupefie the hand of him that toucheth it. It is one degree of working

working at distance, to work by the continuance of a fit *Medium*; as Sound will be conveyed to the Ear by striking upon a Bow-string, if the Horn of the Bow be held to the Ear.

994. The Writers of *Natural Magick* do attribute much to the Virtues that come from the parts of Living Creatures, so as they be taken from them, the Creatures remaining still alive; as if the Creature still living did infuse some immateriate Virtue and Vigor into the part severed. So much may be true, that any part taken from a Living Creature newly slain, may be of greater force, then if it were taken from the like Creature dying of it self; because it is fuller of Spirit.

995. Tryal would be made of the like parts of Individuals in Plants and Living Creatures; as to cut off a Stock of a Tree, and to lay that which you cut off to putrefie, to see whether it will decay the rest of the Stock; or if you should cut off part of the Tail, or Leg of a Dog, or a Cat, and lay it to putrefie, to see whether it will fester, or keep from healing, the part which remaineth.

996. It is received, that it helpeth to continue love, if one wear a Ring or a Bracelet of the Hair of the party beloved. But that may be by the exciting of the Imagination; and perhaps a Glove, or other like Favor, may as well do it.

997. The Sympathy of Individuals that have been entire, or have touched, is of all others, the most incredible; yet according unto our faithful manner of Examination of Nature, we will make some little mention of it. The taking away of Warts, by rubbing them with somewhat that afterwards is put to waste and consume, is a common Experiment; and I do apprehend it the rather, because of mine own experience. I had from my Childhood a Wart upon one of my Fingers; afterwards, when I was about sixteen years old, being then at *Paris*, there grew upon both my hands a number of Warts (at least an hundred) in a moneths space. The *English Ambassadors Lady*, who was a Woman far from Superstition, told me one day she would help me away with my Warts. Whereupon she got a piece of Lard with the skin on, and rubbed the Warts all over with the fat side, and amongst the rest that Wart which I had from my Childhood; then she nailed the piece of Lard, with the fat towards the Sun, upon a post of her Chamber-window, which was to the South. The success was, that within five weeks space all the Warts went quite away, and that Wart which I had so long endured, for company. But at the rest I did little marvel, because they came in a short time, and might go away in a short time again; but the going of that which had staid so long doth yet stick with me. They say the like is done by rubbing of Warts with a green Elder-stick, and then burying the stick to rot in muck. It would be tried with Corns and Wens, and such other Excrescences: I would have it also tried with some parts of Living Creatures that are neerest the nature of Excrescences; as the Combs of Cocks, the Spurs of Cocks, the Horns of Beasts, &c. and I would have it tried both ways; both by rubbing those parts with Lard or Elder as before; and by cutting off some piece of those parts, and laying it to consume, to see whether it will work any effect towards the Consumption of that part which was once joyned with it.

998. It is constantly received and avouched, that the anointing of the Weapon that maketh the Wound, will heal the Wound it self. In this Experiment, upon the relation of men of credit, (though my self, as yet, am not fully inclined to believe it) you shall note the Points following. First, the Oyntment wherewith this is done, is made of divers Ingredients; whereof the strangest

ſtrangeſt and hardeſt to come by, are the Moſs upon the Skull of a dead Man unburied, and the Fats of a Boar, and a Bear killed in the act of generation. Theſe two laſt I could eaſily ſuſpect to be preſcribed as a ſtartling hole, that if the *Experiment* proved not; it might be pretended, that the Beaſts were not killed in the due time; for as for the Moſs, it is certain there is great quantity of it in *Ireland*, upon ſlain Bodies laid on heaps unburied. The other Ingredients are the Blood-ſtone in Powder, and ſome other things which ſeem to have a virtue to ſtanch blood, as alſo the Moſs hath. And the deſcription of the whole Oyntment is to be found in the *Chymical Diſpenſatory* of *Crollius*. Secondly, The ſame kinde of Oynment applied to the hurt it ſelf, worketh not the effect, but onely applied to the weapon. Thirdly, (which I like well) they do not obſerve the confecting of the Oyntment under any certain Conſtellation; which commonly is the excuſe of Magical Medicines when they fail, that they were not made under a fit figure of Heaven. Fourthly, it may be applied to the Weapon, though the party hurt be at great diſtance. Fifthly, it ſeemeth the Imagination of the party to be cured is not needful to concur, for it may be done without the knowledge of the party wounded: And thus much hath been tried, that the Oyntment (for *Experiments* ſake) hath been wiped off the Weapon without the knowledge of the party hurt, and preſently the party hurt hath been in great rage of pain, till the weapon was reanointed. Sixthly, it is affirmed, That if you cannot get the weapon, yet if you put an Inſtrument of Iron or Wood, reſembling the weapon into the Wound, whereby it bleedeth, the anointing of that Inſtrument will ſerve and work the effect. This I doubt ſhould be a device to keep this ſtrange form of Cure in requeſt and uſe, becauſe many times you cannot come by the Weapon it ſelf. Seventhly, the Wound muſt be at firſt waſhed clean with White-wine, or the parties own Water, and then bound up cloſe in fine Linnen, and no more dreſſing renewed till it be whole. Eighthly, the Sword it ſelf muſt be wrapped up cloſe as far as the Oyntment goeth, that it take no wind. Ninthly, the Oyntment, if you wipe it off from the Sword and keep it, wil ſerve again, and rather increaſe in vertue then diminiſh. Tenthly, it will cure in far ſhorter time, then Oyntments of Wounds commonly do. Laſtly, it will cure a Beaſt as well as a Man; which I like beſt of all the reſt, becauſe it ſubjecteth the matter to an eaſie tryal.

999. Experiment Solitary, touching *Secret Proprieties.*

I Would have Men know, that though I reprehend the eaſie paſſing over of the cauſes of things, by aſcribing them to ſecret and hidden virtues and proprieties (for this hath arreſted and laid aſleep all true Inquiry and Indications;) yet I do not underſtand, but that in the practical part of knowledge much will be left to Experience and Probation, whereunto Indication cannot ſo fully reach; and this is not onely in *Specie*, but in *Individuo*. So in Phyſick, if you will cure the *Jaundies*, it is not enough to ſay, that the Medicine muſt not be cooling, for that will hinder the opening which the diſeaſe requireth; that it muſt not be hot, for that will exaſperate Choler; that it muſt go to the Gall, for there is the obſtruction which cauſeth the diſeaſe, &c. But you muſt receive from Experience, that Powder of *Chamapytis*, or the like, drunk in Beer, is good for the *Jaundies*. So again, a wiſe Phyſician doth not continue ſtill the ſame Medicine to a Patient, but he will vary, if the firſt Medicine doth not apparently ſucceed; for of thoſe Remedies that are good for the *Jaundies*, *Stone*, *Agues*, &c. that will do good in one Body, which will not do good in another, according to the correſpondence the Medicine hath to the Individual Body.

The

1000. Experiment Solitary, touching the *General Sympathy of Mens Spirits.*

THe delight which Men have in *Popularity*, *Fame*, *Honor*, *Submission*, and *Subjection* of other *Mens Mindes*, *Wills*, or *Affections* (although these things may be desired for other ends) seemeth to be a thing in it self, without contemplation of consequence, grateful, and agreeable to the Nature of Man. This thing (surely) is not without some signification, as if all Spirits and Souls of Men came forth out of one *Divine Limbus*; else, why be Men so much affected with that which others think or say? The best temper of Mindes, desireth good Name and true Honor; the lighter, Popularity and Applause; the more depraved, Subjection and Tyranny; as is seen in great Conquerors and Troublers of the World; and yet more in Arch-Hereticks, for the introducing of new Doctrines, is likewise an affectation of Tyranny over the Understandings and Beliefs of Men.

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To be taken in this order.

1. *The Poultice.*

℞. Of Manchet, about three Ounces, the Crum onely, thin cut; let it be boiled in Milk till it grow to a Pulp; add in the end, a Dram and a half of the Powder of Red Roses.
Of Saffron ten Grains.
Of Oyl of Roses an Ounce.
Let it be spred upon a Linnen Cloth, and applied luke-warm, and continued for three hours space.

2. *The Bath or Fomentation.*

℞. Of Sage-Leaves, half an handful.
Of the Root of Hemlock sliced, six Drams.
Of Briony Roots, half an Ounce.
Of the Leaves of Red Roses, two Pugils.
Let them be boiled in a Pottle of Water wherein Steel hath been quenched, till the Liquor come to a Quart; after the straining, put in half an handful of Bay-Salt.
Let it be used with Scarlet-Cloth, or Scarlet-Wool, dipped in the Liquor hot, and so renewed seven times; all in the space of a quarter of an hour or little more.

3. *The Plaister.*

℞. *Emplastrum Diacalcitheos*, as much as is sufficient for the part you mean to cover; let it be dissolved with Oyl of Roses in such a consistence as will stick, and spred upon a piece of Holland, and applied.

FINIS.

HISTORY

Natural and Experimental

OF

LIFE & DEATH:

OR,

Of the Prolongation of LIFE.

Written in Latin by the Right Honorable
FRANCIS Lord *Verulam*,
Viſcount St. *Albans*.

LONDON,
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in *Fleetſtreet*. 1669.

THE HISTORY OF Life and Death.

The Preface.

IT is an ancient saying and complaint, That *Life* is short and *Art* long; wherefore it behoveth us, who make it our chiefest aim to perfect *Arts*, to take upon us the consideration of *Prolonging Mans Life*, *GOD*, the *Author* of all *Truth* and *Life*, prospering our Endeavors. For though the *Life* of *Man* be nothing else but a mass and accumulation of sins and sorrows, and they that look for an Eternal Life set but light by a Temporary: Yet the continuation of VVorks of Charity ought not to be contemned, even by us *Christians*. Besides, the beloved *Disciple* of our *Lord* survived the other *Disciples*; and many of the Fathers of the Church, especially of the holy Monks and Hermits, were long-lived: VVhich shews, that this blessing of long life, so often promised in the Old Law, had less abatement after our *Saviours* days then other earthly blessings had; but to esteem of this as the chiefest good, we are but too prone. Onely the enquiry is difficult how to attain the same; and so much the rather, because it is corrupted with false opinions and vain reports: For both those things which the vulgar *Physitians* talk of, *Radical Moisture* and *Natural Heat*, are but meer Fictions; and the immoderate

praiſes of *Chymical Medicines*, firſt puff up with vain hopes, and then fail their admirers.

And as for that *Death* which is cauſed by Suffocation, Putrefaction, and ſeveral Diſeaſes, we ſpeak not of it now, for that pertains to an *Hiſtory* of *Phyſick*; but onely of that *Death* which comes by a total decay of the Body, and the Inconcoction of old Age. Nevertheleſs the laſt act of *Death*, and the very extinguiſhing of *Life* it ſelf, which may ſo many ways be wrought outwardly and inwardly (which notwithſtanding have, as it were, one common Porch before it comes to the point of death) will be pertinent to be inquired of in this Treatiſe; but we reſerve that for the laſt place.

That which may be repaired by degrees, without a total waſte of the firſt ſtock, is potentially eternal, as the *Veſtal Fire*. Therefore when *Phyſicians* and *Philoſophers* ſaw that living Creatures were nouriſhed and their Bodies repaired, but that this did laſt onely for a time, and afterwards came old age, and in the end diſſolution; they ſought Death in ſomewhat which could not properly be repaired, ſuppoſing a *Radical Moiſture* incapable of ſolid reparation, and which, from the firſt infancy, received a ſpurious addition, but no true reparation, whereby it grew daily worſe and worſe, and, in the end, brought the bad to none at all. This conceit of theirs was both ignorant and vain; for all things in living Creatures are in their youth repaired entirely; nay, they are for a time increaſed in quantity, bettered in quality, ſo as the Matter of reparation might be eternal, if the Manner of reparation did not fail. But this is the truth of it, There is in the declining of age an unequal reparation; ſome parts are repaired eaſily, others with difficulty and to their loſs; ſo as from that time the Bodies of Men begin to endure the torments of *Mezentius*, *That the living die in the embraces of the dead*; and the parts eaſily repairable, through their conjunction with the parts hardly repairable, do decay: For the *Spirits*, *Blood*, *Fleſh*, and *Fat* are, even after the decline of years, eaſily repaired; but the drier and more porous parts (as the *Membranes*, all the *Tunicles*, the *Sinews*, *Arteries*, *Veins*, *Bones*, *Cartilages*, moſt of the *Bowels*, in a word, almoſt all the *Organical Parts*) are hardly repairable, and to their loſs. Now theſe hardly-repairable parts, when they come to their office of repairing the other which are eaſily repairable, finding themſelves deprived of their wonted ability and ſtrength, ceaſe to perform any longer their proper Functions: By which means it comes to paſs, that in proceſs of time the whole tends to diſſolution; and even thoſe very parts which in their own nature are with much eaſe repairable, yet through the decay of the Organs of reparation can no more receive reparation, but decline, and in the end utterly fail. And the cauſe of the termination of Life is this, for that the *Spirits*, like a gentle flame, continually preying upon Bodies, conſpiring with the outward *Air*, which is ever ſucking and drying of them, do, in time, deſtroy the whole Fabrick of the Body, as alſo the particular Engines and Organs thereof, and make them unable for the work of Reparation. Theſe are the true ways of *Natural Death*, well and faithfully to be revolved in our mindes; for he that knows not the ways of *Nature*, how can he ſuccor her, or turn her about?

Therefore the *Inquiſition* ought to be twofold; the one touching the *Conſumption* or *Depredation* of the Body of Man; the other touching the *Reparation* and *Renovation* of the ſame: To the end, that the former may,

as

as much as is possible, be forbidden and restrained, and the latter comforted. The former of these pertains, especially to the *Spirits* and outward *Air*, by which the Depredation and Waste is committed; the latter to the whole race of *Alimentation* or *Nourishment*, whereby the Renovation or Restitution is made. And as for the former part touching *Consumption*, this hath many things common with *Bodies Inanimate*, or without life. For such things as the *Native Spirit* (which is in all tangible Bodies, whether living or without life) and the ambient or external Air worketh upon Bodies Inanimate, the same it attempteth upon Animate or Living Bodies; although the *Vital Spirit* superadded, doth partly break and bridle those operations, partly exalt and advance them wonderfully. For it is most manifest that Inanimate Bodies (most of them) will endure a long time without any Reparation; but Bodies Animate without Food and Reparation suddenly fall and are extinguished, as the Fire is. So then, our *Inquisition* shall be double. First, we will consider the Body of Man as Inanimate, and not repaired by *Nourishment*: Secondly, as *Animate* and repaired by *Nourishment*. Thus having Prefaced these things, we come now to the *Topick* places of *Inquisition*.

THE

TO THE READER.

AM to give Advertiſement, that there came forth of late a *Tranſlation* of this *Book* by an unknown *Perſon*, who though he wished well to the propagating of his *Lordſhips Works*, yet he was altogether unacquainted with his *Lordſhips* ſtile and manner of Expreſſions, and ſo published a *Tranſlation* lame and defective in the whole. Whereupon I thought fit to recommend the ſame to be tranſlated anew by a more diligent and zealous Pen, which hath ſince travelled in it; and though it ſtill comes short of that lively and incomparable Spirit and Expreſſion, which lived and died with the *Author*, yet I dare avouch it to be much more warrantable and agreeable then the former. It is true, this *Book* was not intended to have been published in *Engliſh*; but ſeeing it hath been already made free of that *Language*, whatſoever benefit or delight may redound from it, I commend the ſame to the *Courteous* and *Judicious Reader*.

W. R.

To the present Age and Posterity,
Greeting.

Although I had ranked the History of Life and Death *as the last amongst my* Six Monethly Designations; *yet I have thought fit, in respect of the prime use thereof, (in which the least loss of time ought to be esteemed precious) to invert that order, and to send it forth in the second place. For I have hope, and wish, that it may conduce to a common good; and that the Nobler sort of* Physicians *will advance their thoughts, and not employ their times wholly in the sordidness of* Cures, *neither be honored for* Necessity *onely, but that they will become* Coadjutors *and* Instruments *of the* Divine Omnipotence *and* Clemency *in* Prolonging *and* Renewing *the* Life of Man; *especially seeing I prescribe it to be done by safe, and convenient, and civil ways, though hitherto unassayed. For though we* Christians *do continually aspire and pant after the* Land of Promise; *yet it will be a token of* Gods *favor towards us, in our journeyings through this* Worlds Wilderness, *to have our* Shoes *and* Garments (*I mean those of our frail* Bodies) *little worn or impaired.*

Fr. St. Albans.

THE

THE

Particular Topick Places;

OR,

ARTICLES of INQUISITION TOUCHING LIFE and DEATH.

1. FIrst, inquire of *Nature durable*, and *Not durable*, in Bodies Inanimate or without Life, as also in Vegetables; but that not in a large or just Treatise, but as in a Brief or Summary onely.

2. Also inquire diligently of *Desiccation*, *Arefaction*, and *Consumption* of *Bodies Inanimate*, and of *Vegetables*; and of the ways and processes, by which they are done; and further, of Inhibiting and Delaying of *Desiccation*, *Arefaction*, and *Consumption*, and of the *Conservation of Bodies*, in their proper state; and again, of the *Inteneration*, *Emollition*, and *Recovery of Bodies* to their former freshness, after they be once dryed and withered.

Neither need the *Inquisition* touching these things, to be full or exact, seeing they pertain rather to their proper Title of *Nature durable*; seeing also, they are not Principals in this *Inquisition*, but serve onely to give light to the *Prolongation* and *Instauration* of *Life* in *Living Creatures*. In which (as was said before) the same things come to pass, but in a particular manner. So from the *Inquisition* touching *Bodies Inanimate* and *Vegetables*, let the *Inquisition* pass on to other *Living Creatures* besides *Man*.

3. Inquire touching the *length* and *shortness of Life* in *Living Creatures*, with the due circumstances which make most for their long or short lives.

4. But because the *Duration of Bodies* is twofold, One in *Identity*, or the self-same substance, the other by a *Renovation* or *Reparation*; whereof the former hath place onely in *Bodies Inanimate*, the latter in *Vegetables* and *Living Creatures*, and is perfected by *Alimentation* or *Nourishment*; therefore it will be fit to inquire of *Alimentation*, and of the ways and progresses thereof; yet this not exactly, (because it pertains properly to the Titles of *Assimilation* and *Alimentation*) but, as the rest, in progress onely.

From the *Inquisition* touching *Living Creatures*, and *Bodies* repaired by *Nourishment*, pass on to the *Inquisition* touching *Man*. And now being come to the principal subject of *Inquisition*, the *Inquisition* ought to be in all points more precise and accurate.

5. Inquire touching the *length* and *shortness of Life* in *Men*; according to the *Ages* of the *World*, the several *Regions*, *Climates*, and *Places* of their *Nativity* and *Habitation*.

6. Inquire touching the *length* and *shortness of Life* in *Men*, according to their *Races* and *Families*, as if it were a thing hereditary; also according to their *Complexions*, *Constitutions*, and *Habits* of *Body*, their *Statures*, the *manner* and *time* of their growth, and the making and composition of their *Members*.

7. Inquire touching the *length* and *shortness of Life* in *Men*, according to the times of their *Nativity*; but so, as you omit for the present all *Astrological* observations, and the *Figures* of *Heaven*, under which they were born; onely insist upon the vulgar and

manifest Observations; as whether they were born in the Seventh, Eighth, Ninth, or Tenth Moneth; also, whether by Night or by Day, and in what Moneth of the Year.

8. Inquire touching the *Length* and *Shortness of Life in Men*, according to their *Fare*, *Diet*, *Government* of their *Life*, *Exercises*, and the like. For as for the *Air*, in which Men live and make their abode, we account that proper to be inquired of in the above-said *Article*, touching the places of their *Habitation*.

9. Inquire touching the *Length* and *Shortness of Life in Men*, according to their *Studies*, their several *Courses of Life*, the *Affections* of the *Minde*, and divers *Accidents* befalling them.

10. Inquire apart touching those *Medicines* which are thought to prolong *Life*.

11. Inquire touching the *Signs* and *Prognosticks of long and short life*; not those which betoken *Death* at hand, (for they belong to an *History of Physick*) but those which are seen and may be observed even in Health, whether they be Physiognomical signs, or any other.

Hitherto have been propounded *Inquisitions* touching *Length* and *Shortness of Life*, besides the *Rules* of *Art*, and in a confused manner; now we think to add some, which shall be more *Art-like*, and tending to practice, under the name of *Intentions*. Those *Intentions* are generally three: As for the particular Distributions of them, we will propound them when we come to the *Inquisition* it self. The three general *Intentions* are, the *Forbidding of Waste and Consumption*, the *Perfecting of Reparation*, and the *Renewing of Oldness*.

12. Inquire touching those things which conserve and exempt the Body of Man from *Arefaction* and *Consumption*, at least which put off and protract the inclination thereunto.

13. Inquire touching those things which pertain to the whole process of *Alimentation*, (by which the Body of Man is repaired) that it may be good, and with the best improvement.

14. Inquire touching those things which purge out the *old Matter*, and supply with new; as also which do Intenerate and Moisten those parts which are already dried and hardned.

But because it will be hard to know the Ways of Death, unless we search out and discover the *Seat*, or *House*, or rather *Den of Death*, it will be convenient to make Inquisition of this thing; yet not of every kinde of *Death*, but of those *Deaths* which are caused by want and indigence of Nourishment, not by violence; for they are those *Deaths* onely which pertain to a decay of Nature, and meer old Age.

15. Inquire touching the Point of Death, and the Porches of Death, leading thereunto from all parts, so as that Death be caused by a decay of Nature, and not by Violence.

Lastly, because it is behoveful to know the Character and Form of *Old Age*, which will then best be done, if you make a *Collection* of all the *Differences*, both in the State and Functions of the Body, betwixt *Youth* and *Old Age*, that by them you may observe what it is that produceth such manifold *Effects*; let not this Inquisition be omitted.

16. Inquire diligently touching the *Differences* in the *State* of the *Body* and *Faculties* of

17. the *Minde* in *Youth* and *Old Age*; and whether there be any that remain the same without alteration or abatement in *Old Age*.

Nature Durable, and not Durable.

The History.

To the first Article.

1. METALS are of that long lasting, that Men cannot trace the beginnings of them; and when they do decay, they decay through *Rust*, not through perspiration into Air; yet *Gold* decays neither way.

2. *Quick-silver*, though it be an humid and fluid Body, and easily made volatile by Fire; yet (as far as we have observed) by Age alone, without Fire, it neither wasteth nor gathereth Rust.

3. *Stones*, especially the harder sort of them, and many other Fossiles, are of long lasting

ing, and that though they be expoſed to the open air; much more if they be buried in the earth. Notwithſtanding *Stones* gather a kind of *Nitre*, which is to them inſtead of *Ruſt*. *Precious Stones* and *Cryſtals* exceed *Metalls* in long laſting; but then they grow dimmer and leſs Orient, if they be very old.

4. It is obſerved, that *Stones* lying towards the North do ſooner decay with age than thoſe that lie toward the South; and that appears manifeſtly in *Pyramids*, and *Churches*, and other ancient *Buildings*: contrariwiſe, in *Iron*, that expoſed to the South, gathers *Ruſt* ſooner, and that to the North later; as may be ſeen in the *Iron-bars* of windows. And no marvel, ſeeing in all putrefaction (as *Ruſt* is) Moiſture haſtens Diſſolutions; in all ſimple Arefaction, Drineſs.

5. In *Vegetables*, (we ſpeak of ſuch as are fell'd, not growing) the Stocks or Bodies of harder *Trees*, and the Timber made of them, laſt divers ages. But then there is difference in the bodies of Trees: ſome Trees are in a manner ſpongy, as the *Elder*, in which the pith in the midſt is ſoft, and the outward part harder; but in Timber-trees, as the *Oak*, the inner part (which they call *Heart of Oak*) laſteth longer.

6. The *Leaves*, and *Flowers*, and *Stalks* of *Plants* are but of ſhort laſting, but diſſolve into duſt, unleſs they putrefie: the *Roots* are more durable.

7. The *Bones* of living Creatures laſt long, as we may ſee it of mens bones in Charnel-houſes: *Horns* alſo laſt very long; ſo do *Teeth*, as it is ſeen in *Ivory*, and the *Sea-horſe* Teeth.

8. *Hides* alſo and *Skins* endure very long, as is evident in old *Parchment-books*: *Paper* likewiſe will laſt many ages, though not ſo long as *Parchment*.

9. Such *things* as have *paſſed the Fire* laſt long, as *Glaſs* and *Bricks*; likewiſe *Fleſh* and *Fruits* that have *paſſed the Fire* laſt longer than *Raw*: and that not onely becauſe the Baking in the Fire forbids putrefaction; but alſo becauſe the watry humour being drawn forth, the oily humour ſupports it ſelf the longer.

10. *Water* of all Liquors is ſooneſt drunk up by *Air*, contrariwiſe *Oil* lateſt; which we may ſee not onely in the *Liquors* themſelves, but in the *Liquors* mixt with other Bodies: for *Paper* wet with water, and ſo getting ſome degree of tranſparency, will ſoon after wax white, and loſe the tranſparency again, the watry vapour exhaling; but oiled *Paper* will keep the tranſparency long, the *Oil* not being apt to exhale: And therefore they that counterfeit mens hands, will lay the oiled paper upon the writing they mean to counterfeit, and then aſſay to draw the lines.

11. *Gums* all of them laſt very long; the like do *Wax* and *Honey*.

12. But the *equal* or *unequal* uſe of things conduceth no leſs to long laſting or ſhort laſting, than the things themſelves; for *Timber*, and *Stones*, and other *Bodies*, ſtanding continually in the *water*, or continually in the *air*, laſt longer than if they were ſometimes wet, ſometimes dry: and ſo *Stones* continue longer, if they be laid towards the ſame coaſt of Heaven in the Building that they lay in the Mine. The ſame is of *Plants* removed, if they be coaſted juſt as they were before.

Obſervations.

1. *LEt this be laid for a* Foundation, *which is moſt ſure, That there is in every Tangible body a* Spirit, *or body* Pneumatical, *encloſed and covered with the Tangible parts; And that from this* Spirit *is the beginning of all Diſſolution and Conſumption, ſo as the Antidote againſt them is the detaining of this* Spirit.

2. *This* Spirit *is detained two ways: either by a* ſtreight Incloſure, *as it were in a Priſon: or by a kind of* free *and* voluntary Detention *Again, this* voluntary ſtay *is perſwaded two ways: either if the* Spirit *it ſelf be not too moveable or eager to depart; or if the external* Air *importune it not too much to come forth. So then, two ſorts of Subſtances are durable,* Hard Subſtances, *and* Oily: Hard Subſtance *binds in the* Spirits *cloſe*; Oily *partly enticeth the* Spirit *to ſtay, partly is of that nature that it is not importuned by* Air; *for* Air *is conſubſtantial to* Water, *and* Flame *to* Oil. *And touching* Nature Durable *and* not Durable *in* Bodies Inanimate, *thus much.*

The Hiſtory.

13. HErbs of the *colder ſort* die yearly both in Root and Stalk; as *Lettice*, *Purſlane*; alſo *Wheat* and all kind of *Corn*: yet there are ſome *cold Herbs* which will laſt

three or four years; as the *Violet*, *Straw-berry*, *Burnet*, *Prim-rose*, and *Sorrel*. But *Borage* and *Bugloss*, which seem so alike when they are alive, differ in their deaths; for *Borage* will last but one year, *Bugloss* will last more.

14. But many *hot Herbs* bear their age and years better; *Hyssop*, *Thyme*, *Savory*, *Pot-marjoram*, *Balm*, *Wormwood*, *Germander*, *Sage*, and the like. *Fennel* dies yearly in the stalk, buds again from the root: but *Pulse* and *Sweet-marjoram* can better endure age than winter; for being set in a very warm place and wel-fenced, they will live more than one year. It is known, that a knot of *Hyssop* twice a year shorn hath continued forty years.

15. *Bushes* and *Shrubs* live threescore years, and some double as much. A *Vine* may attain to threescore years, and continue fruitful in the old age. *Rose-mary* well placed will come also to threescore years; but *white Thorn* and *Ivy* endure above an hundred years. As for the *Bramble*, the age thereof is not certainly known, because bowing the head to the ground it gets new roots, so as you cannot distinguish the old from the new.

16. Amongst great *Trees* the longest livers are the *Oak*, the *Holm*, *Wild-ash*, the *Elm*, the *Beech-tree*, the *Chest-nut*, the *Plane-tree*, *Ficus Ruminalis*, the *Lote-tree*, the *wild-Olive*, the *Palm-tree* and the *Mulberry tree*. Of these, some have come to the age of eight hundred years; but the least livers of them do attain to two hundred.

17. But *Trees Odorate*, or that have sweet woods, and *Trees Rozennie*, last longer in their Woods or Timber than those above-said, but they are not so long-liv'd; as the *Cypress-tree*, *Maple*, *Pine*, *Box*, *Juniper*. The *Cedar* being born out by the vastness of his body, lives well near as long as the former.

18. The *Ash*, fertile and forward in bearing, reacheth to an hundred years and somewhat better; which also the *Birch*, *Maple*, and *Sirvice-tree* sometimes do: but the *Poplar*, *Lime-tree*, *Willow*, and that which they call the *Sycomore*, and *Walnut-tree*, live not so long.

19. The *Apple-tree*, *Pear-tree*, *Plum-tree*, *Pomegranate-tree*, *Citron-tree*, *Medlar-tree*, *Black-cherry-tree*, *Cherry-tree*, may attain to fifty or sixty years; especially if they be cleansed from the Moss wherewith some of them are cloathed.

20. Generally, greatness of body in trees, if other things be equal, hath some congruity with *length of life*; so hath *hardness* of *substance*: and trees bearing *Mast* or *Nuts* are commonly longer livers than trees bearing *Fruit* or *Berries*: likewise trees putting forth their leaves late, and shedding them late again, live longer than those that are early either in leaves or fruit; the like is of *wild-trees* in comparison of *Orchard-trees*. And lastly, in the same kind, trees that bear a *sowr fruit* out-live those that bear a *sweet fruit*.

An Observation.

ARistotle *noted well the difference between* Plants *and* living Creatures, *in respect of their* Nourishment *and* Reparation: *Namely, that the* bodies *of* living Creatures *are confined within certain* bounds, *and that after they be come to their full* growth *they are continued and preserved by* Nourishment, *but they put forth nothing new except* Hair *and* Nails, *which are counted for no better than* Excrements; *so as the* juice *of* living creatures *must of necessity sooner wax old: but in Trees, which put forth yearly new* boughs, *new* shoots, *new* leaves, *and new* fruits, *it comes to pass that all these parts in* Trees *are once a year young and renewed. Now it being so, that whatsoever is fresh and young draws the* Nourishment *more lively and chearfully to it than that which is decayed and old, it happens withall, that the* stock *and* body *of the* tree, *through which the* sap *passeth to the* branches, *is refreshed and cheared with a more bountiful and vigorous* nourishment *in the passage than otherwise it would have been. And this appears manifest (though* Aristotle *noted it not, neither hath he expressed these things so clearly and perspicuously) in* Hedges, Copses, *and* Pollards, *when the* plashing, shedding, *or* lopping *comforteth the old* stem *or* stock, *and maketh it more flourishing and longer-liv'd.*

Desiccation,

Deſiccation, Prohibiting of Deſiccation, and In-teneration of that which is deſiccated and dried.

The Hiſtory.

To the ſecond Article.

Fire and *ſtrong Heats dry* ſome things, and *melt* others. 1.

Limus ut hic dureſcit, & hæc ut Cera liqueſcit, Uno eodemque Igne?

How this Clay is hardned, and how this wax is melted, with one and the ſame thing, Fire? It drieth *Earth*, *Stones*, *Wood*, *Cloth*, and *Skins*, and whatſoever is not *liqueſiable*; and it melteth *Metalls*, *wax*, *Gums*, *Butter*, *Tallow*, and the like.

Notwithſtanding, even in thoſe things which the *fire* melteth, if it be very vehement and continueth, it doth at laſt dry them. For *metal* in a ſtrong *fire*, (*Gold* onely excepted) the *volatile* part being gone forth, will become leſs ponderous and more brittle; and thoſe *oily* and *fat ſubſtances* in the like *fire* will burn up, and be dried and parched. 2.

Air, eſpecially *open Air*, doth manifeſtly *dry*, but not *melt*: as *High-ways*, and the upper part of the Earth, moiſtned with ſhowers, are *dried*; *linnen clothes* waſhed, if they be hang'd out in the *air*, are likewiſe *dried*; *herbs*, and *leaves*, and *flowers*, laid forth in the ſhade, are *dried*. But much more ſuddenly doth the *Air* this, if it be either enlightned with the *Sun-beams*, (ſo that they cauſe no putrefaction) or if the *air* be ſtirred, as when the *wind* bloweth, or in *rooms open* on all ſides. 3.

Age moſt of all, but yet ſloweſt of all, *drieth*; as in all bodies which (if they be not prevented by putrefaction) are *drie* with *Age*. But *age* is nothing of it ſelf, being onely the meaſure of *time*; that which cauſeth the *effect* is the *native Spirit* of bodies, which ſucketh up the moiſture of the body, and then, together with it, flieth forth; and the *air ambient*, which multiplieth it ſelf upon the *native ſpirits* and *juices* of the body, and preyeth upon them. 4.

Cold of all things moſt properly *drieth*: for *drying* is not cauſed but by *Contraction*; now *contraction* is the proper work of *cold*. But becauſe we *Men* have *heat* in a high degree, namely, that of *Fire*, but *cold* in a very low degree, no other than that of *Winter*, or perhaps of *Ice*, or of *Snow*, or of *Nitre*; therefore the *drying* cauſed by *cold* is but weak, and eaſily reſolved. Notwithſtanding we ſee the *ſurface* of the *earth* to be more *dried* by *Froſt*, or by *March-winds*, than by the *Sun*, ſeeing the ſame *wind* both licketh up the *moiſture* and affecteth with *coldneſs*. 5.

Smoak is a *drier*; as in *Bacon* and *Neats tongues* which are hanged up in the chimneys: and *Perfumes* of *Olibanum*, or *Lignum Aloes*, and the like, dry the *Brain*, and cure *Catarrhs*. 6.

Salt, after ſome reaſonable continuance, *drieth*, not onely on the out-ſide, but in the inſide alſo; as in *Fleſh* and *Fiſh* ſalted, which if they have continued any long time have a manifeſt hardneſs within. 7.

Hot Gums applied to the skin dry and wrinkle it; and ſome *aſtringent waters* alſo do the ſame. 8.

Spirit of *ſtrong waters* imitateth the *fire* in *drying*: for it will both potch an Egg put into it, and toaſt Bread. 9.

Powders dry like *Sponges* by drinking up the moiſture, as it is in Sand thrown upon Lines new written: alſo *ſmoothneſs* and *politeneſs* of bodies, (which ſuffer not the vapour of moiſture to go in by the pores) *dry* by accident, becauſe it expoſeth it to the *air*; as it is ſeen in *precious Stones*, *Looking-glaſſes*, and *Blades* of *Swords*, upon which if you breath, you ſhall ſee at firſt a little miſt, but ſoon after it vaniſheth like a cloud. And thus much for *Deſiccation* or *Drying*. 10.

They uſe at this day in the *Eaſt parts* of *Germany Garners* in *Vaults* under ground, wherein they keep *Wheat* and other *grains*, laying a good quantity of ſtraw both under the *grains* and about them, to ſave them from the dampneſs of the *Vault*; by which device they keep their grains 20 or 30 years. And this doth not onely preſerve them from fuſtineſs, but (that which pertains more to the preſent *inquiſition*) preſerves them alſo in that greenneſs that they are fit and ſerviceable to make *bread*. The ſame is reported to have been in uſe in *Cappadocia* and *Thracia*, and ſome parts of *Spain*. 11.

The placing of *Garners* on the tops of houſes, with windows towards the Eaſt and North, is very commodious. Some alſo make two *Sollars*, an upper and a lower; and the upper *Sollar* hath an hole it, through which the grain continually deſcendeth, like *ſand* in an *hour-glaſs*, and after a few dayes they throw it up again with ſhovels, that ſo it may be in continual motion. Now it is to be noted 12.

that this doth not only prevent the Fuſtineſs, but conſerveth the Greeneſs, and ſlacketh the Deſiccation of it. The Cauſe is that which we noted before, That the diſcharging of the *VVatry humour*, which is quickned by the *Motion* and the *VVinds*, preſerves the *Oily humour* in his being, which otherwiſe would fly out together with the *VVatry humour*. Alſo in ſome Mountains, where the *Air* is very pure, *dead Carkaſes* may be keptfor a good while without any great decay.

13. *Fruits*, as *Pomegranates*, *Citrons*, *Apples*, *Pears*, and the like; alſo *Flowers*, as *Roſes* and *Lilies*, may be kept a long time in Earthen Veſſels cloſe ſtopped: howſoever, they are not free from the injuries of the outward *Air*, which will affect them with his unequal Temper through the ſides of the Veſſel, as it is manifeſt in heat and cold. Therefore it will be good to ſtop the mouths of the Veſſels carefully, and to bury them within the *Earth*; and it will be as good not to bury them in the *Earth*, but to ſink them in the *VVater*, ſo as the place be ſhady, as in *VVells* or *Ciſterns* placed within doors: but thoſe that be ſunk in *Water* will do better in Glaſs veſſels than in Earthen.

14. Generally thoſe things which are kept in the *Earth*, or in *Vaults* under *ground*, or in the *bottom* of a *Well*, will preſerve their freſhneſs longer than thoſe things that are kept above *ground*.

15. They ſay it hath been obſerved, that in *Conſervatories* of *Snow* (whether they were in Mountains, in natural Pits, or in Wells made by Art for that purpoſe) an *Apple*, or *Cheſ-nut*, or *Nut*, by chance falling in, after many months, when the *Snow* hath melted, hath been found in the *Snow* as freſh and fair as if it had been gathered the day before.

16. Country people keep *Cluſters* of *Grapes* in *Meal*, which though it makes them leſs pleaſant to the taſte, yet it preſerves their moiſture and freſhneſs. Alſo the harder ſort of *Fruits* may be kept long, not onely in *Meal*, but alſo in *Saw-duſt*, and in *heaps* of *Corn*.

17. There is an opinion held, that *Bodies* may be preſerved freſh in *Liquors* of their own kind, as in their proper *Menſtrua*; as, to keep *Grapes* in *Wine*, *Olives* in *Oil*.

18. *Pomegranates* and *Quinces* are kept long, being lightly dipped in *Sea-water* or *Salt-water*, and ſoon after taken out again, and then dried in the open *Air*, ſo it be in the Shade.

19. Bodies put in *wine*, *Oil*, or the *Lees* of *Oil*, keep long; much more in *Hony* or *Spirit* of *Wine*; but moſt of all, as ſome ſay, in *Quick-ſilver*.

20. *Fruits* incloſed in *Wax*, *Pitch*, *Plaiſter*, *Paſte*, or any the like Caſe or Covering, keep green very long.

21. It is manifeſt that *Flies*, *Spiders*, *Ants*, or the like ſmall *creatures*, falling by chance into *Amber*, or the *Gums* of *Trees*, and ſo finding a burial in them, do never after corrupt or rot, although they be ſoft and tender Bodies.

22. *Grapes* are kept long by being hanged up in *Punches*: the ſame is of other *Fruits*. For there is a two-fold Commodity of this thing: the one, that they are kept without *preſſing* or *bruiſing*, which they muſt needs ſuffer if they were laid upon any hard ſubſtance; the other, that the *Air* doth encompaſs them on every ſide alike.

23. It is obſerved that *Putrefaction*, no leſs than *Deſiccation* in *Vegetables*, doth not begin in every part alike, but chiefly in that part where, being alive, it did attract nouriſhment. Therefore ſome adviſe to cover the *ſtalks* of *Apples* or other *Fruits* with *Wax* or *Pitch*.

24. Great *Wieks* of *Candles* or *Lamps* do ſooner conſume the *Tallow* or *Oil* than leſſer *Wieks*; alſo *Wieks* of *Cotton* ſooner than thoſe of *Ruſh*, or *Straw*, or ſmall *Twigs*: and in *Staves* of *Torches*, thoſe of *Juniper* or *Firre* ſooner than thoſe of *Aſh*: likewiſe *Flame moved* and *fanned* with the *Wind* ſooner than that which is *ſtill*: And therefore *Candles* ſet in a *Lanthorn* will laſt longer than in the *open Air*. There is a Tradition, that *Lamps* ſet in *Sepulchres* will laſt an incredible time.

25. The *Nature* alſo and *Preparation* of the *Nouriſhment* conduceth no leſs to the *laſting* of *Lamps* and *Candles*, than the nature of the *Flame*; for *Wax* will laſt longer than *Tallow*, and *Tallow* a little wet longer than *Tallow* dry, and *Wax candles* old made longer than *Wax-candles* new made.

26. *Trees*, if you ſtir the *Earth* about their *Root every year*, will continue leſs time; if once in four, or perhaps in ten years, much longer: alſo *cutting* off the *Suckers* and *young Shoots* will make them live the longer: but *Dunging* them, or laying of *Marl* about their Roots, or much *Watering* them, adds to their fertility, but cuts off from their long laſting. And thus much touching the *Prohibiting* of *Deſiccation* or *Conſumption*.

The

The Inteneration or making tender of that which is dried (which is the chief Matter) affords but a ſmall number of *Experiments*. And therefore ſome few *Experiments* which are found in Living Creatures, and alſo in *Man* ſhall be joyned together. 27.

Bands of Willow, wherewith they uſe to binde Trees, laid in Water, grow more flexible; likewiſe they put Boughs of Birch (the ends of them) in Earthen Pots filled with Water, to keep them from withering; and Bowls cleft with dryneſs, ſteep'd in Water, cloſe again. 28.

Boots grown hard and obſtinate with age, by greaſing them before the Fire with Tallow, wax ſoft, or being onely held before the Fire get ſome ſoftneſs. *Bladders* and *Parchments* hardned alſo become tender with warm Water, mixed with Tallow or any Fat thing; but much the better, if they be a little chafed. 29.

Trees grown very old, that have ſtood long without any culture, by digging and opening the Earth about the Roots of them, ſeem to grow young again, and put forth young Branches. 30.

Old Draught Oxen worn out with labor, being taken from the yoak, and put into freſh Paſture, will get young and tender fleſh again, inſomuch, that they will eat as freſh and tender as a *Steer*. 31.

A ſtrict Emaciating Diet of *Guaiacum*, *Biſket*, and the like, (wherewith they uſe to cure the *French-Pox*, *Old catarrhs*, and ſome kinde of *Dropſies*) doth firſt bring men to great poverty and leanneſs, by waſting the Juices and Humors of the Body; which after they begin to be repaired again, ſeem manifeſtly more vigorous and young. Nay, and I am of opinion, that Emaciating Diſeaſes afterwards well cured, have advanced many in the way of long life. 32.

Obſervations.

MEn *ſee clearly, like* Owls, *in the* Night *of their own* Notions; *but in* Experience, *as in the* Day-light *they wink and are but half-ſighted. They ſpeak much of the* Elementary quality *of* Siccity *or* Drineſs, *and of things* Deſiccating, *and of the* Natural Periods *of* Bodies, *in which they are corrupted and conſumed: But mean while, either in the* beginnings, *or* middle paſſages, *or* laſts acts *of* Deſiccation *and* Conſumption, *they obſerve nothing that is of moment.* 1.

Deſiccation *or* Conſumption *in the proceſs thereof, is finiſhed by three* Actions; *and all theſe (as was ſaid before) have their original from the* Native Spirit *of* Bodies. 2.

The firſt Action *is, the* Attenuation *of the* Moiſture *into* Spirit; *the ſecond is, the* Iſſuing forth *or* flight of the Spirit; *the third is, the* Contraction *of the* groſſer parts *of the* Body *immediately after the* Spirit *iſſued forth. And this laſt is, that* Deſiccation *and* Induration *which we chiefly handle; the former two conſume onely.* 3.

Touching Attenuation, *the matter is manifeſt. For the* Spirit *which is incloſed in every* Tangible Body *forgets not its nature, but whatſoever it meets withal in the Body (in which it is incloſed) that it can digeſt and maſter, and turn into it ſelf, that it plainly alters and ſubdues, and multiplies it ſelf upon it, and begets new* Spirit. *And this evicted by one proof, inſtead of many; for that thoſe things which are throughly dryed are leſſened in their* weight, *and become hollow, porous, and reſounding from within. Now it is moſt certain, that the inward* Spirit *of any thing, confers nothing to the* weight, *but rather lightens it; and therefore it muſt needs be, that the ſame* Spirit *hath turned into it the moiſture and juyce of the* Body *which weighed before, by which means the* weight *is leſſened. And this is the* firſt Action, *the* Attenuation *of the* Moiſture, *and converting it into* Spirit. 4.

The ſecond Action, *which is the* Iſſuing forth *or* Flight of the Spirit, *is as manifeſt alſo. For that* iſſuing forth, *when it is in throngs, is apparent even to the ſenſe; in* Vapors *to the ſight, in* Odors *to the ſmelling; but if it iſſueth forth ſlowly, (as when a thing is decayed by age) then it is not apparent to the ſenſe, but the matter is the ſame. Again, where the compoſure of the Body is either ſo ſtreight or ſo tenacious, that the* Spirit *can finde no pores or paſſages by which to depart, then, in the ſtriving to get out, it drives before it the groſſer parts of the Body, and protrudes them beyond the ſuperficies or ſurface of the Body; as it is in the ruſt of* Metals, *and mould of all* Fat things. *And this is the* ſecond Action, *the* Iſſuing forth *or* Flight of the Spirit. 5.

The third Action *is ſomewhat more obſcure, but full as certain; that is, the* Contraction *of the* groſſer parts *after the* Spirit *iſſued forth. And this appears, firſt, in that* Bodies *after the* Spirit *iſſued forth, do manifeſtly ſhrink, and fill a leſs room; as it is in the* 6.

the Kernels of Nuts, *which after they are dried, are too little for the* Shells; *and in* Beams *and* Planchers *of* Houses, *which at first lay close together, but after they are dried, give; and likewise in* Bowls, *which through drought, grow full of cranies, the parts of the* Bowl *contracting themselves together, and after* contraction *must needs be empty spaces. Secondly, It appears by the wrinkles of* Bodies *dryed: For the endeavor of* contracting *it self is such, that by the* contraction *it brings the parts nearer together, and so lifts them up; for whatsoever is* contracted *on the sides, is lifted up in the midst: And this is to be seen in* Papers *and old* Parchments, *and in the* Skins *of* Living Creatures, *and in the* Coats *of soft* Cheeses, *all which, with age, gather wrinkles. Thirdly, This* Contraction *shews it self most in those things, which by heat are not onely wrinkled, but ruffled, and plighted, and, as it were, rouled together; as it is in* Papers, *and* Parchments, *and* Leaves, *brought near the fire: For* Contraction *by* Age, *which is more slow, commonly causeth wrinkles; but* Contraction *by the* Fire, *which is more speedy, causeth plighting. Now in most things where it comes not to* wrinkling *or* plighting, *there is simple* Contraction, *and* angustiation *or* streightning, *and* induration *or* hardning, *and* desiccation, *as was shewed in the first place. But if the issuing forth of the* Spirit, *and* absumption *or* waste *of the* Moisture *be so great, that there is not left body sufficient to unite and contract it self, then of necessity* Contraction *must cease, and the Body become putrid, and nothing else but a little dust cleaving together, which with a light touch is dispersed and falleth asunder; as it is in* Bodies *that are rotten, and in* Paper burnt, *and* Linnen *made into* Tinder, *and* Carkases *embalmed after many ages. And this is the third* Action, *the* Contraction *of the* grosser parts *after the* Spirit *issueth forth.*

7. *It is to be noted, that* Fire *and* Heat *dry onely by accident; for their proper work is to attenuate and dilate the* Spirit *and* Moisture; *and then it follows by accident, that the other parts should contract themselves, either for the flying of* Vacuum *alone, or for some other* motion *withal, whereof we now speak not.*

8. *It is certain, that* Putrefaction *taketh its original from the* Native Spirit, *no less then* Arefaction; *but it goeth on a far different way: For in* Putrefaction, *the* Spirit *is not simply vapored forth, but being detained in part, works strange garboils; and the grosser parts are not so much locally contracted, as they congregate themselves to parts of the same nature.*

Length and Shortness of Life in Living Creatures.

The History.

To the first Article. TOuching *the* Length *and* Shortness of Life *in* Living Creatures, *the Information which may be had, is but slender, Observation is negligent, and Tradition fabulous. In* Tame Creatures, *their degenerate life corrupteth them; in* Wilde Creatures, *their exposing to all weathers, often intercepteth them. Neither do those things which may seem concomitants, give any furtherance to this Information, (the greatness of their Bodies, their time of Bearing in the* Womb, *the number of their* young ones, *the time of their growth, and the rest) in regard that these things are intermixed, and sometimes they concur, sometimes they sever.*

1. *Mans* age (as far as can be gathered by any certain Narration) doth exceed the age of all other *Living Creatures*, except it be of a very few onely; and the *Concomitants* in him are very equally disposed, his *stature* and *proportion* large, his *bearing* in the *womb* nine moneths, his *fruit* commonly one at a birth, his *puberty* at the age of fourteen years, his *time* of *growing* till twenty.

2. The *Elephant* by undoubted relation, exceeds the ordinary race of *Mans* life; but his bearing in the Womb the space of Ten years, is fabulous; of two years, or at least above one, is certain. Now his bulk is great, his time of growth until the thirtieth year, his teeth exceeding hard; neither hath it been observed, that his blood is the coldest of all Creatures: His age hath sometimes reached to Two hundred years.

3. *Lions* are accounted long livers, because many of them have been found Toothless, a sign not so certain, for that may be caused by their strong breath.

4. The *Bear* is a great sleeper, a dull beast, and given to ease; and yet not noted

for

for long life: nay, he hath this ſign of ſhort life, that his *bearing* in the *womb* is but ſhort, ſcarce full forty days.

The *Fox* ſeems to be well diſpoſed in many things for long life; he is well skinned, feeds on fleſh, lives in Dens; and yet he is noted not to have that property. Certainly he is a kind of *Dog*, and that kind is but ſhort-liv'd. 5.

The *Camel* is a long liver, a lean Creature, and ſinewy, ſo that he doth ordinarily attain to fifty, and ſometimes to an hundred years. 6.

The *Horſe* lives but to a moderate age, ſcarce to forty years, his ordinary period is twenty years: but perhaps he is beholden for this ſhortneſs of life to *Man*; for we have now no *Horſes* of the *Sun*, that live freely, and at pleaſure, in good paſtures. Notwithſtanding the *Horſe* grows till he be ſix years old, and is able for generation in his old age. Beſides, the *Mare* goeth longer with her young one than a *woman*, and brings forth, two at a burthen more rarely. The *Aſs* lives commonly to the *Horſe*'s age; but the *Mule* out-lives them both. 7.

The *Hart* is famous amongſt men for long life, yet not upon any relation that is undoubted. They tell of a certain *Hart* that was found with a Collar about his neck, and that Collar hidden with *Fat*. The long life of the *Hart* is the leſs credible, becauſe he comes to his perfection at the fifth year; and not long after his *Horns* (which he ſheds and renews yearly) grow more narrow at the Root, and leſs branched. 8.

The *Dog* is but a ſhort liver, he exceeds not the age of twenty years, and for the moſt part lives not to fourteen years: a Creature of the hotteſt temper, and living in extreams; for he is commonly either in vehement motion, or ſleeping: beſides, the *Bitch* bringeth forth many at a Burden, and goeth nine weeks. 9.

The *Ox* like wiſe, for the greatneſs of his body and ſtrength, is but a ſhort liver, about ſome ſixteen years, and the *Males* live longer than the *Females*; notwithſtanding they bear uſually but one at a burden, and go nine months: a Creature dull, fleſhy, and ſoon fatted, and living onely upon Herby ſubſtances, without Grain. 10.

The *Sheep* ſeldom lives to ten years, though he be a creature of a moderate ſize, and excellently clad; and, that which may ſeem a wonder, being a creature with ſo little a Gall, yet he hath the moſt curled Coat of any other, for the *Hair* of no Creature is ſo much curled as *Wool* is. The *Rams* generate not before the third year, and continue able for generation until the eighth. The *Ews* bear young as long as they live. The *Sheep* is a diſeaſed Creature, and rarely lives to his full age. 11.

The *Goat* lives to the ſame age with the *Sheep*, and is not much unlike in other things; though he be a Creature more nimble, and of ſomewhat a firmer fleſh, and ſo ſhould be longer-liv'd; but then he is much more laſcivious, and that ſhortens his life. 12.

The *Sow* lives to fifteen years, ſometimes to twenty: and though it be a Creature of the moiſteſt fleſh, yet that ſeems to make nothing to *Length* of *Life*. Of the *Wild Boar* or *Sow* we have nothing certain. 13.

The *Cat*'s age is betwixt ſix and ten years: a creature nimble and full of ſpirit, whoſe ſeed (as *Ælian* reports) burneth the Female; whereupon it is ſaid, *That the Cat conceives with pain, and brings forth with eaſe*: A Creature ravenous in eating, rather ſwallowing down his meat whole than feeding. 14.

Hares and *Conies* attain ſcarce to ſeven years, being both Creatures generative, and with young ones of ſeveral conceptions in their bellies. In this they are unlike, that the *Coney* lives under ground; and the *Hare* above ground; and again, that the *Hare* is of a more duskiſh fleſh. 15.

Birds for the ſize of their bodies are much leſſer than *Beaſts*; for an *Eagle* or *Swan* is but a ſmall thing in compariſon of an *Ox* or *Horſe*, and ſo is an *Eſtrich* to an *Elephant*. 16.

Birds are excellently well-clad: for *Feathers*, for warmth and cloſe ſitting to the body, exceed *Wooll* and *Hairs*. 17.

Birds, though they hatch many young ones together, yet they bear them not all in their bodies at once, but lay their Eggs by turns, whereby their Fruit hath the more plentiful nouriſhment whilſt it is in their bodies. 18.

Birds chew little or nothing, but their meat is found whole in their crops, notwithſtanding they will break the ſhells of Fruits, and pick out the Kernels: they are thought to be of a very hot and ſtrong concoction. 19.

20. The motion of *Birds* in their flying is a mixt motion, conſiſting of a moving of the limbs, and of a kind of carriage; which is the moſt wholſome kind of Exerciſe.

21. *Ariſtotle* noted well touching the generation of *Birds*, (but he transferred it ill to other *living Creatures*) that the ſeed of the *Male* confers leſs to generation than the *Female*, but that it rather affords Activity than Matter; ſo that fruitful *Eggs* and unfruitful *Eggs* are hardly diſtinguiſhed.

22. *Birds* (almoſt all of them) come to their full growth the firſt year, or a little after. It is true, that their Feathers in ſome kinds, and their Bills in others, ſhew their years, but for the growth of their Bodies it is not ſo.

23. The *Eagle* is accounted a long liver, yet his years are not ſet down; and it is alledged as a ſign of his long life, that he caſts his Bill, whereby he grows young again: from whence comes that old Proverb, *The old age of an Eagle*. Notwithſtanding perchance the matter may be thus, That the renewing of the *Eagle* doth not caſt his bill, but the caſting of his bill is the renewing of the *Eagle*, for after that his bill is grown to a great crookedneſs, the *Eagle* feeds with much difficulty.

24. *Vultures* are alſo affirmed to be long livers, inſomuch that they extend their life well near to an hundred years. *Kites* likewiſe, and ſo all *Birds* that feed upon fleſh, and *Birds* of prey live long. As for *Hawks*, becauſe they lead a degenerate and ſervile life for the delight of men, the term of their natural life is not certainly known: notwithſtanding amongſt *Mewed Hawks* ſome have been found to have lived thirty years, and amongſt *wild Hawks* forty years.

25. The *Raven* likewiſe is reported to live long, ſometimes to an hundred years: he feeds on Carrion, and flies not often, but rather is a ſedentry and malánchollick *Bird*, and hath very black fleſh. But the *Crow*, like unto him in moſt things, (except in greatneſs and voice) lives not altogether ſo long, and yet is reckoned amongſt the long livers.

26. The *Swan* is certainly found to be a long liver, and exceeds not unfrequently an hundred years. He is a *Bird* excellently plumed, a feeder upon fiſh, and is always carried, and that in running waters.

27. The *Gooſe* alſo may paſs amongſt the long livers, though his food be commonly graſs, and ſuch kind of nouriſhment; eſpecially the *Wild-Gooſe*; whereupon this Proverb grew amongſt the *Germans*, *Magis ſenex quam Anſer nivalis, Older than a Wild-Gooſe*.

28. *Storks* muſt needs be long livers, if that be true which was anciently obſerved of them, that they never came to *Thebes*, becauſe that City was often ſacked. This if it were ſo, then either they muſt have the knowledge of more ages than one, or elſe the old ones muſt tell their young the Hiſtory. But there is nothing more frequent than *Fables*.

29. For *Fables* do ſo abound touching the *Phœnix*, that the truth is utterly loſt if any ſuch *Bird* there be. As for that which was ſo much admired, That ſhe was ever ſeen abroad with a great troop of *Birds* about her, it is no ſuch wonder; for the ſame is uſually ſeen about an *Owl* flying in the day-time, or a *Parrot* let out of a Cage.

30. The *Parrot* hath been certainly known to have lived threeſcore years in *England*, how old ſoever he was before he was brought over: a *Bird* eating almoſt all kind of meats, chewing his meat, and renewing his bill; likewiſe curſt and miſchievous, and of a black fleſh.

31. The *Peacock* lives twenty years; but he comes not forth with his *Argus Eyes* before he be three years old; a *Bird* ſlow of pace, having whitiſh flew.

32. The *Dunghill-Cock* is venerious, martial, and but of a ſhort life; a crank *Bird*, having alſo white fleſh.

33. The *Indian-Cock*, commonly called the *Turkey-Cock*, lives not much longer than the *Dunghill-Cock*: an angry *Bird*, and hath exceeding white fleſh.

34. The *Ring-Doves* are of the longeſt ſort of livers, inſomuch that they attain ſometimes to fifty years of age: an aiery *Bird*, and both builds and ſits on high. But *Doves* and *Turtles* are but ſhort-liv'd, not exceeding eight years.

35. But *Pheaſants* and *Partiges* may live to ſixteen years. They are great breeders, but not ſo white of fleſh as the ordinary *Pullen*.

The *Black bird* is reported to be, amongst the lesser birds, one of the longest livers; an unhappy bird, and a good singer. 36.

The *Sparrow* is noted to be of a very short life; and it is imputed in the Males to their lasciviousness. But the *Linnet*, no bigger in body than the *Sparrow*, hath been observed to have lived twenty years. 37.

Of the *Estrich* we have nothing certain: those that were kept here have been so unfortunate, that no long life appeared by them. Of the bird *Ibis* we find onely that he liveth long, but his years are not recorded. 38.

The age of *Fishes* is more uncertain than that of terrestrial Creatures, because living under the water they are the less observed: many of them breath not, by which means their vital spirit is more closed in; and therefore though they receive some refrigeration by their Gills, yet that refrigeration is not so continual as when it is by breathing. 39.

They are free from the *Deficcation* and *Depredation* of the *Air ambient*, because they live in the water: yet there is no doubt but the *water ambient*, and piercing, and received into the pores of the body, doth more hurt to long life than the Air doth. 40.

It is affirmed too that their blood is not warm. Some of them are great devourers, even of their own kind. Their flesh is softer and more tender than that of terrestrial creatures: they grow exceedingly fat; insomuch that an incredible quantity of Oyl will be extracted out of one *Whale*. 41.

Dolphins are reported to live about thirty years; of which thing a trial was taken in some of them by cutting off their tails: they grow untill ten years of age. 42.

That which they report of some *Fishes* is strange, that after a certain age their bodies will waste and grow very slender, onely their head and tail retaining their former greatness. 43.

There were found in *Cæsar*'s Fish ponds *Lampreys* to have lived threescore years: they were grown so familiar with long use, that *Crassus* the Orator solemnly lamented one of them. 44.

The *Pike* amongst Fishes living in fresh water is found to last longest, sometimes to forty years: he is a Ravener, of a flesh somewhat dry and firm. 45.

But the *Carp*, *Bream*, *Tench*, *Eel*, and the like, are not held to live above ten years. 46.

Salmons are quick of growth, short of life; so are *Trouts*: but the *Pearch* is slow of growth, long of life. 47.

Touching that monstrous bulk of the *Whale* or *Ork*, how long it is weiled by vital spirit, we have received nothing certain; neither yet touching the *Sea-calf*, and *Sea-hog*, and other innumerable *Fishes*. 48.

Crocodiles are reported to be exceeding long-liv'd, and are famous for the time of their growth, for that they, amongst all other Creatures, are thought to grow during their whole life. They are of those Creatures that lay Eggs, ravenous, cruel, and well-fenced against the waters. Touching the other kinds of *Shell-fish*, we find nothing certain how long they live. 49.

Observations.

TO find out a Rule touching Length *and* Shortness *of* Life *in* Living Creatures *is very difficult, by reason of the negligence of Observations, and the intermixing of Causes. A few things we will set down.*

There are more kinds of Birds *found to be long liv'd than of* Beasts; *as the* Eagle, *the* Vulture, *the* Kite, *the* Pelican, *the* Raven, *the* Crow, *the* Swan, *the* Goose, *the* Stork, *the* Crane, *the Bird called the* Ibis, *the* Parrot, *the* Ring dove, *with the rest, though they come to their full growth within a year, and are less of bodies: surely their cloathing is excellent good against the distemperatures of the weather; and besides, living for the most part in the open Air, they are like the Inhabitants of pure Mountains, which are long-liv'd. Again, their* Motion, *which (as I else-where said) is a mixt* Motion, *compounded of a moving of their Limbs and of a carriage in the Air, doth less weary and wear them, and 'tis more wholsome. Neither do they suffer any compression or want of nourishment in their mother's bellies, because the Eggs are laid by turns. But the chiefest cause of all I take to be this, that* Birds *are made more of the substance of the Mother than of the Father, whereby their Spirits are not so eager and hot.* 1.

2. *It may be a Position, that* Creatures *which partake more of the substance of their* Mother *than of their* Father *are longer-liv'd, as* Birds *are; which was said before. Also that those which have a longer time of bearing in the womb, do partake more of the substance of their* Mother, *less of the* Father, *and so are longer-liv'd: Insomuch that I am of opinion, that even amongst Men, (which I have noted in some) those that resemble their* Mothers *most are longest-liv'd; and so are the Children of Old men begotten of young Wives, if the Fathers be sound, not diseased.*

3. *The* first breeding *of* Creatures *is ever material, either to their hurt or benefit. And therefore it stands with reason, that the* lesser Compression, *and the more* liberal Alimentation *of the* Young one *in the womb, should confer much to* Long Life. *Now this happens when either the young ones are brought forth successively, as in* Birds; *or when they are single Births, as in Creatures bearing but one at a Burthen.*

4. *But* long Bearing *in the* Womb *makes for* Length *of* Life *three ways. First, for that the young one partakes more of the substance of the Mother, as hath been said. Secondly, that it comes forth more strong and able. Thirdly, that it undergoes the predatory force of the Air later. Besides, it shews that Nature intendeth to finish her periods by larger Circles. Now though* Oxen *and* Sheep, *which are born in the womb about six months, are but short-liv'd, that happens for other causes.*

5. Feeders *upon* Grass *and mere* Herbs *are but short livers; and Creatures feeding upon* Flesh, *or* Seeds, *or* Fruits, *long livers, as some* Birds *are. As for* Harts, *which are long-liv'd, they* take the one half of their meat *(as men use to say)* from above their heads, *and the* Goose, *besides Grass, findeth something in the water, and Stubble to feed upon.*

6. *We suppose that a good* Cloathing *of the* Body *maketh much to* long life; *for it fenceth and armeth against the intemperances of the Air, which do wonderfully assail and decay the body: which benefit* Birds *especially have. Now that* Sheep, *which have so good Fleeces, should be so short-liv'd, that is to be imputed to Diseases, whereof that Creature is full, and to the bare eating of Grass.*

7. *The seat of the* Spirits, *without doubt, is principally the Head; which though it be usually understood of the* Animal Spirits *only, yet this is all in all. Again, it is not to be doubted but the* Spirits *do most of all waste and prey upon the Body, so that when they are either in greater plenty, or in greater Inflamation and Acrimony, there the life is much shortned. And therefore I conceive a great cause of long life in* Birds *to be the smalness of their Heads in comparison of their Bodies; for even Men which have very great Heads I suppose to be the shorter livers.*

8. *I am of opinion that* Carriage *is of all other motions the most helpful to long life; which I also noted before. Now there are* carried Water-fowls *upon the water, as* Swans; *all* Birds *in their flying, but with a strong endeavour of their limbs; and* Fishes, *of the length of whose live we have no certainty.*

9. *Those* Creatures *which are long before they come to their perfection (not speaking of growth in stature onely, but of other steps to maturity; as Man puts forth, first, his Teeth, next the signs of Puberty, then his beard, and so forward) are* long liv'd, *for it shews that Nature finished her Periods by larger Circles,*

10. Milder Creatures *are not long-liv'd, as the* Sheep *and* Dove; *for Choler is as the whet-stone and Spur to many Functions in the Body.*

11. Creatures *whose* Flesh *is more* duskish *are longer-liv'd than those that have white Flesh; for it sheweth that the juice of the body is more firm, and less apt to dissipate.*

12. *In every corruptible Body* Quantity *maketh much to the conservation of the whole: for a great Fire is longer in quenching, a small portion of Water is sooner evaporated, the Body of a Tree withereth not so fast as a Twig. And therefore generally (I speak it of Species, not of Individuals)* Creatures *that are large in body are longer-liv'd than those that are small, unless there be some other potent cause to hinder it.*

Alimentation, or Nouriſhment: and the way of Nouriſhing.

The Hiſtory.

To the fourth Article.

1. NOuriſhment ought to be of an inferiour nature, and more ſimple ſubſtance than the thing nouriſhed. *Plants* are nouriſhed with the Earth and Water, *Living Creatures* with Plants, *Man* with living Creatures. There are alſo certain *Creatures* feeding upon Fleſh, and *Man* himſelf takes Plants into a part of his Nouriſhment; but *Man* and *Creatures* feeding upon Fleſh are ſcarcely nouriſhed with Plants alone: perhaps *Fruit* or *Grains*, baked or boiled, may, with long uſe, nouriſh them; but *Leaves* or *Plants* or *Herbs* will not do it, as the *Order* of the *Foliatanes* ſhewed by Experience.

2. Over-great *Affinity* or *Conſubſtantiality* of the *Nouriſhment* to the thing nouriſhed proveth not well: Creatures feeding upon Herbs touch no Fleſh; and of Creatures feeding upon Fleſh, few of them eat their own kind: As for *Men*, which are *Cannibals*, they feed not ordinarily upon *Mens* fleſh, but reſerve it as a Dainty, either to ſerve their reveng upon their enemies, or to ſatisfie their appetite at ſome times. So the *Ground* is beſt ſown with *Seed* growing elſewhere, and *Men* do not uſe to *Graft* or *Inoculate* upon the ſame Stock.

3. By how much the more the *Nouriſhment* is better *prepared*, and approacheth nearer in likeneſs to the thing nouriſhed, by ſo much the more are *Plants* more fruitful, and *living Creatures* in better liking and plight: for a young *Slip* or *Cion* is not ſo well nouriſhed if it be pricked into the ground, as if it be grafted into a Stock agreeing with it in Nature, and where it finds the nouriſhment already digeſted and prepared: neither (as is reported, will the *Seed* of an *Onion*, or ſome ſuch like, ſown in the bare earth, bring forth ſo large a fruit as if it be put into another *Onion*, which is a new kind of *Grafting*, into the root, or under ground. Again, it hath been found out lately, that a *Slip* of a *Wild Tree*, as of an *Elm*, *Oak*, *Aſh*, or ſuch like, grafted into a Stock of the ſame kind, will bring forth larger leaves then thoſe that grow without grafting: Alſo Men are not nouriſhed ſo well with raw fleſh as with that which hath paſſed the fire.

4. *Living Creatures* are nouriſhed by the *Mouth*, *Plants* by the *Root*, *Young ones* in the womb by the *Navel*: *Birds* for a while are nouriſhed with the *Yolk* in the Egge, whereof ſome is found in their Crops after they are hatched.

5. All Nouriſhment moveth from the *centre* to the *Circumference*, or from the Inward to the Outward: yet it is to be noted, that in *Trees* and *Plants* the Nouriſhment paſſeth rather by the Bark and Outward parts then by the Pith and Inward parts; for if the Bark be pilled off, though but for a ſmall breadth, round, they live no more: and the Bloud in the Veins of living Creatures doth no leſs nouriſh the Fleſh beneath it then the Fleſh above it.

6. In all *Alimentation* or *Nouriſhment* there is a two-fold Action, *Extuſion* and *Attraction*; whereof the former proceeds from the Inward Function, the latter from the Outward.

7. *Vegetables* aſſimulate their Nouriſhment ſimply, without Excerning: For Gums and Tears of Trees are rather Exuberances then Excrements, and Knots or knobs are nothing but Diſeaſes. But the ſubſtance of living Creatures is more perceptible of the like; and therefore it is conjoyned with a kind of diſdain, whereby it rejecteth the bad, and aſſimulateth the good.

8. It is a ſtrange thing of the *ſtalks* of *Fruits*, that all the Nouriſhment which produceth ſometimes ſuch great Fruits, ſhould be forced to paſs through ſo narrow necks; for the Fruit is never joyn'd to the Stock without ſome ſtalk.

9. It is to be noted, that the Seeds of living Creatures will not be fruitful but when they are new ſhed, but the Seeds of Plants will be fruitful a long time after they are gathered; yet the Slips or Cions of Trees will not grow unleſs they be grafted green; neither will the roots keep long freſh unleſs they be covered with earth.

10. In *living creatures* there are degrees of Nouriſhment according to their Age: in the womb, the young one is nouriſhed with the Mother's blood; when it is new-born, with Milk; afterwards with Meats and Drinks; and in old age the moſt nouriſhing and ſavoury Meats pleaſe beſt.

Above all it maketh to the present *Inquisition*, to inquire diligently and attentively whether a man may not receive *Nourishment* from without, at least some other way beside the Mouth. We know that Baths of Milk are used in some *Hectick Fevers*, and when the body is brought extream low, and *Physicians* do provide *Nourishing clysters*. This matter would be well studied; for if *Nourishment* may be made either from without, or some other way than by the stomach, then the weakness of Concoction, which is incident to old men, might be recompenced by these helps, and Concoction restored to them intire.

Length and Shortness of Life in Man.

The History.

To the 5, 6, 7, 8, 9, and 11 Articles.

1. BEfore the *Floud*, as the *Sacred Scriptures* relate, *Men* lived many hundred years; yet none of the *Fathers* attained to a full thousand. Neither was this *Length* of *Life* peculiar onely to *Grace*, or the *Holy Line*; for there are reckoned of the *Fathers* until the *Floud* eleven Generations; but of the sons of *Adam* by *Cain* onely eight Generations; so as the posterity of *Cain* may seem the longer-liv'd. But this *Length of Life* immediately after the *Floud* was reduced to a moiety, but in the *Post-nati*; for *Noah*, who was born before, equalled the age of his Ancestors, and *Sem* saw the six hundredth year of his life. Afterwards, three Generations being run from the *Floud*, the *Life* of *Man* was brought down to a fourth part of the primative *Age*, that was, to about two hundred years.

2. *Abraham* lived an hundred seventy and five years: a man of an high courage, and prosperous in all things. *Isaac* came to an hundred and eighty years of age: a chaste man, and enjoying more quietness than his Father. But *Jacob*, after many crosses and a numerous progeny, lasted to the hundred forty seventh year of his life: a patient, gentle, and wise man. *Ismael*, a military man, lived an hundred thirty and seven years. *Sarah* (whose years onely amongst women are recorded) died in the hundred twenty seventh year of her age: a beautifull and magnanimous woman; a singular good Mother and Wife; and yet no less famous for her Liberty than Obsequiousness towards her husband. *Joseph* also, a prudent and politick man, passing his youth in affliction, afterwards advanced to the height of honour and prosperity, lived an hundred and ten years. But his brother *Levi*, elder than himself, attained to an hundred thirty seven years: a man impatient of contumely and revengeful. Near unto the same age attained the *son* of *Levi*; also his *grand-child*, the *father* of *Aaron* and *Moses*.

3. *Moses* lived an hundred and twenty years: a stout man, and yet the *meekest upon the earth*, and of a very *slow tongue*. Howsoever *Moses* in his *Psalm* pronounceth that the life of man is but seventy years, and if a man have strength, then eighty; which term of man's life standeth firm in many particulars even at this day. *Aaron*, who was three years the elder, died the same year with his *Brother*: a man of a readier speech, of a more facile disposition, and less constant. But *Phineas*, *grand-child* of *Aaron*, (perhaps out of extraordinary grace) may be collected to have lived three hundred years; if so be the *War* of the *Israelites* against the *Tribe* of *Benjamin* (in which Expedition *Phineas* was consulted with) were performed in the same order of time in which the *History* hath ranked it: He was a man of a most *eminent Zeal*. *Joshua*, a martial man, and an excellent Leader, and evermore victorious, lived to the hundred and tenth year of his life. *Caleb* was his Contemporary, and seemeth to have been of as great years. *Ehud* the Judge seems to have been no less than an hundred years old, in regard that after the Victory over the *Moabites* the *Holy Land* had rest under his Government eighty years: He was a man fierce and undaunted, and one that in a sort neglected his life for the good of his People.

4. *Job* lived, after the restauration of his happiness, an hundred and forty years, being before his afflictions of that age that he had sons at man's estate: a man politick,

litick, eloquent, charitable, and the *Example* of *Patience*. *Eli* the Priest lived ninety eight years; a corpulent man, calm of disposition, and indulgent to his children. But *Elizæus* the *Prophet* may seem to have died when he was above an hundred years old; for he is found to have lived after the *assumption* of *Elias* sixty years; and at the time of that *assumption* he was of those years, that the boys mocked him by the name of *Bald-head*: a man vehement and severe, and of an austere life, and a contemner of riches. Also *Isaiah* the *Prophet* seemeth to have been an hundred years old: for he is found to have exercised the Function of a *Prophet* seventy years together, the years both of his beginning to prophesie and of his death being uncertain: a man of an admirable eloquence, an *Evangelical Prophet*, full of the promises of God of the *New Testament*, as a Bottle with sweet Wine.

Tobias the Elder lived an hundred fifty eight years, the Younger, an hundred twenty seven: merciful men, and great alms-givers. It seems, in the time of the *Captivity*, many of the *Jews* who returned out of *Babylon* were of great years, seeing they could remember both *Temples*, (there being no less than seventy years betwixt them) and wept for the unlikeness of them. Many ages after that, in the time of our *Saviour*, lived old *Simeon*, to the age of ninety; a devout man, and full both of hope and expectation. Into the same time also fell *Anna* the *Prophetess*, who could not possibly be less than an hundred years old; for she had been seven years a wife, about eighty four years a widow, besides the years of her virginity, and the time that she lived after her Prophecy of our Saviour: She was an holy woman, and passed her days in fastings and prayers. 5.

The *long Lives* of *Men* mentioned in *Heathen Authors* have no great certainty in them; both for the intermixture of Fables, whereunto those kind of relations were very prone, and for their false calculation of years. Certainly of the *Ægyptians* we find nothing of moment in those works that are extant as touching *long Life*, for their *Kings* which reigned longest did not exceed fifty or five and fifty years, which is no great matter, seeing many at this day attain to those years. But the *Arcadian Kings* are fabulously reported to have lived very long. Surely that Country was Mountainous, full of flocks of Sheep, and brought forth most wholsome food; notwithstanding, seeing *Pan* was their god, we may conceive that all things about them were *Panick* and vain, and subject to fables. 6.

Numa King of the *Romans* lived to eighty years: a man peaceable, contemplative, and much devoted to Religion. *Marcus Valerius Corvinus* saw an hundred years complete, there being betwixt his first and sixth *Consulship* forty six years: a man valorous, affable, popular, and always fortunate. 7.

Solon of *Athens*, the *Law giver*, and one of the seven *Wise-men*, lived above eighty years: a man of an high courage, but popular, and affected to his Country; also learned, given to pleasures and a soft kind of life. *Epimenides* the *Cretian* is reported to have lived an hundred fifty seven years: the matter is mix'd with a *prodigious Relation*; for fifty seven of those years he is said to have slept in a *Cave*. Half an age after *Xenophon* the *Colophonian* lived an hundred and two years, or rather more: for at the age of twenty five years he left his Country, seventy seven complete years he travelled, and after that returned; but how long he lived after his return appears not; a man no less wandring in mind than in body, for his name was changed for the madness of his opinions from *Xenophanes* to *Xenomanes*: a man no doubt of a vast conceit, and that minded nothing but *Infinitum*. 8.

Anacreon the Poet lived eighty years and somewhat better: a man lascivious, voluptuous, and given to drink. *Pindarus* the *Theban* lived to eighty years: a Poet of an high fancy, singular in his conceits, and a great adorer of the *gods*. *Sophocles* the *Athenian* attained to the like age: a lofty Tragick Poet, given over wholly to Writing, and neglectful of his Family. 9.

Artaxerxes King of *Persia* lived ninety four years: a man of a dull wit, averse to the dispatch of business, desirous of glory, but rather of ease. At the same time lived *Agesilaus* King of *Sparta* to eighty four years of age: a moderate Prince, as being a *Philosopher* among *Kings*; but notwithstanding ambitious, and a Warriour, and no less stout in war than in business. 10.

Gorgias the *Sicilian* was an hundred and eight years old; a *Rhetorician*, and a great boaster of his faculty, one that taught Youth for profit: he had seen many Countries, 11.

Countries, and a little before his death said, That he had done nothing worthy of blame since he was an old man. *Protagoras* of *Abdera* saw ninety years of age: this man was likewise a *Rhetorician*, but professed not so much to teach the Liberal Arts, as the Art of Governing Common-wealths and States: notwithstanding he was a great wanderer in the world, no less than *Gorgias*. *Isocrates* the *Athenian* lived ninety eight years: he was a *Rhetorician* also, but an exceeding modest man; one that shunned the publick light, and opened his School onely in his own house. *Democritus* of *Abdera* reached to an hundred and nine years: he was a great *Philosopher*, and, if ever any man amongst the *Grecians*, a true *Naturalist*; a Surveyor of many Countries, but much more of Nature; also a diligent searcher into Experiments, and (as *Aristotle* objected against him) one that followed Similitudes more than the Laws of Arguments. *Diogenes* the *Sinopean* lived ninety years: a man that used liberty towards others, but tyranny over himself: a course diet, and of much patience. *Zeno* of *Citium* lacked but two years of an hundred: a man of an high mind, and a contemner of other mens opinions; also of a great acuteness, but yet not troublesome, chusing rather to take mens minds than to enforce them: The like whereof afterward was in *Seneca*. *Plato* the *Athenian* attained to eighty one years: a man of a great courage, but yet a lover of ease; in his Notions sublimed, and of a fancy, neat and delicate in his life, rather calm than merry, and one that carried a kind of Majesty in his countenance. *Theophrastus* the *Eressian* arrived at eighty five years of age; a man sweet for his eloquence, sweet for the variety of his matters, and who selected the pleasant things of Philosophy, and let the bitter and harsh go. *Carneades* of *Cyrene* many years after came to the like age of eighty five years: a man of a fluent eloquence, and one who by the acceptable and pleasant variety of his knowledge delighted both himself and others. But *Orbilius*, who lived in *Cicero*'s time, no *Philosopher* or *Rhetorician*, but a *Grammarian*, attained to an hundred years of age, he was first a Souldier, then a Schoolmaster; a man by nature tart both in his Tongue and Pen, and severe towards his Scholars.

12. *Quintus Fabius Maximus* was *Augur* sixty three years, which shewed him to be above eighty years of age at his death; though it be true, that in the *Augurship* Nobility was more respected then age: a wise man, and a great *Deliberator*, and in all his proceedings moderate, and not without affability severe. *Masinissa* King of *Numidia* lived ninety years, and being more than eighty five got a son: a daring man, and trusting upon his fortune, who in his youth had tasted of the inconstancy of Fortune, but in his succeeding age was constantly happy. But *Marcus Porcius Cato* lived above ninety years of age: a man of an Iron body and mind; he had a bitter tongue, and loved to cherish factions; he was given to Husbandry, and was to himself and his Family a Physician.

13. *Terentia Cicero*'s wife, lived an hundred and three years: a woman afflicted with many crosses; first, with the banishment of her Husband; then with the difference betwixt them; lastly, with his last fatal misfortune: She was also oftentimes vexed with the *Gout*. *Luceia* must needs exceed an hundred by many years; for it is said that she acted an whole hundred years upon the Stage, at first perhaps representing the person of some young Girl, at last of some decrepit old Woman. But *Galeria Copiola*, a Player also and a Dancer, was brought upon the Stage as a Novice, in what year of her age is not known; but ninety nine years after, at the *Dedication* of the *Theatre* by *Pompey* the *Great*, she was shewn upon the Stage, not now for an Actress, but for a Wonder: neither was this all, for after that, in the *Solemnities* for the health and life of *Augustus*, she was shewn upon the Stage the third time.

14. There was another *Actress*, somewhat inferiour in age, but much superiour in dignity, which lived well-near ninety years, I mean *Livia Julia Augusta*, wife to *Augustus Cæsar*, and mother to *Tiberius*. For if *Augustus* his life were a Play, (as himself would have it, whenas upon his death-bed he charged his friends they should give him a *Plaudite* after he was dead) certainly this *Lady* was an excellent *Actress*, who could carry it so well with her husband by a dissembled obedience, and with her son by power and authority: a woman affable, and yet of a Matronal carriage, pragmatical, and upholding her power. But *Junia*, the wife of *Caius Cassius*, and sister of *Marcus Brutus*, was also ninety years old; for she survived the *Philippick Battel* sixty four years: a magnanimous woman, in her great wealth happy;

happy in the calamity of her husband and near kinsfolks, and in a long widow-hood unhappy; notwithstanding much honoured of all.

The *year* of our *Lord* seventy six, falling into the time of *Vespasian*, is memorable; 15.
in which we shall find, as it were, a *calendar* of long-liv'd men: For that year there was a *Taxing*, (now a *Taxing* is the most Authentical and truest Informer touching the ages of men;) and in that part of *Italy* which lieth betwixt the *Apennine Mountains* and the *River Po*, there were found an hundred and four and twenty persons that either equalled or exceeded an hundred years of age: namely, of an hundred years just, fifty four persons; of an hundred and ten, fifty seven persons; of an hundred and five and twenty, two onely; of an hundred and thirty, four men; of an hundred and five and thirty, or seven and thirty, four more; of an hundred and forty, three men. Besides these, *Parma* in particular afforded five; whereof three fulfilled an hundred and twenty years, and two an hundred and thirty: *Bruxels* afforded one of an hundred and twenty five years old; *Placentia* one, aged an hundred thirty and one; *Faventia* one woman, aged one hundred thirty and two: a certain Town, then called *Velleiatium*, situate in the *Hills* about *Placentia*, afforded ten, whereof six fulfilled an hundred and ten years of age; four, an hundred and twenty: Lastly, *Rimini* one of an hundred and fifty years, whose name was *Marcus Aponius*.

That our Catalogue might not be extended too much in length, we have thought fit, as well in those whom we have rehearsed, as in those whom we shall rehearse, to offer none under eighty years of age. Now we have affixed to every one a true and short Character *or* Elogy; *but of that sort whereunto, in our judgment,* Length *of* Life *(which is not a little subject to the Manners and Fortunes of men) hath some relation, and that in a two-fold respect: either that such kind of men are for the most part long-liv'd; or that such men may sometimes be of long life, though otherwise not well disposed for it.*

Amongst the *Roman* and *Grecian Emperors*, also the *French* and *Almain*, to these 16.
our dayes, which make up the number of well-near two hundred *Princes*; there are onely four found that lived to eighty years of age: unto whom we may adde the two first Emperors, *Augustus* and *Tiberius*; whereof the latter fulfilled the seventy and eighth year, the former the seventy and sixth year of his age, and might both perhaps have lived to fourscore, if *Livia* and *Caius* had been pleased. *Augustus* (as was said) lived seventy and six years: a man of moderate disposition; in accomplishing his designs vehement, but otherwise calm and serene; in meat and drink sober, in Venery intemperate, through all his life-time happy; and who about the thirtieth year of his life had a great and dangerous sickness, insomuch as they despaired of life in him; whom *Antonius Musa* the Physician, when other Physicians had applied hot Medicines, as most agreeable to his disease, on the contrary cured with cold Medicines, which perchance might be some help to the prolonging of his life. *Tiberius* lived to be two years older: *A man with lean chaps*; as *Augustus* was wont to say, for his speech stuck within his jaws, but was weighty. He was bloudy, a drinker, and one that took Lust into a part of his diet; notwithstanding a great observer of his health, insomuch that he used to say, That he was a fool that after thirty years of age took advice of a *Physician*. *Gordian* the elder lived eighty years, and yet died a violent death when he was scarce warm in his *Empire*: a man of an high spirit and renowned, learned, and a Poet, and constantly happy throughout the whole course of his life, save onely that he ended his dayes by a violent death. *Valerian* the *Emperour* was seventy six years of age before he was taken prisoner by *Sapor* King of *Persia*, after his Captivity he lived seven years in reproaches, and then died a violent death also: a man of a poor mind, and not valiant; notwithstanding lifted up in his own and the opinion of men, but falling short in the performance. *Anastasius*, surnamed *Dicorus*, lived eighty eight years: he was of a setled mind, but too abject, and superstitious, and fearful. *Anicius Justinianus* lived to eighty three years: a man greedy of glory, performing nothing in his own person, but in the valour of his Captains happy and renowned; uxorious, and not his own man, but suffering others to lead him. *Helena* of *Britain*, mother of *Constantine* the *Great*, was fourscore years old: a woman that intermedled not in matters of State neither in her Husband's nor sons Reign, but devoted her self wholly to Religion; magnanimous, and perpetually flourishing. *Theodora* the *Empress* (who was sister to *Zoes*,

wife of *Monomachus*, and reigned alone after her decease) lived above eighty years: a pragmatical woman, and one that took delight in Governing; fortunate in the highest degree, and through her good fortunes credulous.

17. We will proceed now from these *Secular Princes* to the *Princes* in the *Church*. St. *John*, an Apostle of our *Saviour*, and the *Beloved Disciple*, lived ninety three years. He was rightly denoted under the *Emblem* of the *Eagle*, for his piercing sight into the *Divinity*; and was a *Seraph* amongst the *Apostles* in respect of his burning Love. St. *Luke* the *Evangelist* fulfilled fourscore and four years: an eloquent man, and a Traveller, St. *Paul*'s inseparable Companion, and a *Physician*. *Simeon* the son of *Cleophas*, called the *Brother of our Lord*, and Bishop of *Jerusalem*, lived an hundred and twenty years though he was cut short by Martyrdom: a stout man, and constant, and full of good works. *Polycarpus*, *Disciple* unto the *Apostles*, and Bishop of *Smyrna*, seemeth to have extended his age to an hundred years and more; though he were also cut off by Martyrdom: a man of an high mind, of an heroical patience, and unwearied with labours. *Dyonisius Areopagita*, Contemporary to the Apostle St. *Paul*, lived ninety years: he was called the *Bird of Heaven* for his high flying Divinity, and was famous as well for his holy life as for his Meditations. *Aquilla* and *Priscilla*, first St. *Paul* the Apostle's Hosts. Afterward his Fellow-helpers, lived together in a happy and famous Wedlock at least to an hundred years of age a piece; for they were both alive under Pope *Xistus* the first: a noble Pair, and prone to all kind of charity, who amongst other their comforts (which no doubt were great unto the first *Founders* of the *Church*) had this added, to enjoy each other so long in an happy marriage. St. *Paul* the *Hermite* lived an hundred and thirteen years: now he lived in a Cave; his diet was so slender and strict, that it was thought almost impossible to support humane nature therewithal: he passed his years onely in Meditations and Soliloquies; yet he was not illiterate or an Idiot, but learned. St. *Anthony*, the first Founder of *Monks*, or (as some will have it) the Restorer onely, attained to an hundred and five years of age: a man devout and contemplative, though not unfit for Civil affairs: his life was austere and mortifying, notwithstanding he lived in a kind of glorious solitude; and exercised a command, for he had his *Monks* under him. And besides, many *Christians* and *Philosophers* came to visit him as a living Image, from which they parted not without some adoration. St. *Athanasius* exceeded the term of eighty years: a man of an invincible constancy, commanding fame, and not yielding to Fortune: he was free towards the Great ones, with the People gracious and acceptable, beaten and practised to oppositions, and in delivering himself from them stout and wise. St. *Hierom*, by the consent of most Writers, exceeded ninety years of age: a man powerful in his Pen, and of a manly Eloquence, variously learned both in the Tongues and Sciences, also a Traveller, and that lived strictly towards his old age, in an estate private, and not dignified; he bore high Spirits, and shined far out of obscurity.

18. The *Popes* of *Rome* are in number to this day two hundred forty and one. Of so great a number five onely have attained to the age of fourscore years, or upwards. But in many of the first *Popes* their full age was intercepted by the Prerogative and Crown of *Martyrdom*. *John* the twenty third, *Pope* of *Rome*, fulfilled the ninetieth year of his age: a man of an unquiet disposition, and one that studied novelty: he altered many things, some to the better, others onely to the new, a great accumulator of Riches and Treasures. *Gregory*, called the twelfth, created in Schism, and not fully acknowledged *Pope*, died at ninety years: of him, in respect of his short *Papacy*, we find nothing to make a judgment upon. *Paul* the third lived eighty years and one: a temperate man, and of a profound wisdom: he was Learned, an Astrologer, and one that tended his health carefully; but, after the example of old *Eli* the Priest, over-indulgent to his Family. *Paul* the fourth attained to the age of eighty three years: a man of an harsh nature and severe, of an haughty mind and imperious, prone to anger; his speech was eloquent and ready. *Gregory* the thirteenth fulfilled the like age of eighty three years: an absolute good man, sound in mind and body, politick, temperate, full of good works, and an alms-giver.

19. Those that follow are to be more promiscuous in their order, more doubtful in their faith, and more barren of observation. King *Arganthenius*, who reigned at *Cadiz* in *Spain*,

Spain lived an hundred and thirty, or (as some would have it) an hundred and forty years, of which he reigned eighty. Concerning his Manners, Institution of his Life; and the time wherein he reigned, there is a general silence. *Cyniras* King of *Cyprus*, living in the *Island* then termed the *Happy* and *Pleasant Island*, is affirmed to have attained to an hundred and fifty or sixty years. Two *Latin Kings* in *Italy*, the Father and the Son, are reported to have lived, the one eight hundred, the other six hundred years: but this is delivered unto us by certain *Philologists*, who though otherwise credulous enough, yet themselves have suspected the truth of this matter, or rather condemned it. Others record some *Arcadian Kings* to have lived three hundred years: the Country, no doubt, is a place apt for long life; but the Relation I suspect to be fabulous. They tell of one *Dando* in *Illyrium*, that lived without the inconveniences of old age to five hundred years. They tell also of the *Epians*, a part of *Ætolia*, that the whole Nation of them were exceeding long liv'd, insomuch that many of them were two hundred years old; and that one principal man amongst them, named *Litorius*, a man of a Giant-like stature, could have told three hundred years. It is recorded, that on the top of the Mountain *Timolus*, anciently called *Tempsis*, many of the Inhabitants lived to an hundred and fifty years. We read that the *Sect* of the *Esseans* amongst the *Jews* did usually extend their life to an hundred years: Now that *Sect* used a single or abstemious diet, after the rule of *Pythagoras*. *Apollonius Tyaneus* exceeded an hundred years, his face bewraying no such age: he was an admirable man, of the *Heathens* reputed to have something Divine in him, of the *Christians* held for a Sorcerer; in his diet *Pythagorical*, a great traveller, much renowned, and by some adored as a *god*: notwithstanding, towards the end of his life he was subject to many complaints against him, and reproaches, all which he made shift to escape. But lest his long life should be imputed to his *Pythagorical* diet, and not rather that it was hereditary, his *Grandfather* before him lived an hundred and thirty years. It is undoubted that *Quintus Metellus* lived above an hundred years, and that after several *Consulships* happily administred, in his old age he was made *Pontifex Maximus*, and exercised those holy duties full two and twenty years; in the performance of which Rites his voice never failed, nor his hand trembled. It is most certain that *Appius Cæcus* was very old, but his years are not extant; the most part whereof he passed after he was blind; yet this misfortune no whit softned him, but that he was able to govern a numerous Family, a great Retinue and Dependance, yea, even the Commonwealth it self, with great stoutness. In his extream old age he was brought in a Litter into the *Senate-house*, and vehemently disswaded the Peace with *Pyrrhus*: the beginning of his Oration was very memorable, shewing an invincible spirit and strength of mind; *I have with great grief of mind (Fathers Conscript) these many years born my blindness, but now I could wish that I were deaf also, when I hear you speak to such dishonourable Treaties.* *Marcus Perpenna* lived ninety eight years, surviving all those whose Suffrages he had gathered in the *Senate-house*, being *Consul*, I mean, all the *Senators* at that time; as also all those whom a little after, being *Consul*, he chose into the *Senate*, seven onely being excepted. *Hiero* King of *Sicily*, in the time of the second *Punick War*, lived almost an hundred years: a man moderate both in his Government and in his Life; a worshiper of the *gods*, and a religious conserver of Friendship: liberal, and constantly fortunate. *Statilia*, descended of a noble Family in the days of *Claudius*, lived ninety nine years. *Clodia*, the daughter of *Osilius*, an hundred and fifteen. *Xenophilus*, an ancient Philosopher, of the Sect of *Pythagoras*, attained to an hundred and six years, remaining healthful and vigorous in his old age, and famous amongst the vulgar for his learning. The *Islanders* of *Corcyra* were anciently accounted long liv'd, but now they live after the rate of other men, *Hipocrates Cous*, the famous *Physician*, lived an hundred and four years, and approved and credited his own Art by so long a life: a man that coupled Learning and Wisdom together, very conversant in Experience and Observation; one that haunted not after Words or Methods, but severed the very Nerves of Science, and so propounded them. *Demonax* a Philosoper, not onely in Profession but Practice, lived in the dayes of *Adrian* almost to an hundred years: a man of an high mind, and a vanquisher of his own mind, and that truly and without affectation; a contemner of the world, and yet civil and courteous. When his friends spake to him about his Burial, he said, *Take no care for my Burial, for Stench will bury a Carcase.* They replied, *Is it your*

mind than to be cast out to Birds and Dogs? He said again, *Seeing in my life-time I endeavoured to my uttermost to benefit Men, what hurt is it if when I am dead I benefit Beasts?* Certain *Indian* People called *Pandoræ* are exceedingly long-liv'd, even to no less than two hundred years. They adde a thing more marvellous, That having, when they are boys, an hair somewhat whitish, in their old age, before their gray hairs, they grow coal black, though indeed this be every where to be seen, that they which have white hair whilst they are boys, in their man's estate change their hairs into a darker colour. The *Seres*, another people of *India*, with their Wine of Palms are accounted long livers, even to an hundred and thirty years. *Euphranor* the *Grammarian* grew old in his School, and taught Scholars when he was above an hundred years old. The elder *Ovid*, father to the *Poet*, lived ninety years, differing much from the disposition of his son, for he contemned the Muses, and diswaded his son from Poetry. *Asinius Pollio*, intimate with *Augustus*, exceeded the age of an hundred years: a man of an unreasonable Profuseness, Eloquent, and a lover of Learning; but vehement, proud, cruel, and one that made his private ends the centre of his thoughts. There was an opinion, that *Seneca* was an extream old man, no less than an hundred and fourteen years of age: which could not possibly be, it being as improbable that a decrepit old man should be set over *Nero*'s Youth, as, on the contrary, it was true, that he was able to manage with great dexterity the affairs of State: besides, a little before, in the midst of *Claudius* his Reign, he was banished *Rome* for Adulteries committed with some *Noble Ladies*, which was a Crime no way competible with so extreme old age. *Johannes de Temporibus*, among all the men of our later Ages, out of a common fame and vulgar opinion, was reputed long-liv'd, even to a miracle, or rather, even to a fable; his age hath been counted above three hundred years: He was by Nation a *French-man*, and followed the Wars under *Charls* the *Great*. *Garcius Aretine*, Great Grand-father to *Petrarch*, arrived at the age of an hundred and four years: he had ever enjoyed the benefit of good health; besides, at the last, he felt rather a decay of his strength, than any sickness or malady, which is the true resolution by old age. Amongst the *Venetians* there have been found not a few long livers, and those of the more eminent sort: *Franciscus Donatus*, Duke; *Thomas Contarenus*, Procurator of St. *Mark*; *Franciscus Molinus*, Procurator also of St. *Mark*, and others. But most memorable is that of *Cornarus* the *Venetian*, who being in his youth of a sickly body, began first to eat and drink by measure to a certain weight, thereby to recover his health: this Cure turned by use into a Diet, that Diet to an extraordinary long Life, even of an hundred years and better, without any decay in his senses, and with a constant enjoying of his health. In our age *William Postel*, a *French-man*, lived to an hundred and well-nigh twenty years, the top of his beard on the upper-lip being black, and not gray at all: a man crazed in his brain, and of a fancy not altogether sound; a great Traveller, Mathematician, and somewhat stained with *Heresie*.

20. I suppose there is scarce a *Village* with us in *England*, if it be any whit populous, but it affords some Man or Woman of fourscore years of age; nay, a few years since there was in the County of *Hereford* a May-game or Morrice dance, consisting of eight men, whose age computed together made up eight hundred years, insomuch that what some of them wanted of an hundred, others exceeded as much.

21. In the *Hospital* of *Bethlehem*, corruptly called *Bedlam*, in the *Suburbs* of *London*, there are found from time to time many mad persons that live to a great age.

22. The ages of *Nymphs*, *Fauns*, and *Satyrs*, whom they make to be indeed mortal, but yet exceedingly long-liv'd, (a thing which ancient Superstition and the late Credulity of some have admitted) we account but for *Fables* and *Dreams*; especially being that which hath neither consent with *Philosophy* nor with *Divinity*. And as touching the *History* of *Long Life* in *Man* by *Individuals*, or next unto *Individuals*, thus much. Now we will pass on to *Observations* by certain Heads.

23. The *Running* on of *Ages*, and *Succession* of *Generations*, seem to have no whit abated from the length of Life; for we see that from the time of *Moses* unto these our dayes, the term of man's life hath stood about fourscore years of age, neither hath it declined (as a man would have thought) by little and little. No doubt there are times in every Country wherein men are longer or shorter liv'd.

Longer,

Longer, for the most part when the times are barbarous, and men fare less deliciously, and are more given to bodily exercises: Shorter, when the times are more civil, and men abandon themselves to luxury and ease. But these things pass on by their turns, the succession of Generations alters is not. The same, no doubt, is in other living Creatures; for neither Oxen, nor Horses, nor Sheep, nor any the like, are abridged of their wonted ages at this day. And therefore the Great Abridger of Age was the *Floud*; and perhaps some such notable accidents (as particular *Inundations*, *long Droughts*, *Earthquakes*, or the like) may do the same again. And the like reason is in the dimension and stature of Bodies; for neither are they lessened by succession of Generations, howsoever *Virgil* (following the vulgar opinion) divined, that after Ages would bring forth lesser Bodies than the then present: whereupon speaking of ploughing up the *Æmathian* and *Æmonensian* Fields, he saith, *Grandiaq; effossis mirabitur ossa sepulchris, That after-ages shall admire the great bones digged up in ancient Sepulchres.* For whereas it is manifested that there were heretofore men of Gigantine Statures, (such as for certain have been found in *Sicily*, and else-where, in ancient Sepulchres and Caves) yet within these last three thousand years, a time whereof we have sure memory, those very places have produced none such: although this thing also hath certain turns and changes, by the Civilizing of a Nation, no less than the former. And this is the rather to be noted, because men are wholly carried away with an opinion, that there is a continual decay by Succession of Ages, as well in the term of man's Life as in the stature and strength of his Body; and that all things decline and change to the worse.

24. In *Cold* and *Northern Countries* men live longer commonly than in *Hot*: which must needs be in respect the skin is more compact and close, and the juices of the body less dissipable, and the Spirits themselves less eager to consume, and in better disposition to repair, and the Air (as being little heated by the Sun-beams) less predatory: And yet under the *Æquinoctial Line*, where the Sun passeth to and fro, and causeth a double Summer and double Winter, and where the Days and Nights are more equal, (if other things be concurring) they live also very long; as in *Peru* and *Taprobane*.

25. *Islanders* are, for the most part, longer-liv'd than those that live in *Continents*: for they live not so long in *Russia* as in the *Orcades*; nor so long in *Africa*, though under the same *Parallel*, as in the *Canaries* and *Tercera*'s; and the *Japonians* are longer-liv'd than the *Chineses*, though the *Chineses* are made upon long life. And this thing is no marvel, seeing the Air of the Sea doth heat and cherish in cooler Regions, and cool in hotter.

26. *High Situations* do rather afford long-livers than *Low*, especially if they be not Tops of Mountains, but Rising Grounds, as to their general Situations; such as was *Arcadia* in *Greece*, and that part of *Ætolia* where we related them to have lived so long. Now there would be the same reason for *Mountains* themselves, because of the pureness and clearness of the Air, but that they are corrupted by accident, namely, by the Vapours rising thither out of the Valleys, and resting there; and therefore in Snowy *Mountains* there is not found any notable long life, not in the *Alps*, not in the *Pyrenean Mountains*, not in the *Apennine*: yet in the tops of the *Mountains* running along towards *Æthiopia* and the *Abyssines*, where by reason of the Sands beneath little or no Vapour riseth to the *Mountains*, they live long, even at this very day, attaining many times to an hundred and fifty years.

27. *Marshes* and *Fens* are propitious to the Natives, and malignant to Strangers, as touching the lengthning and shortning of their lives: and that which may seem more marvellous, *Salt-Marshes*, where the Sea Ebbs and Flows, are less wholsome than those of *Fresh water*.

28. The *Countries* which have been observed to produce long-livers are these; *Arcadia*, *Ætolia*, *India* on this side *Ganges*, *Brasil*, *Taprobane*, *Britain*, *Ireland*, with the Islands of the *Orcades* and *Hebrides*: for as for *Æthiopia*, which by one of the Ancients is reported to bring forth long-Livers, 'tis but a toy.

29. It is a Secret; The *healthfulness* of *Air*, especially in any perfection, is better found by *Experiment* than by *Discourse* or *Conjecture*. You may make a trial by a lock of Wool exposed for a few dayes in the open Air, if the weight be not much

increased; another by a piece of flesh exposed likewise, if it corrupt not over-soon; another by a Weather-glass, if the Water interchange not too suddenly. Of these and the like enquire further.

30. Not onely the *Goodness* or *Pureness* of the *Air*, but also the *Equality* of the *Air*, is material to long life. Intermixture of Hills and Dales is pleasant to the sight, but suspected for long life. A Plain, moderately drie, but yet not over-barren or sandy, nor altogether without Trees and Shade, is very convenient for length of life.

31. *Inequality* of *Air* (as was even now said) in the place of our dwelling is naught; but *Change* of *Air* by travelling, after one be used unto it, is good; and therefore great Travellers have been long liv'd. Also those that have lived perpetually in a little Cottage, in the same place, have been long-livers: for air accustomed consumeth less; but air changed nourisheth and repaireth more.

32. As the continuation and number of Successions (which we said before) makes nothing to the Length and Shortness of Life; so the *immediate condition* of the *Parents*, (as well the Father as the Mother) without doubt availeth much. For some are begotten of old men, some of young men, some of men of middle age; again, some are begotten of fathers healthful and well-disposed, others of diseased and languishing; again, some of fathers immediately after repletion, or when they are drunk, others after sleeping, or in the morning; again, some after a long intermission of *Venus*, others upon the act repeated; again, some in the fervency of the father's love, (as it is commonly in Bastards) others after the cooling of it, as in long-married couples. The same things may be considered on the part of the Mother: unto which must be added the condition of the Mother whilst she is with child, as touching her health, as touching her diet, the time of her bearing in the womb, to the tenth month, or earlier. To reduce these things to a Rule, how far they may concern *Long Life*, is hard; and so much the harder, for that those things which a man would conceive to be the best, will fall out to the contrary: For that alacrity in the Generation which begets lusty and lively children, will be less profitable to long life, because of the Acrimony and inflaming of the Spirits. We said before, That to partake more of the mother's bloud conduceth to long life: also we suppose all things in moderation to be best; rather Conjugal love than Meretricious; the hour for Generation to be the morning; a state of body not too lusty or full, and such like. It ought to be well observed, that a strong Constitution in the Parents is rather good for them then for the Child, especially in the Mother: And therefore *Plato* thought, ignorantly enough, that the virtue of Generations halted, because the Woman used not the same exercise both of mind and body with the Men. The contrary is rather true; for the difference of virtue betwixt the Male and the Female is most profitable for the Child; and the thinner Women yield more towards the nourishment of the Child; which also holds in Nurses. Neither did the *Spartan Women*, which married not before twenty two, or, as some say, twenty five, (and therefore were called *Man-like women*) bring forth a more generous or long-liv'd Progeny than the *Roman* or *Athenian*, or *Theban women* did, which were ripe for Marriage at twelve or fourteen years; and if there were any thing eminent in the *Spartans*, that was rather to be imputed to the Parsimony of their Diet than to the late Marriages of their Women. But this we are taught by experience, that there are some Races which are long liv'd for a few Descents; so that Life is like some Diseases, a thing hereditary within certain bounds.

33. *Fair* in *Face*, or *Skin*, or *Hair*, are shorter livers; *Black*, or *Red*, or *Freckled*, longer. Also too fresh a colour in Youth doth less promise long life than paleness. A *hard skin* is a sign of long life rather that a *soft*; but we understand not this of a *rugged skin*, such as they call the *Goose skin*, which is as it were spongy, but of that which is hard and close. A *Fore-head* with deep furrows and wrinkles is a better sign than a smooth and plain *Forehead*.

34. The *Hairs* of the *Head* hard and like bristles, do betoken longer life than those that are soft and delicate. *Curled Hairs* betoken the same thing, if they be hard withal; but the contrary if they be soft and shining: the like if the *curling* be rather thick than in large bunches.

35. Early or late *Baldness* is an indifferent thing, seeing many which have been

Bald

Bald betimes have lived long. Alſo early *gray hairs* (howſoever they may ſeem forerunners of old age approaching) are no ſure ſigns; for many that have grown *gray* betimes have lived to great years: nay, haſty *gray hairs* without *Baldneſs* is a token of long life; contrarily, if they be accompanied with *Baldneſs*.

Hairineſs of the *upper parts* is a ſign of ſhort life, and they that have extraordinary much *hair* on their breaſts live not long: but *Hairineſs* of the *lower parts*, as of the Thighes and Legs, is a ſign of long life. 36.

Talneſs of *Stature* (if it be not immoderate) with convenient making, and not too ſlender, eſpecially if the body be active withal, is a ſign of long life: Alſo on the contrary, men of low ſtature live long, if they be not too active and ſtirring. 37.

In the proportion of the body they which are *ſhort* to the *waſtes*, with *long Leggs*, are longer-liv'd than they which are *long* to the *waſtes*, and have *ſhort Leggs*: alſo they which are large in the *neather parts*, and ſtreight in the *upper*, (the making of their body riſing, as it were, into a ſharp figure) are longer-liv'd than they that have *broad ſhoulders*, and are *ſlender downwards*. 38.

Leanneſs, where the affections are ſetled, calm, and peaceable; alſo a more *fat habit of body*, joyned with Choler, and a diſpoſition ſtirring and peremptory, ſignifie long life: but *Corpulency* in Youth foreſhews ſhort life, in Age it is a thing more indifferent. 39.

To be *long* and *ſlow* in *growing* is a ſign of long life; if to a greater ſtature, the greater ſign, if to a leſſer ſtature, yet a ſign though: contrarily, to *grow* quickly to a great ſtature is an evil ſign; if to a ſmall ſtature, the leſs evil. 40.

Firm Fleſh, a raw-bone body, and veins lying higher than the fleſh, betoken long life; the contrary to theſe, ſhort life. 41.

A *Head* ſomewhat leſſer than to the proportion of the body; a moderate *Neck*, not long, nor ſlender, nor flat, nor too ſhort; wide *Noſtrils*, whatſoever the form of the Noſe be; a large *Mouth*; and *Ear* griſtly, not fleſhy; *Teeth* ſtrong and contiguous, ſmall, or thin-ſet, fore-token long life; and much more if ſome new *Teeth* put forth in our elder years. 42.

A broad *Breaſt*, yet not bearing out, but rather bending inwards; *Shoulders* ſomewhat crooked, and (as they call ſuch perſons) round-back'd; a flat *Belly*; a *Hand* large, and with few lines in the Palm; a ſhort and round *Foot*, *Thighs* not fleſhy, and *Calves* of the *Leggs* not hanging over, but neat, are ſigns of long life. 43.

Eyes ſomewhat large, and the *Circles* of them inclined to greenneſs; *Senſes* not too quick; the *Pulſe* in youth ſlower, towards old age quicker; *Facility* of *holding* the *Breath*, and longer than uſual; the body in youth inclined to be bound, in the decline of years more laxative, are alſo ſigns of long life. 44.

Concerning the *Times* of *Nativity*, as they refer to long life, nothing hath been obſerved worthy the ſetting down, ſave onely *Aſtrological Obſervations*, which we rejected in our *opicks*. A *Birth* at the eighth month is not onely long-liv'd, but not likely to live. Alſo *winter births* are accounted the longer-liv'd. 45.

A *Pythagorical* or *Monaſtical Diet*, according to ſtrict rules, and always exactly equal, (as that of *Cornarus* was) ſeemeth to be very effectual for long life. Yet on the contrary, amongſt thoſe that live freely and after the common ſort, ſuch as have *good ſtomachs*, and *feed* more *plentifully*, are often the longeſt-liv'd. The *middle diet*, which we account the temperate, is commended, and conduceth to good health, but not to long life: for the *ſpare diet* begets few *Spirits*, and dull, and ſo waſteth the body leſs; and the *liberal diet* yieldeth more ample nouriſhment, and ſo repaireth more: but the *middle diet* doth neither of both, for where the Extreams are hurtful, there the Mean is beſt; but where the Extreams are helpful, there the Mean is nothing worth. 46.

Now to that *ſpare diet* there are requiſite *Watching*, leſt the Spirits being few ſhould be oppreſſed with much ſleep; *little Exerciſe*, leſt they ſhould exhale; *abſtinence* from *Venery*, leſt they ſhould be exhauſted: but to the *liberal diet*, on the other ſide, are requiſite much *Sleep*, frequent *Exerciſes*, and a ſeaſonable uſe of *Venery*. *Baths* and *Anointings* (ſuch as were anciently in uſe) did rather tend to deliciouſneſs than to prolonging of life. But of all theſe things we ſhall ſpeak more exactly when we come to the *Inquiſition* according to *Intentions*. Mean while that of *Celſus*, who was not onely a learned Phyſician, but a wiſe man, is not to be omitted, who adviſeth interchanging and alternation of the diet, but ſtill with an inclination to the more benign: as that a man ſhould ſometimes accuſtom himſelf to watching,

watching, sometimes to sleep; but to sleep oftnest: again, that he should sometimes give himself to fasting, sometimes to feasting; but to feasting oftnest: that he should sometimes inure himself to great labours of the miud; sometimes to relaxations of the same; but to relaxations oftnest. Certainly this is without all question, that *Diet* well ordered bears the greatest part in the prolongation of life: neither did I ever meet an extream long liv'd man, but being asked of his course, he observed something peculiar; some one thing, some another. I remember an *old man*, above an hundred years of age, who was produced as witness touching an ancient Prescription. When he had finished his testimony the *Judge* familiarly asked him how he came to live so long. He answered, beside expectation, and not without the laughter of the hearers, *By eating before I was hungry, and drinking before I was dry.* But of these things we shall speak hereafter.

47. A *Life* led in *Religion* and in *Holy Exercises* seemeth to conduce to long life. There are in this kind of life these things, Leisure, Admiration and Contemplation of heavenly things, Joyes not sensual, noble hopes, wholsome Fears, sweet Sorrows; lastly, continual Renovations by Observances, Penances, Expiations: all which are very powerful to the prolongation of life. Unto which if you add that austere diet which hardneth the mass of the Body, and humbleth the Spirits, no marvel if an extraordinary length of life do follow; such was that of *Paul* the *Hermite*, *Simeon Stelita* the *Columnar Anchorite*, and of many other *Hermites* and *Anchorites*.

48. Next unto this is the life led in good Letters, such as was that of Philosophers, Rhetoricians, Grammarians. This life is also led in leisure, and in those thoughts, which, seeing they are severed from the affairs of the world, bite not, but rather delight through their Variety and Impertinency: They live also at their pleasure, spending their time in such things as like them best, and for the most part in the company of young men, which is ever the most chearful. But in Philosophies there is great difference betwixt the Sects as touching long life: For those Philosophies which have in them a touch of Superstition, and are conversant in high Contemplations, are the best; as the *Pythagorical* and *Platonick*: also those which did institute a perambulation of the world, and considered the variety of natural things, and had reachless, and high, and magnanimous thoughts, (as of *Infinitum*, of the Stars, of the Heroical Vertues, and such like) were good for lengthning of life; such were those of *Democritus Philolaus*, *Xenophanes*, the Astrologians and Stoicks: also those which had no profound Speculation in them, but discoursed calmly on both sides, out of common Sense, and the received Opinions, without any sharp Inquisitions, were likewise good; such were those of *Carneades* and the *Academicks*, also of the Rhetoricians and Grammarians. But contrary, Philosophies conversant in perplexing Subtilties, and which pronounced peremptorily, and which examined and wrested all things to the Scale of Principles, lastly, which were thorny and narrow, were evil: such were those commonly of the *Peripateticks*, and of the *School-men*.

49. The *Country life* also is well fitted for long life: it is much abroad, and in the open air, it is not slothful, but ever in employment; it feedeth upon fresh Cates, and unbought; it is without Cares and Envy.

50. For the *Military life*, we have a good opinion of that whilst a man is young. Certainly many excellent *Warriors* have been long-liv'd; *Corvinus*, *Camillus*, *Xenophon*, *Agesilaus*, with others both ancient and modern. No doubt it furthereth long life to have all things from our youth to our elder age mend, and grow to the better, that a Youth full of crosses may minister sweetness to our Old age. We conceive also that *Military affections*, inflamed with a desire of Fighting, and hope of Victory, do infuse such a heat into the *Spirits*, as may be profitable for long life.

Medicines for Long Life.

THE Art of Physick, *which we now have, looks no further commonly than to* Conservation *of* Health *and* Cure *of* Diseases: *As for those things which tend properly to* Long Life, *there is but slight mention, and by the way onely. Notwithstanding we will propound those* Medicines *which are notable in this kind, I mean, those which are* Cordials. *For it is consonant to reason, that those* things *which being taken in* Cures *do defend and fortifie the* Heart, *or, more truly, the* Spirits, *against Poysons and Diseases, being transferred with judgment and choice into* Diet, *should have a good effect, in some sort, towards the* Prolonging *of* Life. *This we will do, not heaping them promiscuously together, (as the manner is) but selecting the best.* *To the tenth Article.*

Gold is given in three forms; either in that which they call *Aurum potabile*, or in *Wine* wherein *Gold* hath been *quenched*, or in *Gold* in the *Substance*, such as are *Leaf gold*, and the *Filings* of *Gold*. As for *Aurum potabile*, it is used to be given in desperate or dangerous diseases, and that not without good success. But we suppose that the Spirits of the *Salt*, by which the *Gold* is dissolved, do rather minister that vertue which is found in it, than the *Gold* it self; though this secret be wholly suppressed. Now if the body of *Gold* could be opened with these *Corrosive waters*, or by these *Corrosive waters* (so the venomous quality were wanting) well washed, we conceive it would be no unprofitable Medicine. 1.

Pearls are taken either in a fine Powder, or in a certain Mass, or Dissolution by the juice of sour and new Limons; and they are given sometimes in Aromatical Confections, sometimes in Liquor. The *Pearl*, no doubt, hath some affinity with the Shell in which it groweth, and may be of the same quality with the Shels of *Cra-fishes*. 2.

Amongst the *transparent precious Stones*, two onely are accounted *Cordial*, the *Emerauld* and the *Jacinth*, which are given under the same forms that the *Pearls* are; save only that the dissolutions of them, as far as we know, are not in use. But we suspect these *Glassie Jewels*, lest they should be cutting. 3.

Of these which we have mentioned, how far and in what manner they are helpful, shall be spoken hereafter.

Bezoar-Stone is of approved vertue for refreshing the Spirits, and procuring a gentle Sweat. As for the *Unicorn's Horn*, it hath lost the credit with us; yet so, as it may keep rank with *Hart's Horn*, and the *Bone* in the heart of a *Hart*, and *Ivory*, and such like. 4.

Amber-griece is one of the best to appease and comfort the Spirits. 5.

Hereafter follow the names only of the *Simple Cordials*, seeing their Vertues are sufficiently known.

Hot.	Hot.	Cold.	Cold.
Saffron.	*Clove-Gilly-flowers.*	*Nitre.*	*Juice of sweet*
Folium Indum.	*Orenge-flowers.*	*Roses. Violets.*	*Orenges.*
Lignum Aloes.	*Rosemary.*	*Strawberry-*	*Juice of Pearmains.*
Citron Pill or	*Mint.*	*Leaves.*	*Borage.*
Rind.	*Betony.*	*Straw-berries.*	*Bugloss.*
Balm.	*Carduus Benedictus.*	*Juice of sweet*	*Burnet. Sanders.*
Basil.		*Limons.*	*Camphire.*

Seeing our speech now is of those things which may be transferred into Diet, *all* hot Waters *and* Chymical Oiles, *(which, as a certain* Trifler *saith, are under the* Planet Mars, *and have a furious and destructive force) as also all hot and biting* Spices *are to be rejected, and a Consideration to be had, how Waters and Liquors may be made of the former Simples: not those phlegmatick distilled Waters, nor again those burning Waters of Spirits of Wine; but such as may be more temperate, and yet lively, and sending forth a benign Vapour.*

I make some question touching the frequent letting of *Bloud*, whether it conduceth to long life nor no; and I am rather in the opinion that it doth, if it be turned into a habit, and other things be well disposed: for it letteth out the old Juice of the body, and bringeth in new. 6.

I suppose also, that some *Emaciating Diseases* well cured, do profit to long life, for they yield new Juice, the old being consumed; and, as (as he saith) *To recover a sickness is to renew youth*: Therefore it were good to make some *Artificial Diseases*, which is done by strict and *Emaciating Diets*, of which I shall speak hereafter.

The Intentions.

To the 12, 13, and 14 Articles.

HAving finished the Inquisition *according to the* Subjects, *as namely, of* Inanimate Bodies, Vegetables, Living Creatures, Man; *I will now come nearer to the matter, and order mine* Inquisitions *by certain* Intentions, *such as are true and proper, (as I am wholly perswaded) and which are the very paths to* Mortal Life. *For in this part, nothing that is of worth hath hitherto been inquired, but the contemplations of men have been but simple, and* non-proficients. *For when I hear men on the one side speak of* comforting Natural heat, *and the* Radical moisture; *and of* Meats *which breed good* Blood, *such as may neither be burnt nor phlegmatick; and of the cheering and recreating the* Spirits; *I suppose them to be no bad men which speak these things: but none of these worketh effectually towards the end. But when on the other side I hear several discourses touching* Medicines *made of* Gold, *because* Gold *is not subject to corruption; and touching* Precious stones *to refresh the spirits by their hidden properties and lustre, and that if they could be taken and retained in Vessels, the* Balsoms, *and* Quintessences *of* living Creatures, *would make men conceive a proud hope of Immortality: And that the Flesh of* Serpents *and* Harts, *by a certain consent, are powerful to the Renovation of Life, because the one casteth his Skin, the other his Horns: (they should also have added the Flesh of* Eagles, *because the* Eagle *changes his Bill) And that a certain* Man, *when he had found an Oyntment hidden under the ground, and had anointed himself therewith from head to foot, (excepting onely the soles of his feet) did, by his anointing, live three hundred years, without any disease, save onely some Tumors in the soles of his feet: and of* Artesius, *who when he found his Spirit ready to depart, drew into his body the spirit of a certain young man, and thereby made him breathless, but himself lived many years by another mans Spirit: And of* Fortunate Hours *according to the* Figures *of* Heaven, *in which* Medicines *are to be gathered and compounded for the prolongation of Life: And of the* Seales *of* Planets, *by which vertues may be drawn and fetched down from* Heaven *to prolong Life: and such like fabulous and superstitious vanities: I wonder exceedingly that men should so much doat, as to suffer themselves to be deluded with these things. And again, I do pity Mankind that they should have the hard fortune to be besieged with such frivolous and senceless apprehensions. But mine* Intentions *do both come home to the Matter, and are far from vain and credulous Imaginations; being also such, as I conceive, posterity may adde much to the matters which satisfie these* Intentions; *but to the* Intentions *themselves, but a little. Notwithstanding there are a few things, and those of very great moment, of which I would have men to be forewarned*

First, we are of that opinion, that we esteem the Offices *of* Life *to be more worthy than* Life *it self. Therefore if there be any thing of that kind that may indeed exactly answer our* Intentions, *yet so, that the* Offices *and* Duties *of* Life *be thereby hindred; whatsoever it be of this kind, we reject it. Perhaps we may make some light mention of some things, but we insist not upon them. For we make no serious nor diligent discourse, either of leading the life in Caves, where the Sunbeams and several changes of the Air pierce not, like* Epimenides *his Cave; or of perpetual Baths, made of Liquors prepared; or of Shirts, and Sear-cloths so applied, that the Body should be always as it were in a Box; or of thick paintings of the body, after the manner of some* Barbarous Nations; *or of an exact ordering of our Life and Diet, which aimeth onely at this, and mindeth nothing else but that a man live, (as was that of* Herodicus *amongst the Antients, and of* Cornarus *the* Venetian *in our days, but with greater moderation;) or of any such Prodigy, Tediousness, or Inconvenience: but we propound such Remedies and Precepts, by which the* Offices *of Life may neither be deserted, nor receive any great interruptions or molestations.*

Secondly, on the other side we denounce unto men that they will give over trifling, and not imagine that so great a work as the stopping and turning back the powerful course of nature, can be brought to pass by some Morning-draught, or the taking of some precious Drug, but that they would be assured that it must needs be, that this is a work of labour, and consisteth of many Remedies, and a fit connexion of them amongst themselves; for no man can be so stupid as to imagine, that what was never yet done, can be done, but by such ways as were never yet attempted.

Thirdly, we ingeniously profess, that some of those things which we shall propound have not been tried by us by way of Experiment, (for our course of life doth not permit that) but are derived (as we suppose) upon good reason, out of our Principles and Grounds, (of which some we set down, others we reserve in our mind) and are, as it were, cut and digged out of the Rock *and* Mine *of* Nature *her self. Nevertheless we have been careful, and that with all providence and circumspection, (seeing the* Scripture *saith of the* Body *of* Man, *that* it is more worth than Raiment) *to propound such Remedies, as may at least be safe, if peradventure they be not fruitful.*

Fourthly, we would have men rightly to observe and distinguish, that those things which are good for an Healthful Life, *are not always good for a* Long Life; *for there are some things which do further the alacrity of the Spirits, and the strength and vigour of the Functions, which, notwithstanding, do cut off from the sum of Life; and there are other things which are profitable to prolongation of Life, which are not without some peril of health, unless this matter be salved by fit Remedies; of which, notwithstanding, as occasion shall be offered, we will not omit to give some Cautions and Monitions.*

Lastly we have thought good to propound sundry Remedies, *according to the several* Intentions; *but the choice of those* Remedies, *and the order of them, to leave to Discretion: for to set down exactly which of them agreeth best, with which Constitution of Body, which with the several courses of Life, which with each Mans particular Age, and how they are to be taken one after another, and how the whole Practique of these things is to be administred and governed, would be too long, neither is it fit to be published.*

In the Topicks *we propunded three Intentions: The* Prohibiting *of* Consumption, *The* Perfecting *of* Reparation, *and the* Renewing *of* Oldness. *But seeing those things which shall be said are nothing less than words, we will deduce these three* Intentions *to ten* Operations.

The first is, the Operation *upon the* Spirits *that they may renew their vigour.* 1.
The second Operation *is upon the* Exclusion *of* Air. 2.
The third Operation *is upon the* Bloud, *and the* Sanguifying Heat. 3.
The fourth Operation *is upon the* Juices *of the* Body. 4.
The fifth Operation *is upon the* Bowels, *for their* Extrusion *of* Aliment. 5.
The sixth Operation *is upon the* Outward Parts, *for their* Attraction *of* Aliment. 6.
The seventh Operation *is upon the* Aliment *it self, for the* Insinuation *thereof.* 7.
The eighth Operation *is upon the last* Act *of* Assimilation. 8.
The ninth Operation *is upon the* Inteneration *of the* Parts, *after they begin to be dried.* 9.
The tenth Operation *is upon the* Purging *away of* Old Juice, *and* Supplying *of* New Juice. 10.

Of these Operations, *the four first belong to the First* Intention, *the four next to the Second* Intention, *and the two last to the Third* Intention.

But because this part touching the Intensions *doth tend to Practice, under the name of* History, *we will not onely comprise* Experiments *and* Observations, *but also* Counsels, Remedies, Explications *of* Causes, Assumptions, *and whatsoever hath reference hereunto.*

The Operation upon the Spirits that they may remain Youthful, and renew their Vigour.

The Hiſtory.

1. THE *Spirits* are the Maſter-workmen of all effects in the *Body*. This is manifeſt by Conſent, and by infinite inſtances.

2. If any man could procure that a young man's *Spirit* could be conveyed into an old man's *Body*, it is not unlikely but this great Wheel of the *Spirits* might turn about the leſſer Wheel of the *Parts*, and ſo the courſe of Nature become retrogade.

3. In every Conſumption, whether it be by Fire or by Age, the more the *Spirit* of the Body, or the Heat, preyeth upon the Moiſture, the leſſer is the duration of that thing. This occurs every where, and is manifeſt.

4. The *Spirits* are to be put into ſuch a temperament and degree of activity, that they ſhould not (as he ſaith) *drink* and *guzzle* the juices of the Body, but *ſip them onely*.

5. There are two kinds of *Flames*: the one eager and weak, which conſumes ſlight ſubſtances but hath little power over the harder; as the flame of ſtraw, or ſmall Sticks: the other ſtrong and conſtant, which converts hard and obſtinate ſubſtances; as the flame of hard wood, and ſuch like.

6. The eager flames, and yet leſs robuſt, do dry Bodies, and render them exhauſt and ſapleſs; but the ſtronger flames do intenerate and melt them.

7. Alſo in *Diſſipating Medicines*, ſome vapour forth the thin part of the tumors or ſwellings, and theſe harden the tumour; others potently diſcuſs, and theſe ſoften it.

8. Alſo in *Purging* and *Abſterging Medicines*, ſome carry away the fluid humors violently, others draw the more obſtinate and viſcous.

9. The *Spirits* ought to be inveſted and armed with ſuch a heat, that they may chuſe rather to ſtir and undermine hard and obſtinate matters, than to diſcharge and carry away the thin and prepared; for by that means the Body becomes green and ſolid.

10. *The* Spirits *are ſo to be wrought and tempered, that they may be in* Subſtance Denſe, *not* Rare; *in* Heat Strong, *not* Eager; *in* Quantity Sufficient *for the offices of Life, not* Redundant *or* Turgid; *in* Motion Appeaſed, *not* Dancing *or* Unequal.

11. That *Vapours* work powerfully upon the *Spirits*, it is manifeſt by Sleep, by Drunkenneſs, by Melancholick Paſſions, by letificant Medicines, by Odours, calling the Spirits back again in Swounings and Faintings.

12. The *Spirits* are condenſed four ways; either by *putting them to flight*, or by *refrigerating* and *cooling* them, or by *ſtroaking* them, or by *quieting* them. And firſt of their *Condenſation* by *putting them to flight*.

13. Whatſoever putteth to flight on all parts, driveth the body into his Centre, and ſo *Condenſeth*.

14. To the *Condenſation* of the *Spirits* by flight, the moſt powerful and effectual is *Opium*, and next *Opiates*, and generally all *Soporiferous things*.

15. The force of *Opium* to the *condenſation* of the *Spirits* is exceeding ſtrong, whenas perhaps three grains thereof will in a ſhort time ſo coagulate the *Spirits*, that they return no more, but are extinguiſhed, and become immoveable.

16. *Opium*, and the like, put not the *Spirits* to flight by their coldneſs, for they have parts manifeſtly hot; but, on the contrary, cool by their putting the *Spirits* to flight.

17. The *Flight* of the *Spirits* by *Opium* and *Opiate Medicines* is beſt ſeen by applying the ſame outwardly; for the *Spirits* ſtraight with-draw themſelves, and will return no more, but the part is mortified, and turns to a *Gangrene*.

18. *Opiates*, in grievous pains, as in the Stone, or the cutting off of a Limb, mitigate pains moſt of all, by putting the *Spirits* to flight.

19. *Opiates* obtain a good effect from a bad cauſe; for the *Flight* of the *Spirits* is evil, but the *Condenſation* of them through their flight is good.

The

The *Grecians* attributed much, both for health and for prolongation of life, as *Opiates:* but the *Arabians* much more, insomuch that their *grand Medicines* (which they called the *gods Hands*) had *Opium* for their Basis and principal Ingredient, other things being mixed to abate and correct the noxious qualities thereof; such were *Treacle*, *Methridate*, and the rest. 20.

Whatsoever is given with good success in the curing of *Pestilential* and *Malignant Diseases*, to stop and bridle the *Spirits*, lest they grow turbulent and tumultuate, may very happily be transferred to the prolongation of life; for one thing is effectual unto both, namely, the *condensation* of the *Spirits*: now there is nothing better for that than *Opiates*. 21.

The *Turks* find *Opium*, even in a reasonable good quantity, harmless and comfortable, insomuch that they take it before their Battel to excite courage: but to us, unless it be in a very small quantity, and with good Correctives, it is mortal. 22.

Opium and *Opiates* are manifestly found to excite *Venus*; which shews them to have force to corroborate the Spirits. 23.

Distilled Water of *wilde Poppy* is given with good success in Surfeits, Agues, and divers diseases; which no doubt is a temperate kind of *Opiate*. Neither let any man wonder at the various use of it; for that is familiar to *Opiates*, in regard that the Spirits, corroborated and condensed, will rise up against any disease. 24.

The *Turks* use a kind of Herb which they call *Caphe*, which they dry and powder, and then drink in warm water; which, they say, doth not a little sharpen them, both in their Courage, and in their Wits; notwithstanding, if it be taken in a large quantity, it affects and disturbs the mind: whereby it is manifest, that it is of the same nature with *Opiates*. 25.

There is a Root much renowned in all the *Eastern parts*, which they call *Betel*, which the *Indians* and others use to carry in their mouths, and to champ it, and by that champing they are wonderfully enabled both to endure labours, and to overcome sicknesses, and to the act of carnal copulation: It seems to be a kind of *Stupefactive*, because it exceedingly blacks the Teeth. 26.

Tobacco in our age is immoderately grown into use, and it affects men with a secret kind of delight, insomuch that they who have once inured themselves unto it can hardly afterwards leave it: and no doubt it hath power to lighten the body, and to shake off weariness. Now the vertue of it is commonly thought to be, because it opens the passages, and voids humors: but it may more rightly be referred to the *condensation* of the Spirits; for it is a kind of *Henbane*, and manifestly troubles the Head, as *Opiates* do. 27.

There are sometimes *Humors* engendred in the body, which are, as it were, *Opiate* themselves; as it is in some kind of *Melancholies*, with which if a man be affected, it is a sign of very long life. 28.

The *simple Opiates* (which are also called *Stupefactives*) are these: *Opium* it self, which is the juice of *Poppy*; both the *Poppies*, as well in the Herb as in the Seed; *Henbane*, *Mandrake*, *Hemlock*, *Tobacco*, *Night-shade*. 29.

The compound *Opiates* are, *Treacle*, *Methridate*, *Trifera*, *Ladanum*, *Paracelsi*, *Diacodium*, *Diascordium*, *Philonium*, *Pills* of *Hounds-tongue*. 30.

From this which hath been said, certain Designations or Counsels may be deduced for the prolongation of life, according to the present intension; namely, of *condensing* the *Spirits* by *Opiates*. 31.

Let there be therefore every year, from Adult years of Youth, an *Opiate* diet; let it be taken about the end of *May*, because the Spirits in the Summer are more loose and attenuated, and there are less dangers from cold humours; let it be some *Magistral Opiate*, weaker than those that are commonly in use, both in respect of a smaller quantity of *Opium*, and of a more sparing mixture of extreme hot things; let it be taken in the morning betwixt sleeps. The fare for that time would be more simple and sparing than ordinary, without Wine, or Spices, or Vapourous things. This Medicine to be taken onely each other day, and to be continued for a fortnight. This Designation in our judgment comes home to the intension. 32.

Opiates also may be taken, not onely by the mouth, but also by *Fumes*; but the *Fumes* must be such as may not move the expulsive Faculty too strongly, nor force down humours, but onely taken in a Weft, may work upon the Spirits within the brain. And therefore a *Suffumigation* of *Tobacco*, *Lignum-Aloes*, *Rosemary-leaves* dried, 33.

dried, and a little *Myrrhe* snuffed up in the morning at the mouth and nostrils, would be very good.

34. In *Grand Opiates*, such as are *Treacle*, *Methridate*, and the rest, it would not be amiss (especially in youth) to take rather the *distilled Waters* of them than themselves in their bodies; for the vapour in distilling doth rise, but the heat of the Medicine commonly setleth. Now *distilled waters* are good in those vertues which are conveyed by Vapours, in other things but weak.

35. There are Medicines which have a certain weak and hidden degree, and therefore safe to an *Opiate* vertue; these send forth a slow and copious vapour, but not malignant as *Opiates* do, therefore they put not the Spirits to *flight*; notwithstanding they congregate them, and somewhat thicken them.

36. Medicines in order to *Opiates* are principally *Saffron*, next *Folium Indum*, *Amber-greese*, *Coriander-seed prepared*, *Amomum*, *Pseuda-momum*, *Lignum-Rhodium*, *Orenge-flower water*, and much more the *Infusion* of the same *Flowers* new gathered in the *Oil* of *Almonds*; *Nutmegs* pricked full of holes, and macerated in Rose-water.

37. As *Opiates* are to be taken very sparingly, and at certain times, as was said, so these secondaries may be taken familiarly, and in our daily diet, and they will be very effectual to prolongation of life. Certainly an *Apothecary* of *Calecute*, by the use of *Amber*, is said to have lived an hundred and sixty years; and the *Noble-men* of *Barbary*, through the use thereof, are certifi'd to be very long-liv'd, whereas the mean people are but of short life. And our *Ancestors*, who were longer-liv'd than we, did use *Saffron* much in their Cakes, Broths, and the like. And touching the first way of condensing the Spirits of *Opiates* and the *Subordinates* thereto, thus much.

38. Now we will enquire of the second way of condensing the *Spirits* by *Cold*. For the proper work of *Cold* is *Condensation*, and it is done without any malignity, or adverse quality; and therefore it is a safer operation than by *Opiates*, though somewhat less powerful, if it be done by turns onely, as *Opiates* are. But then again, because it may be used familiarly, and in our daily diet with moderation, it is much more powerful for the prolongation of life than by *Opiates*.

39. The *Refrigeration* of the Spirits is effected three ways, either by *Respiration*, or by *Vapours*, or by *Aliment*. The first is the best, but, in a sort, out of our power; the second is potent, but yet ready, and at hand; the third is weak, and somewhat about.

40. *Air clear* and *pure*, and which hath no fogginess in it, before it be received into the Lungs, and which is least exposed to the Sun-beams, condenseth the Spirits best. Such is found either on the tops of dry Mountains, or in Champagnes open to the wind, and yet not without some shade.

41. As for the *Refrigeration* and *Condensation* of the *Spirits* by *Vapours*, the Root of this operation we place in *Nitre*, as a Creature purposely made and chosen for this end, being thereunto led, and perswaded by these Arguments.

42. *Nitre* is a kind of cool Spice: this is apparent to the sense it self, for it bites the Tongue and Palate with *cold*, as Spices do with *heat*, and it is the onely thing, as far as we know, that hath this property.

43. Almost all *cold things* (which are cold properly, and not by accident, as *Opium* is) are poor and jejune of Spirit; contrarily, things full of *Spirit* are almost all hot, onely *Nitre* is found amongst Vegetables, which aboundeth with *Spirit*, and yet is cold. As for *Camphire*, which is full of Spirit, and yet performeth the actions of cold, it cooleth by accident onely; as namely, for that by the thinness thereof, without *Acrimony*, it helpeth perspiration in inflammations.

44. In *congealing* and *freezing* of *Liquors*, (which is lately grown into use) by laying Snow and Ice on the out-side of the Vessel, *Nitre* is also added, and no doubt it exciteth and fortifieth the *Congelation*. It is true, that they use also for this work ordinary Bay-Salt, which doth rather give activity to the coldness of the Snow, than cool by it self: But, as I have heard, in the hotter Regions, where Snow falls not, the congealing is wrought by *Nitre* alone; but this I cannot certainly affirm.

45. It is affirmed that *Gun powder*, which consisteth principally of *Nitre*, being taken in drink, doth conduce to valour, and that it is used oftentimes by Mariners and Souldiers before they begin their Battels, as the *Turks* do *Opium*.

Nitre is given with good success in burning Agues, and Pestilential Fevers, to mitigate and bridle their pernicious heats. 46.

It is manifest, that *Nitre* in *Gun-powder* doth mightily abhor the Flame, from whence is caused that horrible Crack and puffing. 47.

Nitre is found to be, as it were, the *Spirit* of the Earth: for this is most certain, that any Earth, though pure and unmixt with Nitrous matter, if it be so laid up and covered, that it be free from the Sun-beams, and putteth forth no Vegetable, will gather *Nitre*, even in good abundance. By which it is clear, that the Spirit of *Nitre* is not onely inferiour to the *Spirit* of living Creatures, but also to the *Spirit* of Vegetables. 48.

Cattle which drink of *Nitrous* water do manifestly grow fat, which is a sign of the cold in *Nitre*. 49.

The manuring of the Soil is chiefly by *Nitrous substances*; for all Dung is *Nitrous*, and this is a sign of the Spirit in *Nitre*. 50.

From hence it appears, that the Spirits of Man may be cooled and condensed by the Spirit of *Nitre*, and be made more crude, and less eager. And therefore, as strong Wines, and Spices, and the like, do burn the Spirits, and shorten life; so on the contrary side, *Nitre* doth compose and repress them, and furthereth to life. 51.

Nitre may be used with meat, mixed with our Salt, to the tenth part of the Salt; in Broths taken in the morning, for three grains to ten, also in Beer: but howsoever it be used, with moderation, it is of prime force to long life. 52.

As *Opium* holds the preheminence in *condensing* the Spirits, by putting them to *flight*, and hath withal his *Subordinates*, less potent, but more safe, which may be taken both in greater quantity, and in more frequent use, of which we have formerly spoken: so also *Nitre*, which condenseth the Spirits by cold, and by a kind of Frescour, (as we now a-days speak) hath also his *Subordinates*. 53.

Subordinates to *Nitre* are, all those things which yield an Odour somewhat Earthy, like the smell of Earth, pure and good, newly digged or turned up; of this sort the chief are, *Borage*, *Bugloss*, *Langue de Bœuf*, *Burnet*, *Strawberry leaves* and *Strawberries*, *Frambois* or *Raspis*, raw *Cucumers*, raw *Pearmains*, *Vine-leaves*, *and Buds*; also *Violets*. 54.

The next in order are those which have a certain freshness of smell, but somewhat more inclined to heat; yet not altogether void of that vertue of refreshing by coolness; such as are *Balm*, *green Citrons*, *green Orenges*, *Rose-water distilled*, *roasted Wardens*; also the *Damask*, *Red*, and *Musk Roses*. 55

This is to be noted, that *Subordinates* to *Nitre* do commonly confer more to this *Intension*, *Raw*, then having passed the Fire, because that the Spirit of Cooling is dissipated by the Fire; therefore they are best taken, either infused in some liquor, or raw. 56.

As the condensation of the Spirits by *Subordinates* to *Opium* is, in some sort, performed by *Odours*, so also that which is by *Subordinates* to *Nitre*; therefore the smell of new and pure *Earth*, taken either by following the Plough, or by digging, or by weeding, excellently refresheth the Spirits. Also the Leaves of Trees in Woods, or Hedges, falling towards the middle of Autumn, yield a good refreshing to the Spirits, but none so good as *Strawberry-leaves* dying. Likewise the smell of *Violets*, or *Wall-flowers*, or *Bean-flowers*, or *Sweet-briar*, or *Hony-suckles*, taken as they grow, in passing by them onely, is of the same nature. 57.

Nay, and we know a certain great Lord who lived long, that had every morning immediately after sleep, a *Clod* of fresh *Earth* laid in a fair Napkin under his Nose, that he might take the smell thereof. 58.

There is no doubt, but the cooling and tempering of the blood by cool things, such as are *Endive*, *Succory*, *Liver wort*, *Purslain*, and the like, do also by consequent cool the Spirits; but this is about, whereas vaponrs cool immediately. 59.

And as touching the condensing of the Spirits by *Cold*, thus much: The third way of condensing the Spirits, we said to be by that which we call *stroaking* the *Spirits*: The fourth, by *quieting* the *alacrity* and *unruliness* of them. 60.

Such things *stroke* the *Spirits* as are pleasing and friendly to them, yet they allure them not to go abroad; but rather prevail, that the Spirits contented, as it were, in 61.

in their own society, do enjoy themselves, and betake themselves into their proper Centre.

61. For these, if you recollect those things which were formerly set down, as *Subordinates* to *Opium* and *Nitre*, there will need no other *Inquisition*.

62. As for the quieting of the *unrulinesse* of the Spirits, we shall presently speak of that, when we enquire touching their *Motion*. Now then, seeing we have spoken of that *Condensation* of the *Spirits* which pertaineth to their substance, we will come to the *temper* of *Heat* in them.

63. The *Heat* of the *Spirits*, as we said, ought to be of that kind that it may be *robust*, not *eager*, and may delight rather to master the tough and obstinate, than to carry away the thin and light humors.

64 We must beware of *Spices*, *Wine*, and strong *Drinks*, that our use of them be very temperate, and sometimes discontinued; also of *Savory*, *Wild marjoram*, *Penny-royal*, and all such as bite and heat the tongue; for they yield unto the *Spirits* an *heat* not *Operative*, but *Predatory*.

65. These yield a *robust heat*, especially *Elecampane*, *Garlick*, *Carduus Benedictus*, *Water-cresses* while they are young, *Germander*, *Angelica*, *Zedoary*, *Vervin*, *Valerian*, *Myrrhe*, *Pepper-wort*, *Elder flowers*, *Garden-Chervile*: The use of these things with choice and judgement, sometimes in Sallads, sometimes in Medicines, will satisfie this *Operation*.

66. It falls out well that the *Grand Opiates* will also serve excellently for this *Operation*, in respect that they yield such an *heat* by composition, which is wished, but not to be found, in Simples. For the mixing of those excessive hot things (such as are *Euphorbium*, *Pellitory* of *Spain*, *Stavis-acre*, *Dragon-wort*, *Anacordi*, *Castoreum*, *Aristolochium*, *Opponax*, *Ammoniachum*, *Galbanum*, and the like, which of themselves cannot be taken inwardly) to qualifie and abate the *Stupefactive* virtue of the *Opium*, they do make such a constitution of a Medicament as we now require; which is excellently seen in this, That *Treacle* and *Methridate*, and the rest, are not sharp, nor bite the tongue, but are onely somewhat bitter, and of strong scent, and at last manifest their heat when they come into the stomach, and in their subsequent operations.

67. There conduce also to the *robust heat* of the Spirits *Venus* often excited, rarely performed; and no less some of the affections, of which shall be spoken hereafter. So touching the heat of the Spirits, Analogical to the prolongation of Life, thus much.

68. Touching the *Quantity* of the Spirits, that they be not *exuberant* and *boiling*, but rather *sparing*, and within a mean, (seeing a small flame doth not devour so much as a great flame) the *Inquisition* will be short.

69. It seems to be approved by experience, that a *spare Diet*, and almost a *Pythagorical*, such as is either prescribed by the strict Rules of a *Monastical life*, or practised by *Hermites*, which have Necessity and Poverty for their Rule, rendreth a man long-liv'd.

70. Hitherto appertain *drinking of water*, a *hard Bed*, *abstinence from Fire*, a *slender Diet*, (as namely, of *Herbs*, *Fruits*, *Flesh*, and *Fish*, rather *powdred* and *salted* than *fresh* and *hot*) an *Hair-shirt*, *frequent Fastings*, *frequent Watchings*, *few sensual Pleasures*, and such like; for all these diminish the Spirits, and reduce them to such a *quantity* as may be sufficient onely for the Functions of Life, whereby the depredation is the less.

71. But if the *Diet* shall not be altogether so *rigorous* and *mortifying*, yet notwithstanding shall be always *equal* and *constant* to it self, it worketh the same effect. We see it in *Flames*, that a *Flame* somewhat bigger (so it be always alike and quiet) consumeth less of the fuel than a lesser Flame blown with Bellows, and by Gusts stronger or weaker: That which the *Regiment* and *Diet* of *Cornarus* the *Venetian* shewed plainly, who did eat and drink so many years together by a just weight, whereby he exceeded an hundred years of age, strong in limbs, and intire in his senses.

72. Care also must be taken, that a body plentifully nourished, and not emaciated by any of these aforesaid Diets, omitteth not a seasonable use of *Venus*, lest the Spirits increase too fast, and soften and destroy the body. So then, touching a moderate *quantity* of Spirits, and (as we may say) Frugal, thus much.

73. The *Inquisition* touching *bridling* the *motions* of the *Spirits* followeth next.

Motion

Motion doth manifestly attenuate and inflame them. This bridling is done by three means: by *Sleep*; by *avoiding* of *vehement Labours, immoderate Exercise*, and, in a word, all *Lassitude*; and by refraining *irksome Affections*. And first, touching *Sleep*.

74. The Fable tells us, that *Epimenides slept* many years together in a Cave, and all that time needed no meat, because the *Spirits* waste not much in *sleep*.

75. Experience teacheth us that certain Creatures, as *Dormice* and *Bats*, *sleep* in some close places an whole Winter together; such is the force of *sleep* to restrain all vital Consumption. That which *Bees* and *Drones* are also thought to do, though sometimes destitute of *Honey*; and likewise *Butter-flies*, and other *Flies*.

76. *Sleep* after *Dinner* (the stomach sending up no unpleasing Vapours to the head, as being the first Dews of our Meat) is good for the *spirits*, but derogatory and hurtful to all other points of health. Notwithstanding in extream old age there is the same reason of Meat and *Sleep*, for both our meals and our *sleeps* should be then frequent, but short and little; nay, and towards the last period of old age, a mere *Rest*, and, as it were, a perpetual *Reposing* doth best, especially in Winter-time.

77. But as moderate *sleep* conferreth to long life, so much more if it be *quiet* and not *disturbed*.

78. These procure *quiet sleep*, *Violets*, *Lettuce*, especially boiled; *Sirrup* of *dried Roses*, *Saffron*, *Balm*, *Apples*, at our going to bed; a *sop* of *Bread* in *Malmsey*, especially where *Musk-Roses* have been first *infused*: therefore it would not be amiss to make some *Pill*, or a small Draught of these things, and to use it familiarly. Also those things which shut the mouth of the stomach close, as *Coriander-seed* prepared, *Quinces* and *Wardens* roasted, do induce sound sleep; but above all things in youth, and for those that have sufficient strong stomacks, it will be best to take a good draught of *clear cold Water* when they go to bed.

Touching voluntary and procured Trances, *as also* fixed *and* profound Thoughts, *so as they be without irksomness, I have nothing certain: no doubt they make to this* Intension, *and* condense *the* Spirits, *and that more potently than* Sleep, *seeing they lay asleep, and suspend the senses as much or more. Touching them, let further inquiry be made. So far touching* Sleep.

79. As for *Motion* and *Exercise*, Lassitude hurteth, and so doth all Motion and Exercise which is too nimble and swift; as Running, Tennis, Fencing, and the like; and again, when our strength is extended and strained to the uttermost, as Dancing, Wrestling, and such like; for it is certain, that the *spirits* being driven into streights, either by the swiftness of the motion, or by the straining of the forces, do afterward become more eager and predatory. On the other side, *Exercises* which stir up a good strong motion, but not over-swift, or to our utmost strength, (such as are Leaping, Shooting, Riding, Bowling, and the like) do not hurt, but rather benefit.

We must come now to the *Affections* and *Passions* of the *Mind*, and see which of them are hurtful to long life, which profitable.

80. *Great Joys* attenuate and diffuse the *spirits*, and shorten life; *familiar Chearfulness* strengthens the *spirits*, by calling them forth, and yet not resolving them.

81. *Impressions* of *Joy* in the sense are naught; ruminations of *Joy* in the memory, or apprehensions of them in hope or fancy, are good.

82. *Joy suppressed*, or communicated sparingly, doth more comfort the *spirits* than *Joy* poured forth and published.

83. *Grief* and *Sadness*, if it be void of *Fear*, and afflict not too much, doth rather prolong life; for it contracteth the *spirits*, and is a kind of *condensation*.

84. *Great Fears* shorten the life: for though *Grief* and *Fear* do both streighten the *spirit*, yet in *Grief* there is a simple contraction; but in *Fear*, by reason of the cares taken for the remedy, and hopes intermixed, there is a turmoil and vexing of the *spirits*.

85. *Anger* suppressed is also a kind of vexation, and causeth the *spirit* to feed upon the juices of the body; but let loose and breaking forth, it helpeth: as those *Medicines* do which induce a *robust heat*.

86. *Envy* is the worst of all *Passions*, and feedeth upon the *spirits*, and they again upon the *body*; and so much the more because it is perpetual, and, as it is said, *keepeth no holidays*.

87. *Pity* of another man's misfortune, which is not likely to befall our selves, is good;

but *Pity*, which may reflect with some similitude upon the party pitying, is naught, because it exciteth *Fear*.

88. *Light Shame* hurteth not, seeing it contracteth the *Spirits* a little, and then straight diffuseth them: insomuch that *shamefac'd* persons commonly live long: but *Shame* for some great ignominy, and which afflicteth the mind long, contracteth the *Spirits* even to suffocation, and is pernicious.

89. *Love*, if it be not unfortunate, and too deeply wounding, is a kind of *Joy*, and is subject to the same Laws which we have set down touching *Joy*.

90. *Hope* is the most beneficial of all the *Affections*, and doth much to the prolongation of life, if it be not too often frustrated, but entertaineth the Fancy with an expectation of good: therefore they which fix and propound to themselves some end, as the mark and scope of their life, and continually and by degrees go forward in the same, are, for the most part, long-liv'd; in so much that when they are come to the top of their hope, and can go no higher therein, they commonly droop, and live not long after: So that *Hope* is a *Leaf-joy*, which may be beaten out to a great extension, like *Gold*.

91. *Admiration* and *light contemplation* are very powerful to the prolonging of life; for they hold the *spirits* in such things as delight them, and suffer them not to tumultuate, or to carry themselves unquietly and waywardly. And therefore all the *Contemplators* of *Natural things*, which had so many and eminent Objects to admire, (as *Democritus*, *Plato*, *Parmedides*, *Apollonius*) were long liv'd: also *Rhetoricians*, which tasted but lightly of things, and studied rather Exornation of speech than profundity of matters, were also long-liv'd; as *Gorgias*, *Protagoras*, *Isocrates*, *Seneca*. And certainly, as old men are for the most part talkative, so talkative men do often grow very old; for it shews a *light contemplation*, and such as doth not much stain the *Spirits*, or vex them: but subtil, and acute, and eager inquision shortens life; for it tireth the *spirit*, and wasteth it.

And as touching the *motion* of the *Spirits* by the *Affections* of the *Mind*, thus much. Now we will adde certain other general *Observations* touching the *Spirits*, beside the former, which fall not into the precedent distribution.

92. Especial care must be taken that the *Spirits* be not too often *resolved*; for attenuation goeth before resolution, and the *Spirit* once attenuated doth not very easily retire, or is *condensed*. Now *Resolution* is caused by over-great labours, over-vehement affections of the mind, over great sweats, over great evacuations, hot Baths, and an untemperate and unseasonable use of *Venus*; also by over-great cares and carpings, and anxious expectations; lastly, by malignant diseases, and intolerable pains and torments of the body: all which, as much as may be, (which our vulgar *Physicians* also advise) must be avoided.

93. The *spirits* are delighted both with *wonted* things, and with *new*. Now it maketh wonderfully to the conservation of the *spirits* in vigour, that we neither use *wonted* things to a satiety and glutting; nor *new* things, before a quick and strong appetite. And therfore both *customs* are to be broken off with judgment and care, before they breed a fulness; and the *appetite* after new things to be restrained for a time until it grow more sharp and jocond: and moreover, the *life*, as much as may be, so to be ordered, that it may have many *renovations*, and the *spirits* by perpetual conversing in the same actions may not wax dull. For though it were no ill saying of *Seneca's*, *The fool doth ever begin to live*; yet this folly, and many more such, are good for long life.

94. It is to be observed touching the *spirits*, (though the contrary used to be done) That when men perceive their *spirits* to be in good, placid, and healthful state, (that which will be seen by the tranquility of their Mind, and chearful disposition) that they cherish them, and not change them: but when, in a turbulent and untoward state, (which will also appear by their sadness, lumpishness, and other indisposition of their mind) that then they straight overwhelm them, and alter them. Now the *spirits* are contained in the same state, by a restraining of the affections, temperateness of diet, abstinence from *Venus*, moderation in labour, indifferent rest and repose: and the contrary to these do alter and overwhelm the *spirits*; as namely, vehement affections, profuse feastings, immoderate *Venus*, difficult labours, earnest studies, and prosecution of business. Yet men are wont, when they are merriest and best disposed, then to apply themselves to feastings,

Venus.

Venus, Labours, Endeavours, Businesses, whereas if they have a regard to long life, (which may seem strange) they should rather practise the contrary. For we ought to cherish and preserve good *spirits*, and for the evil-disposed *Spirits* to discharge and alter them.

95. *Ficinus* saith not unwisely, That *old men*, for the comforting of their spirits, ought often to remember and ruminate upon the *Acts* of their *Childhood* and *Youth*. Certainly such a remembrance is a kind of peculiar Recreation to every *old man*: and therefore it is a delight to men to enjoy the society of them which have been brought up together with them, and to visit the places of their education. *Vespasian* did attribute so much to this matter, that when he was *Emperour* he would by no means be perswaded to leave his Father's house, though but mean, lest he should lose the wonted object of his eyes, and the memory of his childhood; and besides, he would drink in a *wooden Cup*, tipped with silver, which was his *Grandmother's*, upon *Festival dayes*.

96. One thing above all is grateful to the *Spirits*, that there be a *continual progress* to the more *benign*; therefore we should lead such a Youth and Manhood, that our Old age should find new Solaces, whereof the chief is *moderate ease*: And therefore old men in honourable places lay violent hands upon themselves, who retire not to their ease: whereof may be found an eminent Example in *Cassiodorus*, who was of that reputation amongst the *Gothish Kings* of *Italy*, that he was as the Soul of their affairs; afterwards, being near eighty years of age, he betook himself to a Monastery, where he ended not his dayes before he was an hundred years old. But this thing doth require two Cautions: one, that they drive not off till their bodies be utterly worn out and diseased; for in such bodies all mutation, though to the more *benign*, hasteneth death: the other, that they surrender not themselves to a *sluggish ease*, but that they embrace something which may entertain their thoughts and mind with contentation; in which kind the chief delights are Reading and Contemplation; and then the desires of Building and Planting.

97. Lastly, the same *Action*, *Endeavour* and *Labour* undertaken *chearfully* and with a *good will* doth refresh the *Spirits*; but with an *aversation* and *unwillingness*, doth fret and deject them. And therefore it conferreth to long life, either that a man hath the art to institute his life so as it may be free and suitable to his own humour; or else to lay such a command upon his mind, that whatsoever is imposed by Fortune, it may rather lead him than drag him.

98. Neither is that to be omitted towards the government of the *Affections*, that especial care be taken of the *mouth* of the *Stomach*, especially that it be not too much relaxed; for that part hath a greater dominion over the affections, especially the daily affections, than either the Heart or Brain; only those things excepted which are wrought by potent vapours, as in Drunkenness and Melancholly.

99. Touching the *Operation* upon the *Spirits*; that they may *remain youthful*, and *renew* their *vigour*, thus much: which we have done the more accurately, for that there is, for the most part, amongst *Physicians* and other Authors touching these *Operations* a deep silence; but especially, because the *Operation* upon the *Spirits*, and their *waxing green again*, is the most ready and compendious way to long life; and that for a two-fold compendiousness: one, because the *Spirits* work compendiously upon the body; the other, because *Vapours* and the *Affections* work compendiously upon the *Spirits*; so as these attain the end, as it were, in a right line, other things rather in lines circular.

The Operation upon the Exclusion of the Air. 2.

The History.

1. THE *Exclusion* of the *Air ambient* tendeth to length of life two wayes: First for that the *External Air*, next unto the *Native Spirit*, (howsoever the *Air* may be said to animate the Spirit of Man, and conferreth not a little to health) doth most of all prey upon the juices of the body,

and haſten the Deſiccation thereof; and therefore the *Excluſion* of it is effectual to length of life.

2. Another effect which followeth the *Excluſion* of *Air* is much more ſubtil and profound, namely, that the Body cloſed up, and not perſpiring by the pores, detaineth the *Spirits* within, and turneth it upon the harder parts of the body, whereby the *Spirit* mollifies and intenerates them.

3. Of this thing the reaſon is explained in the *Deſiccation* of *Inanimate Bodies*; and it is an Axiom almoſt infallible, That the *Spirit* diſcharged and iſſuing forth, drieth Bodies; detained, melteth and intenerateth them. And it is further to be aſſumed, That all Heat doth properly attenuate and moiſten, and contracteth and drieth onely by Accident.

4. *Leading* the *Life* in *Dens* and *caves*, where the *Air* receives not the Sun-beams, may be effectual to long life. For the *Air* of it ſelf doth not much towards the depredation of the body, unleſs it be ſtirred up by heat. Certainly, if a man ſhall recal things paſt to his memory, it will appear that the ſtatures of men have been anciently much greater than thoſe that ſucceeded, as in *Sicily*, and ſome other places: but this kind of men led their lives, for the moſt part, in *Caves*. Now length of life and largeneſs of limbs have ſome affinity. The *cave* alſo of *Epimenides* walks among the Fables. I ſuppoſe likewiſe, that the life of *Columnar Anchorites* was a thing reſembling the life in *Caves*, in reſpect the Sun-beams could not much pierce thither, nor the *Air* receive any great changes or inequalities. This is certain, both the *Simeon Stelita's*, as well *Daniel* as *Saba*, and other *Columnar Anchorites*, have been exceeding long-liv'd. Likewiſe the *Anchorites* in our dayes, cloſed up and immured either within Walls or Pillars, are often found to be long-liv'd.

5. Next unto the life in *Caves* is the life on *Mountains*: for as the beams of the Sun do not penetrate into *Caves*; ſo on the tops of *Mountains*, being deſtitute of Reflexion, they are of ſmall force. But this is to be underſtood of *Mountains* where the Air is clear and pure; namely, whether by reaſon of the drineſs of the Vallies, Clouds and Vapours do not aſcend; as it is in the Mountains which encompaſs *Barbary*, where, even at this day, they live many times to an hundred and fifty years, as hath been noted before.

6. And this kind of *Air* of *Caves* and *Mountains*, of its own proper nature, is little or nothing predatory; but *Air*, ſuch as ours is, which is predatory through the heat of the Sun, ought as much as is poſſible, to be excluded from the body.

7. But the *Air* is prohibited and excluded two ways: firſt, by *cloſing* the Pores; ſecondly, by *filling* them up.

8. To the *cloſing* of the Pores help coldneſs of the air, going naked, whereby the skin is made hard, waſhing in cold water, Aſtringents applied to the skin, ſuch as are *Maſtick*, *Myrrhe*, *Myrtle*.

9. But much more may we ſatisfie this *Operation* by *Baths*, yet thoſe rarely uſed, (eſpecially in Summer) which are made of *Aſtringent Mineral waters*, ſuch as may ſafely be uſed, as Waters participating of Steel and Coperas; for theſe do potently contract the skin.

10. As for *filling* up the *Pores*, *Paintings* and ſuch like *Unctuous daubings*, and (which may moſt commodiouſly be uſed) *Oil* and *fat things*, do no leſs conſerve the ſubſtance of the body, than Oil-colours and Varniſh do preſerve Wood.

11. The ancient *Britains* painted their bodies with *Woad*, and were exceeding long liv'd: the *Picts* alſo uſed paintings, and are thought by ſome to have derived their name from thence.

12. The *Braſilians* and *Virginians* paint themſelves at this day, who are (eſpecially the former) very long liv'd; inſomuch that five years ago the *French Jeſuites* had ſpeech with ſome who remembred the building of *Fernambuck*, which was done an hundred and twenty years ſince; and they were then at Man's eſtate.

13. *Joannes de temporibus*, who is reported to have extended his life to three hundred years, being asked how he preſerved himſelf ſo long, is ſaid to have anſwered, *By Oyl without, and by Honey within.*

14. The *Iriſh*, eſpecially the *wild-Iriſh*, even at this day live very long: certainly they report, that within theſe few years the *Counteſs* of *Deſmond* lived to an hundred and forty years of age, and bred Teeth three times. Now the *Iriſh* have a faſhion to chafe, and, as it were, to baſte themſelves with old Salt-butter againſt the fire.

The

The same *Irish* use to wear *Saffroned Linen* and *Shirts*: which though it were at first devised to prevent Vermin, yet howsoever I take it to be very useful for lengthning of life; for *Saffron*, of all things that I know, is the best thing for the skin, and the comforting of the flesh, seeing it is both notably Astringent, and hath besides an Oleosity and subtle heat, without any Acrimony. I remember a certain *Englishman*, who when he went to Sea carried a bagg of *Saffron* next his stomack, that he might conceal it, and so escape Custom; and whereas he was wont to be always exceeding Sea-sick, at that time he continued very well, and felt no provocation to vomit. 15.

Hippocrates adviseth in Winter to wear clean Linen, and in Summer foul Linen and besmeared with Oil. The reason may seem to be, because in Summer the *Spirits* exhale most, therefore the pores of the skin would be filled up. 16.

Hereupon we are of opinion, that the use of *Oil*, either of *Olives* or sweet *Almonds*, to anoint the skin therewith, would principally conduce to long life: The *anointing* would be done every morning when we rise out of bed, with Oil in which a little *Bay-salt* and *Saffron* is mixed. But this *anointing* must be lightly done with Wool, or some soft sponge, not laying it on thick, but gently touching and wetting the skin. 17.

It is certain that *Liquors*, even the Oily themselves, in great quantities draw somewhat from the body; but contrarily, in small quantities are drunk in by the body: therefore the anointing would be but light, as we said, or rather the shirt it self would be besmeared with Oil. 18.

It may happily be objected, that this anointing with Oil, which we commend, (though it were never in use with us, and amongst the *Italians* is cast off again) was anciently very familiar amongst the *Grecians* and *Romans*, and a part of their Diet; and yet men were not longer-liv'd in those dayes than now. But it may rightly be answered, Oil was in use onely after Baths, unless it were perhaps amongst *Champions*: now hot Baths are as much contrary to our operation, as *Anointings* are congruous, seeing the one opens the passages, the other stops them up: therefore the Bath, without the anointing following, is utterly bad; the anointing without the Bath is best of all. Besides, the anointing amongst them was used onely for *delicacy*, or (if you take it at the best) for *health*, but by no means in order to long life; and therefore they used them with all precious Ointments, which were good for deliciousness, but hurtful to our intention, in regard of their heat: So that *Virgil* seemeth not to have said amiss, 19.

——*Nec Casiâ liquidi corrumpitur usus Olivi,*
That odoriferous Casia hath not supplanted the use of neat Oil-Olive.

Anointing with *Oil* conduceth to health, both in Winter, by the exclusion of the *cold Air*, and in Summer, by detaining the spirits within, and prohibiting the Resolution of them, and keeping off the force of the air which is then most predatory. 20.

Seeing the anointing with *Oil* is one of the most potent operations to long life, we have thought good to add some cautions, lest the health should be endangered: They are four, according to the four *Inconveniences* which may follow thereupon. 21.

The first *Inconvenience* is, that by *repressing sweats*, it may ingender diseases from those excrementitious humours. To this a remedy must be given by *Purges* and *Clysters*, that evacuation may be duly performed. This is certain, that evacuation by sweats commonly advanceth health, and derogateth from long life; but gentle *Purgers* work upon the humours, not upon the spirits, as sweat doth. 22.

The second *Inconvenience* is, that it may *heat* the body, and in time inflame it; for the spirits shut in, and not breathing forth, acquire heat. This inconvenience may be prevented, if the *Diet* most usually incline to the colder part, and that at times some proper cooling Medicines be taken, of which we shall straight speak in the operation upon the *Bloud*. 23.

The third is, that it may *annoy the head*; for all *Oppletion* from without strikes back the vapours, and sends them up unto the head. This inconvenience is remedied by *Purgers*, especially *Clysters*, and by shutting the mouth of the stomach strongly with Stipticks, and by combing and rubbing the head, and by washing it with convenient Lies, that something may exhale, and by not omitting competent and good exercises, that something also may perspire by the skin. 24.

25. The fourth *Inconvenience* is a more subtil Evil, namely, that the Spirit being detained by the closing up of the *Pores*, is likely to multiply it self too much; for when little issueth forth, and new Spirit is continually ingendred, the Spirit increaseth too fast, and so preyeth upon the body more plentifully. But this is not altogether so; for all Spirit closed up is dull, (for it is blown and excited with motion as Flame is) and therefore it is less active, and less generative of it self: Indeed it is thereby increased in Heat, (as Flame is) but slow in Motion. And therefore the remedy to this inconvenience must be by cold things, being sometimes mixed with *Oil*, such as are *Roses* and *Myrtles*; for we must altogether disclaim hot things, as we said of *Cassia*.

26. Neither will it be unprofitable to wear next the body Garments that have in them some *Unctuosity* or *Oleosity*, not *Aquosity*, for they will exhaust the body less; such as are those of Woollen rather than those of Linen. Certainly it is manifest in the Spirits of Odours, that if you lay sweet powders amongst Linen, they will much sooner lose their smell than amongst Woollen. And therefore Linen is to be preferred for delicacy and neatness, but to be suspected for our *Operation*.

27. The *Wild Irish*, as soon as they fall sick, the first thing they do is to take the sheets off their beds, and to wrap themselves in the woollen cloaths.

28. Some report, that they have found great benefit in the conservation of their health by wearing *Scarlet Waistcoats* next their skin, and under their shirts, as well down to the neather parts as on the upper.

29. It is also to be observed, that *Air* accustomed to the body doth less prey upon it than new *Air* and often changed; and therefore poor people, in small Cottages, who live always within the smell of the same chimney, and change not their seats, are commonly longest liv'd: notwithstanding, to other operations (especially for them whose Spirits are not altogether dull) we judge change of air to be very profitable; but a mean must be used, which may satisfie on both sides. This may be done by removing our habitation four times a year, at constant and set times, unto convenient seats, that so the body may neither be in too much peregrination, nor in too much station. And touching the *Operation* upon the *Exclusion* of *Air*, and avoiding the predatory force thereof, thus much.

The Operation upon the Bloud, and the Sanguifying Heat. 3.

The History.

1. THE following *Operations* answer to the two precedent, and are in the relation of *Passives* and *Actives*: for the two precedent intend this, that the *Spirits* and *Air* in their actions may be the less depredatory; and the two latter, that the *Bloud* and *Juice* of the body may be the less depredable. But because the Bloud is an irrigation or watering of the Juices and Members, and a preparation to them, therefore we will put the operation upon the *Bloud* in the first place. Concerning this *Operation* we will propound certain Counsels, few in number, but very powerful in virtue. They are three.

2. First, there is no doubt, but that if the bloud be brought to a cold temper, it will be so much the less dissipable. But because the cold things which are taken by the mouth agree but ill with many other Intentions, therefore it will be best to find out some such things as may be free from these inconveniences. They are two.

3. The first is this: Let there be brought into use, especially in youth, *Clysters*, not *purging* at all, or *absterging*, but onely cooling, and somewhat opening: those are approved which are made of the Juices of *Lettuce*, *Purslane*, *Liver-wort*, *Housesleek*, and the *Mucilage* of the seed of *Flea-wort*, with some temperate opening decoction, and a little

little *Camphire*: but in the declining age let the *Houſleek* and *Purſlane* be left out, and the juices of *Borrage* and *Endive*, and the like, be put in their rooms. And let theſe *Clyſters* be retained, if it may be, for an hour or more.

The other is this, Let there be in uſe, eſpecially in Summer, *Baths* of freſh water, and but luke-warm, altogether without *Emollients*, as *Mallows*, *Mercury*, *Milk*, and the like; rather take new *whey* in ſome good quantity, and *Roſes*. 4.

But (that which is the principal in this intention, and new) we adviſe that before the bathing of the body be anointed with Oil, with ſome *thickneſs*, whereby the quality of the cooling may be received, and the water excluded: yet let not the pores of the body be ſhut too cloſe; for when the outward cold cloſeth up the body too ſtrongly, it is ſo far from furthering coolneſs, that it rather forbids, and ſtirs up heat. 5.

Like unto this is the uſe of *Bladders*, with ſome decoctions and cooling juices, applied to the inferiour region of the body, namely, from the ribbs to the privy parts; for this alſo is a kind of *bathing*, where the body of the liquor is for the moſt part excluded, and the cooling quality admitted. 6.

The third counſel remaineth, which belongeth not to the quality of the *blood*, but to the ſubſtance thereof, that it may be made more firm and leſs diſſipable, and ſuch, as the heat of the ſpirit may have the leſs power over it. 7.

And as for the uſe of *Filings* of *Gold*, *Leaf-gold*, *Powder* of *Pearl*, *Precious ſtones*, *Coral*, and the like, we have no opinion of them at this day, unleſs it be onely as they may ſatisfie this preſent *Operation*. Certainly, ſeeing the *Arabians*, *Grecians*, and *modern Phyſicians* have attributed ſuch virtues to theſe things, it cannot be altogether Nothing which ſo great men have obſerved of them. And therefore omitting all fantaſtical opinions about them, we do verily believe, that if there could be ſome ſuch thing conveyed into the whole maſs of the bloud in minute and fine portions, over which the ſpirits and heat ſhould have little or no power, abſolutely it would not only reſiſt *Putrefaction*, but *Arefaction* alſo, and be a moſt effectual means to the prolongation of life. Nevertheleſs in this thing ſeveral cautions are to be given. Firſt, that there be a moſt exact comminution. Secondly, that ſuch hard and ſolid things be void of all malignant qualities, leſt while they be diſperſed and lurk in the veins, they breed ſome ill convenience. Thirdly, that they be never taken together with meats, nor in any ſuch manner as they may ſtick long, leſt they beget dangerous obſtructions about the Meſentery. Laſtly, that they be taken very rarely, that they may not congregate and knot together in the veins. 8.

Therefore let the manner of taking them be *faſting*, in *white wine*, a little *Oil* of *Almonds* mingled therewith, *Exerciſe* uſed immediately upon the taking of them. 9.

The *Simples* which may ſatisfie this *Operation* are, in ſtead of all, *Gold*, *Pearls*, and *Coral*: for all *Metalls*, except *Gold*, are not without ſome malignant quality in the diſſolutions of them, neither will they be beaten to that exquiſite fineneſs that *Leaf-gold* hath. As for all *glaſſie* and *tranſparent Jewels*, we like them not, (as we ſaid before) for fear of Corroſion. 10.

But, in our judgment, the ſafer and more effectual way would be by the uſe of *Woods* in Infuſions and Decoctions; for there is in them ſufficient to cauſe *firmneſs* of *bloud*, and not the like danger for breeding obſtructions; but eſpecially, becauſe they may be taken in meat and drink, whereby they will find the more eaſie entrance into the veins, and not be avoided in excrements. 11.

The *Woods* fit for this purpoſe are *Sanders*, the *Oak* and *Vine*. As for all *hot woods* or ſomething *Roſennie*, we reject them: notwithſtanding you may adde the *woody ſtalks* of *Roſemary* dried, for *Roſemary* is a Shrub, and exceedeth in age many Trees; alſo the *woody ſtalks* of *Ivy*, but in ſuch quantity as they may not yield an unpleaſing taſte. 12.

Let the *Woods* be taken either boiled in *Broths*, or infuſed in *Muſt* or *Ale* before they leave working: but in *Broths* (as the cuſtom is for *Guaiacum* and the like) they would be infuſed a good while before the boiling, that the firmer part of the *wood*, and not that onely which lieth looſely, may be drawn forth. As for *Aſh*, though it be uſed for Cups, yet we like it not. And touching the *Operation* upon the *Bloud* thus much. 13.

The Operation upon the Juices of the Body. 4.

The Hiſtory.

1. THere are two kinds of *Bodies* (as was ſaid before in the *Inquiſition* touching *Inanimates*) which are hardly conſumed, *Hard* things and *Fat* things; as is ſeen in *Metalls* and *Stones*, and in *Oil* and *wax*.

2. It muſt be ordered therefore, that the *juice* of the *body* be ſomewhat *hard*, and that it be *fatty* or *ſubroſcid*.

3. As for *hardneſs*, it is cauſed three ways: by *Aliment of a firm nature*, by *cold* condenſing the skin and fleſh, and by *Exerciſe*, binding and compacting the juices of the body, that they be not ſoft and frothy.

4. As for the *Nature* of the *Aliment*, it ought to be ſuch as is not eaſily *diſſipable*; ſuch as are *Beef*, *Swine's fleſh*, *Dear*, *Goat*, *Kid*, *Swan*, *Gooſe*, *Ring-dove*, eſpecially if they be a little powdred; *Fiſh* likewiſe ſalted and dried, *Old Cheeſe*, and the like.

5. As for the *Bread*; *Oaten-bread*, or *bread* with ſome mixture of *Peaſe* in it, or *Rye-bread*, or *Barly-bread*, are more ſolid than *wheat-bread*, and in *wheat-bread*, the courſe *wheat-bread* is more ſolid than the pure *Manchet*.

6. The Inhabitants of the *Orcades*, which live upon *ſalted fiſh*, and generally all *Fiſh-eaters*, are long liv'd.

7. The *Monks* and *Hermites* which fed ſparingly, and upon dry *Aliment*, attained commonly to a great age.

8. Alſo *pure water* uſually drunk makes the juices of the body leſs frothy? unto which if, for the dulneſs of the ſpirits, (which no doubt in *Water* are but a little penetrative) you ſhall adde a little *Nitre*, we conceive it would be very good. And touching the *firmneſs* of the *Aliment* thus much.

9. As for the *Condenſation* of the *skin* and *fleſh* by *cold*: They are longer-liv'd for the moſt part that live abroad in the *open air*, than they that live in *Houſes*; and the Inhabitants of the *cold Countries*, than the Inhabitants of the *hot*.

10. Great ſtore of *clothes*, either upon the bed or back, do reſolve the body.

11. Waſhing the *body* in *cold water* is good for length of life; uſe of *hot Baths* is naught. Touching *Baths* of *Aſtringent Mineral Waters* we have ſpoken before.

12. As for *Exerciſe*; an *idle life* doth manifeſtly make the fleſh ſoft and diſſipable: *robuſt exerciſe* (ſo it be without over-much ſweating or wearineſs) maketh it hard and compact. Alſo *exerciſe* within cold Water, as ſwimming, is very good; and generally *exerciſe* abroad is better than that within houſes.

13. Touching *Frications*, (which are a kind of *exerciſe*) becauſe they do rather call forth the Aliment than harden the fleſh, we will inquire hereafter in the due place.

14. Having now ſpoken of *hardning* the *juices* of the *body*, we are to come next to the *Oleoſity* and *Fattineſs* of them, which is a more perfect and potent Intention than *Induration*, becauſe it hath no inconvenience or evil annexed. For all thoſe things which pertain to the *hardning* of the *juices* are of that nature, that while they prohibit the abſumption of the Aliment, they alſo hinder the operation of the ſame; whereby it happens, that the ſame things are both propitious and adverſe to length of life: but thoſe things which pertain to making the *Juices Oily* and *Roſcid*, help on both ſides, for they render the Aliment both leſs diſſipable, and more reparable

15. But whereas we ſay that the *Juice* of the *body* ought to be *Roſcid* and *Fat*, it is to be noted that we mean it not of a viſible *Fat*, but of a *Dewineſs* diſperſed, or (if you will call it) *Radical* in the very ſubſtance of the body.

16. Neither again let any man think, that *Oil* or the *Fat* of *Meats* or *Marrow* do engender the like, and ſatisfie our intention: for thoſe things which are once perfect are not brought back again; but the Aliments ought to be ſuch, which after digeſtion and maturation do then in the end engender *Oleoſity* in the *Juices*.

17. Neither again let any man think, that *Oil* or *Fat* by it ſelf and ſimple is hard of diſſipation, but in mixture it doth not retain the ſame nature: for as *Oil* by it ſelf is much more longer in conſuming then *Water*; ſo in Paper or Linnen it ſticketh longer, and is later dried, as we noted before.

To

To the Irroration of the body, roasted meats or baked meats are more effectual than boiled meats, and all preparation of meat with water is inconvenient: besides, Oil is more plentifully extracted out of drie bodies than out of moist bodies. 18.

Generally, to the *Irroration* of the body much use of sweet things is profitable, as of *Sugar*, *Honey*, *sweet Almonds*, *Pine-Apples*, *Pistachio's*, *Dates*, *Raisins* of the *Sun*, *Corans*, *Figs*, and the like. Contrarily, all sour, and very salt, and very biting things are opposite to the generation of *Roscid Juice*. 19.

Neither would we be thought to favaur the *Manichees*, or their diet, though we commend the frequent use of all kinds of Seeds, Kernels, and Roots, in Meats or Sauces, considering all Bread (and Bread is that which maketh the Meat firm) is made either of Seeds or Roots. 20.

But there is nothing makes so much to the *Irroration* of the body, as the quality of the Drink, which is the convoy of the Meat; therefore let there be in use such Drinks as without all acrimony or sowrness are notwithstanding subtil: such are those Wines which are (as the old woman said in *Plautus*) *vetustate edentula*, toothless with age, and *Ale* of the same kind. 21.

Mead (as we suppose) would not be ill if it were strong and old: but because all Honey hath in it some sharp parts, (as appears by that sharp water which the *Chymists* extract out of it, which will dissolve metals) it were better to take the same portion of Sugar, not lightly infused in it, but so incorporated as Honey useth to be in *Mead*, and to keep it to the age of a year, or at least six months, whereby the Water may lose the crudity, and the Sugar acquire subtilty. 22.

Now ancientness in Wine or Beer hath this in it, that it ingenders subtilty in the parts of the Liquor, and acrimony in the Spirits, whereof the first is profitable, and the second hurtful. Now to rectifie this evil commixture, let there be put into the vessel, before the Wine be separated from the Must, *Swines-flesh* or *Deers-flesh* well boiled, that the Spirits of the Wine may have whereupon to ruminate and feed, and so lay aside their mordacity. 23.

In like manner, if *Ale* should be made not only with the grains of Wheat, Barly, Oates, Pease, and the like; but also should admit a part (suppose a third part to these grains) of some fat roots, such as are *Potado-roots*, *Pith* of *Artichokes*, *Burre-roots*, or some other sweet and esculent roots; we suppose it would be a more useful drink for long life than *Ale* made of grains onely. 24.

Also such things as have very thin parts, yet notwithstanding are without all acrimony or mordacity, are very good Sallets: which vertue we find to be in some few of the Flowers; namely, Flowers of *Ivy*, which infused in Vinegar are pleasant even to the taste; *Marigold leaves*, which are used in Broths; and Flowers of *Betony*. And touching the operation upon the *Juices* of the *Body* thus much. 25.

The Operation upon the Bowels for their Extrusion of Aliment. 5.

The History.

WHat those things are which comfort the *Principal Bowels*, which are the fountains of Concoctions, namely, the *Stomack*, *Liver*, *Heart* and *Brain*, to perform their functions well, (whereby *Aliment* is distributed into the parts, *Spirits* are dispersed, and the *Reparation* of the whole body is accomplished) may be derived from *Physitians*, and from their Prescripts, and Advices. 1.

Touching the *Spleen*, *Gall*, *Kidneys*, *Mesenteries*, *Guts* and *Lungs*, we speak not, for these are members ministring to the principal; and whereas speech is made touching health, they require sometime a most special consideration, because each of these have their diseases, which unless they be cured, will have influence upon the *Principal Members*. But as touching the prolongation of life, and reparation by aliments, and retardation of the incoction of old age; if the Concoctions and 2.

those *principal Bowels* be well disposed, the rest will commonly follow according to ones wish.

3. And as for those things which, according to the different state of every man's body may be transferred into his Diet and the regiment of his life, he may collect them out of the Books of Physicians, which have written of the comforting and preserving the four *Principal Members*: For conservation of health hath commonly need of no more than some short courses of Physick; but length of life cannot be hoped without an orderly diet, and a constant race of *Soveraign Medicines*. But we will propound some few, and those the most select and prime directions.

4 The *Stomach* (which, as they say, is the Master of the house, and whose strength and goodness is fundamental to the other concoctions) ought so to be guarded and confirmed, that it may be without *Intemperateness* hot; next *astricted* or *bound*, not loose; furthermore *clean*, not surcharged with foul Humours, and yet (in regard it is nourished from it self, not from the veins) not altogether *empty* or *hungry*: lastly, it is to be kept ever in *appetite*, because *appetite* sharpens digestion.

5. I wonder much how that same *Calidum bibere*, to drink warm drink, (which was in use amongst the Ancients) is laid down again. I knew a Physician that was very famous, who in the beginning of dinner and supper, would usually eat a few spoonfulls of very warm *broth* with much greediness, and then would presently wish that it were out again, saying, *He had no need of the broth, but only of the warmth.*

6. I do verily conceive it good, that the first draught either of *Wine*, or *Ale*, or any other *drink*, (to which a man is most accustomed) be taken at supper *warm*.

7. *Wine* in which *Gold* hath been quenched, I conceive, would be very good once in a meal; not that I believe the *Gold* conferreth any vertue thereunto, but that I know that the quenching of all Metals in any kind of liquor doth leave a most potent Astriction: Now I chuse *Gold*, because besides that Astriction which I desire, it leaveth nothing else behind it of a metalline impression.

8. I am of opinion, that the sops of bread dipped in wine, taken at the midst of the meal, are better than wine it self; especially if there were infused into the wine in which the sops were dipped *Rosemary* and *Citron-pill*, and that with *Sugar*, that it may not slip too fast.

9. It is certain that the use of *Quinces* is good to strengthen the stomach; but we take them to be better if they be used in that which they call *Quiddeny* of *Quinces*, than in the bodies of the *Quinces* themselves, because they lie heavy in the stomach. But those *Quiddenies* are best taken after meals, alone; before meals, dipped in Vinegar.

10. Such things as are good for the stomach above other Simples are these, *Rosemary*, *Elecampane*, *Mastick*, *wormwood*, *Sage*, *Mint*.

11. I allow Pills of *Aloes*, *Mastick* and *Saffron* in Winter-time, taken before dinner; but so, as the *Aloes* be not only oftentimes washed in *Rose-water*, but also in *Vinegar* in which *Tragacanth* hath been infused, and after that be macerated for a few hours in Oil of sweet *Almonds* new drawn, before it be made into Pills.

12. *Wine* or *Ale* wherein *Wormwood* hath been infused, with a little *Elecampane* and yellow *Sanders*, will do well, taken at times, and that especially in Winter.

13. But in Summer, a draught of *White-wine* allayed with *Strawberry-water*, in which Wine Powder of Pearls and of the shells of *Cra-fishes* exquisitely beaten and (which may perhaps seem strange) a little *Chalk* have been infused, doth excellently refresh and strengthen the stomach.

14. But generally, all *Draughts* in the morning (which are but too frequently used) of *cooling* things, as of Juices, Decoctions, Whey, Barly-waters, and the like) are to be avoided, and nothing is to be put into the stomach fasting which is purely *cold*. These things are better given, if need require, either at five in the afternoon, or else an hour after a light breakfast.

15. Often fastings are bad for long life; besides, all thirst is to be avoided, and the stomach is to be kept clean, but always moist.

16. *Oil* of *Olives* new and good, in which a little *Methridate* hath been dissolved, anointed upon the back-bone, just against the mouth of the stomach, doth wonderfully comfort the stomach.

17. A small bag filled with locks of Scarlet-wool steeped in Red-wine, in which *Myrtle*,

Myrtle, and *Citron-pill*, and a little *Saffron* have been infuſed, may be always worn upon the ſtomach. And touching thoſe things wich comfort the ſtomach thus much, ſeeing many of thoſe things alſo which ſerve for other operations are helpful to this.

The *Liver*, if it be preſerved from *Torrefaction*, or *Deſiccation*, and from *Obſtruction*, it needeth no more; for that looſeneſs of it which begets *Aquoſities* is plainly a diſeaſe, but the other two old age approaching induceth. 18.

Hereunto appertain moſt eſpecially thoſe things which are ſet down in the *Operation* upon the *Bloud*: we will adde a very few things more, but thoſe ſelected. 19.

Principally let there be in uſe the Wine of ſweet *Pomegranats*, or, if that cannot be had, the juice of them newly expreſſed; let it be taken in the morning with a little *Sugar*, and into the glaſs into which the Expreſſion is made put a ſmall piece of *Citron-pill* green, and three or four whole *Cloves*: let this be taken from *February* till the end of *April*. 20.

Bring alſo into uſe above all other Herbs *Water-creſſes*, but young, not old; they may be uſed either raw in Sallets, or in Broths, or in Drinks: and after that take *Spoon-wort*. 21.

Aloes, however waſhed or corrected, is hurtful for the *Liver*, and therefore it is never to be taken ordinarily. Contrariwiſe, *Rhubarb* is ſovereign for the *Liver*, ſo that theſe three cautions be interpoſed. Firſt, that it be taken before meat, leſt it dry the body too much, or leave ſome impreſſions of the *Stipicity* thereof. Secondly, that it be macerated an hour or two in Oil of ſweet *Almonds* new drawn, with *Roſe-water*, before it be infuſed in Liquor, or given in the proper ſubſtance. Thirdly, that it be taken by turns, one while ſimple, another while with *Tartar*, or a little *Bay-ſalt*, that it carry not away the lighter parts onely, and make the maſs of the Humours more obſtinate. 22.

I allow *Wine*, or ſome decoction with *Steel*, to be taken three or four times in the year, to open the more ſtrong obſtructions; yet ſo, that a draught of two or three ſpoonfuls of Oil of ſweet *Almonds* new drawn ever go before, and the motion of the Body, eſpecially of the arms and ſides, conſtantly follow. 23

Sweetned Liquors, and that with ſome fatneſs, are principally, and not a little effectual to prevent the *Arefaction*, and *Saltneſs*, and *Torrefaction*, and in a word, the *Oldneſs* of the *Liver*, eſpecially if they be well incorporated with age. They are made of ſweet Fruits and Roots, as namely, the Wines and Julips of *Raiſins* of the *Sun* new, *Jujubaes*, *dried Figs*, *Dates*, *Parſnips*, *Potatoes*, and the like, with the mixture of *Licoris* ſometimes: alſo a Julip of the *Indian* grain, (which they call *Maiz*) with the mixture of ſome ſweet things, doth much to the ſame end. But it is to be noted, that the intention of preſerving the *Liver* in a kind of ſoftneſs and fatneſs, is much more powerful than that other which pertains to the opening of the *Liver*, which rather tendeth to health than to length of life, ſaving that that *Obſtruction* which induceth *Torrefaction* is as oppoſite to long life as thoſe other *Arefactions*. 24.

I commend the Roots of *Succory*, *Spinage* and *Beets* cleared of their piths, and boiled till they be tender in Water, with a third part of *White-wine*, for ordinary Sallets, to be eaten with Oil and Vinegar: alſo *Aſparagus*, pith of *Artichokes*, and *Burre-roots* boiled and ſerved in after the ſame manner; alſo Broths in the Spring-time of *Vine-buds*, and the green blades of *wheat*. And touching the preſerving of the *Liver* thus much. 25.

The *Heart* receiveth benefit or harm moſt from the *Air* which we breath, from *Vapours*, and from the *Affections*. Now many of thoſe things which have been formerly ſpoken touching the Spirits may be transferred hither; but that indigeſted maſs of Cordials collected by Phyſicians avails little to our intention; notwithſtanding thoſe things which are found to be good againſt Poyſons may with good judgment be given to ſtrengthen and fortifie the *Heart*, eſpecially if they be of that kind, that they do not ſo much reſiſt the particular poyſons as arm the heart and ſpirits againſt poyſon in general. And touching the ſeveral Cordials, you may repair to the *Table* already ſet down. 26.

The goodneſs of the Air is better known by experience than by ſigns. We hold that Air to be beſt where the Country is level and plain, and that lieth open on all ſides, ſo that the ſoil be dry, and yet not barren or ſandy; which puts forth 27.

Wild Thyme, and *Eye-bright*, and a kind of *Marjoram*, and here and there ſtalks of *Calamint*; which is not altogether void of wood, but conveniently ſet with ſome Trees for ſhade; where the *Sweet-briar-roſe* ſmelleth ſomething Musky and Aromatically. If there be *Rivers*, we ſuppoſe them rather hurtful than good, unleſs they be very ſmall, and clear, and gravelly.

28. It is certain that the *morning air* is more lively and refreſhing than the *evening air*, though the latter be preferr'd out of delicacy.

29. We conceive alſo, that the *air ſtirred* with a *gentle wind* is more wholeſome than the *air* of a *ſerene* and *calm ſkie*; but the beſt is, the *wind* blowing from the *Weſt* in the morning, and from the *North* in the afternoon.

30. *Odours* are eſpecially profitable for the comforting of the *heart*, yet not ſo as though a good *odour* were the prerogative of a good *air*: for it is certain, that as there are ſome *Peſtilential airs* which ſmell not ſo ill as others that are leſs hurtful; ſo, on the contrary, there are ſome *airs* moſt wholſome and friendly to the *ſpirits*, which either ſmell not at all, or are leſs pleaſing and fragrant to the ſenſe. And generally, where the *air* is good, *odours* ſhould be taken but now and then; for a continual *odour*, though never ſo good, is burthenſome to the *ſpirits*.

31. We commend above all others (as we have touched before) *odour* of *Plants*, *growing*, and not *plucked*, taken in the open *air*: the principal of that kind are *Violets*, *Gilliflowers*, *Pinks*, *Bean-flowers*, *Lime-tree-bloſſoms*, *Vine-buds*, *Honey-ſuckles*, *yellow Wall-flowers*, *Muſk-Roſes*, (for other *Roſes* growing are faſt of their ſmells) *Strawberry-leaves*, eſpecially *dying*, *Sweet-briar*, principally in the early Spring, *wild Mint*, *Lavender flowered*; and in the hotter Countries, *Orenge-tree*, *Citron-tree*, *Myrtle*, *Laurel*: Therefore to walk or ſit near the breath of theſe *Plants* would not be neglected.

32. For the comforting of the *Heart*, we prefer cool ſmels before hot ſmells: therefore the beſt perfume is, either in the morning, or about the heat of the day, to take an equal portion of *Vinegar*, *Roſe-water*, and *claret-wine*, and to pour them upon a Fire-pan ſomewhat heated.

33. Neither let us be thought to ſacrifice to our Mother the *Earth*, though we adviſe, that in *digging* or *ploughing* the *Earth* for health, a quantity of *claret-wine* be poured thereon.

34. *Orenge-flower-water*, pure and good, with a ſmall portion of *Roſe-water* and *briſk wine*, ſnuffed up into the noſtrils, or put into the noſtrills with a *Syringe*, after the manner of an *Errhine*, (but not too frequently) is very good.

35. But *champing* (though we have no *Betel*) or holding in the mouth onely of ſuch things as cheer the Spirits, (even daily done) is exceeding comfortable. Therefore for that purpoſe make *Grains* or little *Cakes* of *Amber-griece*, *Muſk*, *Lignum-Aloes*, *Lignum Rhodium*, *Orras Powder*, and *Roſes*; and let thoſe *Grains* or *Cakes* be made up with *Roſe-water* which hath paſſed through a little *Indian Balſam*.

36. The *Vapours* which ariſing from things inwardly taken do fortifie and cheriſh the *heart* ought to have theſe three properties, that they be Friendly, Clear, and Cooling; for hot *vapours* are naught, and *wine* it ſelf, which is thought to have onely an heating *vapour*, is not altogether void of an *Opiate quality*. Now we call thoſe *vapours* Clear which have more of the *vapour* than of the *exhalation*, and which are not ſmoaky, or fuliginous, or unctuous, but moiſt and equal.

37. Out of that unprofitable rabble of *Cordials*, a few ought to be taken into daily diet: inſtead of all, *Amber-griece*, *Saffron*, and the grain of *Kermes*, of the hotter ſort; Roots of *Bugloſs* and *Borrage*, *Citrons*, *Sweet Limons*, and *Pearmains*, of the colder ſort. Alſo that way which we ſaid, both *Gold* and *Pearls* work a good effect, not onely within the veins, but in their paſſage, and about the parts near the heart; namely, by cooling, without any malignant quality.

38. Of *Bezoar-ſtone* we believe well, becauſe of many trials: but then the manner of taking it ought to be ſuch, as the vertue thereof may more eaſily be communicated to the *ſpirits*: therefore we approve not the taking of it in *Brotks* or *Syrups*, or in *Roſe-water*, or any ſuch like; but onely in *wine*, *Cinnamon-water*, or the like diſtilled water, but that weak or ſmall, not burning or ſtrong.

39. Of the *Affections* we have ſpoken before; we onely adde this, That every *Noble*, and *Reſolute*, and (as they call it) *Heroical Deſire*, ſtrengthneth and inlargeth the powers of the Heart. And touching the *Heart* thus much.

As for the *Brain*, where the Seat and Court of the *Animal Spirits* is kept, those things which were inquired before touching *Opium*, and *Nitre*, and the *Subordinates* to them both, also touching the *procuring* of *placid sleep*, may likewise be referred hither. This also is most certain, that the *Brain* is in some sort in the custody of the *Stomach*; and therefore those things which comfort and strengthen the *Stomach* do help the *Brain* by consent, and may no less be transferred hither. We will adde a few Observations, three Outward, one Inward. 40.

We would have *bathing* of the *Feet* to be often used, at least once in a week: and the *Bath* to be made of *Lye* with *Bay-salt*, and a little *Sage*, *Chamomile*, *Fennel*, *Sweet-marjoram*, and *Pepper-wort*, with the leaves of *Angellica* green. 41.

We commend also a *Fume* or *Suffumigation* every morning of dried *Rosemary*, *Bay-leaves* dried, and *Lignum-Aloes*: for all sweet *Gums* oppress the head. 42.

Especially care must be taken that no *hot things* be applied to the *Head* outwardly; such are all kind of Spices, the very *Nutmeg* not excepted: for those hot things we debase them to the soles of the *Feet*, and would have them applied there onely; but a light anointing of the *Head* with *Oil*, mixed with *Roses*, *Myrtle*, and a little *Salt* and *Saffron*, we much commend. 43.

Not forgetting those things which we have before delivered touching *Opiates*, *Nitre*, and the like, which so much *condense* the *Spirits*; we think it not impertinent to that effect, that once in fourteen days *Broth* be taken in the morning with three or four grains of *Castoreum*, and a little *Angelica-seed*, and *Calamus*, which both fortifie the *Brain*, and in that aforesaid density of the substance of the *spirits*, (so necessary to long life) adde also a *vivacity* of *motion* and *vigour* to them. 44.

In handling the *Comforters* of the four *principal Bowels*, we have propounded those things which are both proper and choice, and may safely and conveniently be transferred into Diets and Regiment of Life: for variety of *Medicines* is the *Daughter* of *Ignorance*; and it is not more true, that *many Dishes have caused many Diseases*, as the *Proverb* is, than this is true, that *many Medicines have caused few Cures*. And touching the *Operation* upon the *principal Bowels* for their *Extrusion* of *Aliment*, thus much. 45.

The Operation upon the Outward Parts for their Attraction of Aliment. 6.

The History.

ALthough a good *Concoction* performed by the *Inward Parts* be the principal towards a perfect Alimentation; yet the Actions of the *Outward Parts* ought also to concur; that like as the *Inward Faculty* sendeth forth and extrudeth the Aliment, so the *Faculty* of the *Outward Parts* may call forth and attract the same: and the more weak the *Faculty* of *Concoction* shall be, the more need is there of a concurring help of the *Attractive Faculty*. 1.

A *strong Attraction* of the *outward parts* is chiefly caused by the motion of the Body, by which the parts being heated and comforted, do more chearfully call forth and *attract* the Aliment unto themselves. 2.

But this is most of all to be foreseen and avoided, that the same motion and heat which calls the new juice to the members, doth not again despoil the member of that juice wherewith it had been before refreshed. 3.

Frications used in the morning serve especially to this *Intention*: but this must evermore accompany them, that after the *Frication* the part be lightly anointed with Oil, lest the Attrition of the outward parts make them by Perspiration dry and juiceless. 4.

The next is *Exercise*, (by which the parts confricate and chafe themselves) so it 5.

be moderate, and which (as was noted before) is not ſwift, nor to the utmoſt ſtrength, nor unto wearineſs. But in *Exerciſe* and *Frication* there is the ſame reaſon and caution, that the body may not perſpire or exhale too much: Therefore *Exerciſe* is better in the open air than in the houſe, and better in Winter than in Summer; and again, *Exerciſe* is not onely to be concluded with Unction, as *Frication* is, but in vehement *Exerciſes* Unction is to be uſed both in the beginning and in the end, as it was anciently to *Champions*.

6. That *Exerciſe* may reſolve either the ſpirits or the juices as little as may be, it is neceſſary that it be uſed when the ſtomach is not altogether empty: and therefore that it may not be uſed upon a full ſtomach, (which doth much concern health) nor yet upon an empty ſtomach, (which doth no leſs concern long life) it is beſt to take a breakfaſt in the morning, not of any Phyſical Drugs, or of any Liquors or of Raiſins, or of Figs, or the like; but of plain Meat and Drink, yet that very light, and in moderate quantity.

7. *Exerciſes* uſed for the irrigation of the members, ought to be equal to all the members; not (as *Socrates* ſaid) *that the Legs ſhould move, and the Arms ſhould reſt*, or on the contrary; but that all the parts may participate of the motion. And it is altogether requiſite to long life, that the Body ſhould never abide long in one poſture, but that every half hour, at leaſt, it change the poſture, ſaving onely in ſleep.

8. Thoſe things which are uſed to *Mortification* may be transferred to *Vivification*: for both Hair ſhirts, and Scourgings, and all vexations of the outward parts, do fortifie the Attractive force of them.

9. *Cardan* commends *Nettling*, even to let out *Melancholly*: but of this we have no experience; and beſides, we have no good opinion of it, leſt, through the venemous quality of the *Nettle*, it may with often uſe breed Itches and other diſeaſes of the skin. And touching the *Operation* upon the *Outward Parts* for their *Attraction* of *Aliment*, thus much.

The Operation upon the Aliment it ſelf for the Inſinuation thereof. 7.

The Hiſtory.

1. THe vulgar reproof touching many Diſhes doth rather become a ſevere *Reformer* than a *Phyſician*: or howſoever it may be good for perſervation of health, yet it is hurtful to length of life, by reaſon that a various mixture of Aliments, and ſomewhat heterogeneous, finds a paſſage into the veins and juices of the body more lively and chearfully than a ſimple and homogeneous diet doth: beſides, it is more forcible to ſtir up *Appetite*, which is the ſpur of Digeſtion. Therefore we allow both a *full Table*, and a *continual changing of Diſhes*, according to the Seaſons of the year, or upon other occaſions.

2. Alſo that opinion of the *Simplicity* of *Meats* without *Sawces* is but a ſimplicity of judgment; for good and well-choſen *Sawces* are the moſt wholeſome preparation of *Meats*, and conduce both to health and to long life.

3. It muſt be ordered, that with Meats hard of digeſtion be conjoyned ſtrong Liquors and Sawces that may penetrate and make way; but with Meats more eaſie of digeſtion, ſmaller Liquors and fat Sawces.

4. Whereas we adviſed before, that the firſt *Draught* at *Supper* ſhould be taken warm; now we adde, that for the preparation of the ſtomach, a good draught of that Liquor (to which every man is moſt accuſtomed) be taken warm half an hour before meat alſo, but a little ſpiced, to pleaſe the taſte.

5. The preparation of Meats, and Bread, and Drinks, that they may be rightly handled, and in order to this Intention, is of exceeding great moment howſoever it may ſeem a Mechanical thing, and ſavouring of the Kitchin and Buttery; yet it is of more conſequence than thoſe Fables of Gold and precious Stones, and the like.

The

The moiſtning of the juices of the body by a moiſt preparation of the aliment, is a childiſh thing; it may be ſomewhat available againſt the fervours of diſeaſes, but it is altogether averſe to roſcid alimentation. Therefore boiling of meats, as concerning our Intention, is far inferiour to roaſting, and baking, and the like. 6.

Roaſting ought to be with a quick fire, and ſoon diſpatched; not with a dull fire, and in long time. 7.

All ſolid fleſhes ought to be ſerved in, not altogether freſh, but ſomewhat powdered or corned; the leſs Salt may be ſpent at the table with them, or none at all: for Salt incorporated with the meat before is better diſtributed in the body, then eaten with it at the table. 8.

There would be brought into uſe ſeveral and good *Macerations*, and *Infuſions* of *Meats* in convenient Liquors, before the roaſting of them: the like whereof are ſometime in uſe before they bake them, and in the Pickles of ſome Fiſhes. 9.

But *beatings*, and as it were *ſcourgings*, of fleſh-meats before they be boiled, would work no ſmall matter. We ſee it is confeſſed that *Partridges* and *Pheaſants* killed with an *Hawk*, alſo *Bucks* and *Stags* killed in *Hunting*, (if they ſtand not out too long, eat better even to the taſte; and ſome *Fiſhes* ſcourged and beaten, become more tender and wholſome; alſo hard and ſour *Pears*, and ſome other Fruits, grow ſweet with rowling them. It were good to practiſe ſome ſuch beating and bruiſing of the harder kinds of Fleſhes before they be brought to the fire; and this would be one of the beſt preparations of all. 10.

Bread a little levened, and very little ſalted, is beſt, and which is baked in an Oven throughly heated, and not with a faint heat. 11.

The preparation of Drinks in order to long life ſhall not exceed one Precept. And as touching *water-drinkers* we have nothing to ſay; ſuch a diet (as we ſaid before) may prolong life to an indifferent term, but to no eminent length: but in other Drinks, that are full of ſpirit, (ſuch as are *Wine*, *Ale*, *Mead*, and the like) this one thing is to be obſerved and purſued, as the ſum of all, That the parts of the *Liquor* may be exceeding thin and ſubtil, and the *Spirit* exceeding mild. This is hard to be done by *Age* alone, for that makes the parts a little more ſubtil, but the ſpirits much more ſharp and eager: therefore of the *Infuſions* in the Veſſels of ſome fat ſubſtance, which may reſtrain the acrimony of the ſpirits, counſel hath been given before. There is alſo another way without *Infuſion* or *Mixture*: this is, that the Liquor might be continually agitated, either by carriage upon the Water, or by carriage by Land, or by hanging the veſſels upon lines, and daily ſtirring them, or ſome ſuch other way: for it is certain that this *local motion* doth both ſubtilize the parts, and doth ſo incorporate and compact the ſpirits with the parts, that they have no leiſure to turn to ſowrneſs, which is a kind of *putrefaction*. 12.

But in extream *old age* ſuch a preparation of meats is to be made as may be almoſt in the middle way to *chylus*. And touching the *Diſtillations* of *Meats*, they are mere toys; for the Nutritive part, at leaſt the beſt of it, doth not aſcend in *Vapours*. 13.

The incorporating of meat and drink before they meet in the ſtomach is a degree to *chylus*: therefore let *Chickens*, or *Partridges*, or *Pheaſants*, or the like, be taken and boiled in water with a little ſalt, then let them be cleanſed and dried, afterward let them be infuſed in *Muſt* or *Ale* before it hath done working, with a little *Sugar*. 14.

Alſo *Grazies* of meat, and the *mincings* of them ſmall well ſeaſon'd, are good for *old perſons*; and the rather, for that they are deſtituted of the office of their *Teeth* in chewing, which is a principal kind of preparation. 15.

And as for the helps of that defect, (namely, of the ſtrength of *Teeth* to grind the meat) there are three things which may conduce thereunto. Firſt, that new *Teeth* may put forth; that which ſeems altogether difficult, and cannot be accompliſhed without an inward and powerful reſtauration of the body. Secondly, that the *Jaws* be ſo confirmed by due *Aſtringents*, that they may in ſome ſort ſupply the office of the *Teeth*; which may poſſibly be effected. Thirdly, that the meat be ſo prepared, that there ſhall be no need of chewing: which remedy is ready at hand. 16.

We have ſome thought alſo touching the *Quantity* of the meat and drink, that the ſame taken in a larger *quantity* at ſome times is good for the *irrigation* of the *body*: therefore both *great Feaſtings* and *free Drinkings* are not altogether to be inhibited. And touching the *Operation* upon the *Aliments* and the *Preparation* of them, thus much. 17.

The

The Operation upon the last Act of Assimilation. 8.

Touching the last Act *of* Assimilation (*unto which the three* Operations *immediately preceeding chiefly tend*) *our advice shall be brief and single: and the thing it self rather needs Explication, than any various Rules.*

1. IT is certain, that all bodies are endued with some desire of *Assimilating* those things which are next them. This the rare and pneumatical bodies, as *Flame, Spirit, Air,* perform generously and with alacrity: on the contrary, those that carry a gross and tangible bulk about them, do but weakly, in regard that the desire of *assimilating* other things is bound in by a stronger desire of Rest, and containing themselves from *Motion.*

2. Again, it is certain that the desire of *assimilating* being bound, as we said, in a Gross body, and made uneffectual, is somewhat freed and stirred up by the *heat* and *neighbouring spirit,* so that it is then actuated: which is the onely cause why *Inanimates assimilate not,* and *Animates assimilate.*

3. This also is certain, that the harder the Consistence of the body is, the more doth that body stand in need of a greater heat to prick forward the *assimilation:* which falls out ill for old men, because in them the parts are more obstinate, and the heat weaker; and therefore either the obstinacy of their parts is to be softned, or their heat increased. And as touching the *Malacissation* or *mollifying* of the members, we shall speak afterward, having also formerly propounded many things which pertain to the prohibiting and preventing of this kind of hardness. For the other, touching the increasing of the heat, we will now deliver a single precept, after we have first assumed this *Axiom.*

4. The *Act* of *Assimilation* (which, as we said, is excited by the heat circumfused) is a motion exceeding accurate, subtile, and in little; now all such motions do then come to their vigour, when the *local Motion* wholly ceaseth which disturbeth it. For the *Motion* of *Separation* into *homogeneal* parts, which is in Milk, that the Cream should swim above, and the Whey sink to the bottom, will never work, if the Milk be never so little agitated; neither will any *Putrefaction* proceed in Water or mixt Bodies, if the same be in continual *Local Motion.* So then, from this *Assumption* we will conclude this for the present Inquisition.

5. The *Act* it self of *Assimilation* is chiefly accomplished in Sleep and Rest, especially towards the morning, the distribution being finished. Therefore we have nothing else to advise, but that men keep themselves hot in their sleep; and further, that towards the morning there be used some Anointing, or shirt tincted with Oil, such as may gently stir up heat, and after that to fall asleep again. And touching the last *Act* of *Assimilation* thus much.

The Operation upon the Inteneration of that which begins to be Arefied, or the Malacissation of the Body. 9.

WE have inquired formerly touching the Inteneration *from within, which is done by many windings and Circuits, as well of* Alimentation *as of* Detaining *the* Spirit *from issuing forth, and therefore is accomplished slowly. Now we are to inquire touching that* Inteneration *which is from without, and is effected, as it were, suddenly; or touching the* Malacissation *and* Suppling *of the* Body.

The History.

1. IN the *Fable* of restoring *Pelias* to youth again, *Medea,* when she feigned to do it propounded this way of accomplishing the same, That the Old man's body should be cut into several pieces, and then boiled in a Cauldron with certain Medicaments. There may, perhaps, some boiling be required to this matter, but the cutting into pieces is not needful.

Not-

Notwithſtanding, this cutting into pieces ſeems, in ſome ſort, to be uſeful; not with a knife, but with judgment. For whereas the Conſiſtence of the *Bowels* and *Parts* is very diverſe, it is needfull that the *Inteneration* of them both be not effected the ſame way, but that there be a Cure deſigned of each in particular, beſides thoſe things which pertain to the Inteneration of the whole maſs of the Body; of which, notwithſtanding, in the firſt place. 2.

This *Operation* (if perhaps it be within our power) is moſt likely to be done by Baths, Unctions, and the like; concerning which theſe things that follow are to be obſerved. 3.

We muſt not be too forward in hoping to accompliſh this matter from the Examples of thoſe things which we ſee done in the *Imbibitions* and *Macerations* of *inanimates*, by which they are intenerated, whereof we introduced ſome inſtances before: For this kind of operation is more eaſie upon *Inanimates*, becauſe they attract and ſuck in the Liquor; but upon the bodies of Living creatures it is harder, becauſe in them the motion rather tendeth outward and to the *Circumference*. 4.

Therefore the *Emollient Baths* which are in uſe do little good, but on the contrary hurt, becauſe they rather draw forth than make entrance, and reſolve the ſtructure of the body rather than conſolidate it. 5.

The *Baths* and *Unctions* which may ſerve to the preſent *Operation* (namely, of *Intenerating* the *body* truly and really) ought to have three properties. 6.

The firſt and principal is, That they conſiſt of thoſe *things* which in their whole ſubſtance are like unto the *body* and *fleſh* of *man*, and which have a *feeding* and *nurſing* virtue from without. 7.

The ſecond is, That they be mixed with ſuch things as through the *ſubtilty* of their *parts* may *make entrance*, and ſo inſinuate and conveigh their *nouriſhing virtue* into the *body*. 8.

The third is, That they receive ſome *mixture* (though much inferiour to the reſt) of ſuch things as are *Aſtringent*; I mean not ſour or tart things, but unctuous and comforting; that while the other two do operate, the exhaling out of the body, which deſtroyeth the virtue of the things *intenerating*, may (as much as is poſſible) be prohibited; and the motion to the inward parts, by the *Aſtriction* of the skin and cloſing of the paſſages, may be promoted and furthered. 9.

That which is moſt *conſubſtantial* to the body of man is *warm Bloud*, either of man, or of ſome other living creature: but the device of *Ficinus*, touching the ſucking of *bloud* out of the arm of a wholeſome young man, for the reſtauration of ſtrength in old men, is very frivolous; for that which nouriſheth from within ought no way to be equal or homogeneal to the body nouriſhed, but in ſome ſort inferiour and ſubordinate, that it may be converted: but in things applied outwardly, by how much the *ſubſtance* is *liker*, by ſo much the *conſent* is *better*. 10.

It hath been anciently received, that a *Bath* made of the *bloud* of *Infants* will cure the *Lepreſie*, and heal the fleſh already putrefi'd; inſomuch that this thing hath begot envy towards ſome *Kings* from the common people. 11.

It is reported that *Heraclitus*, for cure of the *Dropſie*, was put into the *warm belly* of an *Ox* newly ſlain. 12.

They uſe the *bloud* of *Kitlins* warm to cure the *diſeaſe* called St. *Anthony's Fire*, and to reſtore the fleſh and skin. 13.

An *Arm* or other *Member* newly cut off, or that upon ſome other occaſion will not leave *bleeding*, is with good ſucceſs put into the *belly* of ſome *creatures newly ripped up*, for it worketh potently to ſtanch the *bloud*; the *bloud* of the member cut off by conſent ſucking in, and vehemently drawing to it ſelf, the *warm bloud* of the creature ſlain, whereby it ſelf is ſtopped and retireth. 14.

It is much uſed in extreme and deſperate *diſeaſes* to cut in two *young Pigeons*, yet living, and apply them to the *ſoles* of the *feet*, and to ſhift them one after another, whereby ſometime there followeth a wonderful eaſe. This is imputed vulgarly as if they ſhould draw down the malignity of the diſeaſe; but howſoever, this application goeth to the *Head*, and comforteth the *Animal Spirits*. 15.

But theſe *bloudy Baths* and *Unctions* ſeem to us ſluttiſh and odious: let us ſearch out ſome others, which perhaps have leſs loathſomeneſs in them, and yet no leſs benefit. 16.

17. Next unto *warm Bloud, things alike in substance* to the Body of a man are *nutritives*: *fat fleshes* of *Oxen, Swine, Dear*; *Oisters* amongst *Fishes*; *Milk, Butter, Yolks* of *Eggs, Flower* of *Wheat, sweet wine*, either Sugred, or before it be fined.

18. Such things as we would have mixed to make impression are, instead of all, *Salts*, especially *Bay salt*; also Wine (when it is full of Spirit) maketh entrance, and is an excellent Convoy.

19. *Astringents* of that kind which we described, namely, unctuous and comfortable things, are *Saffron, Mastick, Myrrhe*, and *Myrtle berries*.

20. Of these parts, in our judgment, may very well be made such a *Bath* as we design: *Physicians* and *Posterity* will find out better things hereafter.

21. But the *Operation* will be much better and more powerful, if such a *Bath* as we have propounded (which we hold to be the principal matter) be attended with a fourfold *Course* and *Order*.

22. First, that there go before the *Bath* a *Frication* of the body, and an *Anointing* with *Oil*, with some thickning substance, that the virtue and moistning heat of the *Bath* may pierce the body, and not the watry part of the Liquor. Then let the *Bath* follow, for the space of some two hours. After the *Bath*, let the body be *Emplaistered* with *Mastick, Myrrhe, Tragacanth, Diapalma*, and *Saffron*; that the perspiration of the body may (as much as is possible) be inhibited, till the *supple matter* be by degrees turned into *solid*: This to be continued for the space of twenty four hours or more. Lastly, the *Emplaistering* being removed, let there be an *anointing* with *Oil* mixed with *Salt* and *Saffron*. And let this *Bath*, together with the *Emplaistering* and *Unction*, (as before) be renewed every fifth day. This *Malacissation* or *suppling* of the body be continued for one whole month.

23. Also during the time of this *Malacissation*, we hold it useful and proper, and according to our intention, that men nourish their bodies well, and keep out of the cold air, and drink nothing but warm drink.

24. Now this is one of those things (as we warned in general in the beginning) whereof we have made no trial by *Experiment*, but onely set it down out of our aiming and levelling at the end: For having set up the Mark, we deliver the Light to others.

25. Neither ought the *warmths* and *cherishings* of *living bodies* to be neglected. *Ficinus* saith, and that seriously enough, *That the laying of the young Maid in* David's *bosom was wholsome for him, but it came too late.* He should also have added, That the *young Maid*, after the manner of the *Persian Virgins*, ought to have been anointed with *Myrrhe*, and such like, not for deliciousness, but to increase the virtue of this cherishing by a living body.

26. *Barbarossa*, in his extream old age, by the advice of a *Physician*, a *Jew*, did continually apply young Boys to his stomach and belly, for warmth and cherishing: also some old men lay Whelps (creatures of the hottest kind) close to their stomachs every night.

27. There hath gone a report, almost undoubted, and that under several names, of certain men that had great *Noses*, who being weary of the derision of people, have cut off the bunches or hillocks of their *Noses*, and then making a wide gash in their arms, have held their *Noses* in the place for a certain time, and so brought forth fair and comely *Noses*: Which if it be true, it shews plainly the *consent* of *flesh* unto *flesh*, especially in *live fleshes*.

28. Touching the particular *Inteneration* of the *principal Bowels*, the *Stomach, Lungs, Liver, Heart, Brain, Marrow* of the *Back-bone, Guts, Reins, Gall, Veins, Arteries, Nerves, Cartilages, Bones*, the *Inquisition* and *Direction* would be too long seeing we now set not forth a *Practick*, but certain *Indications* to the *Practick*.

The Operation upon the Purging away of old Juice, and Supplying of new Juice; or of Renovation by Turns. 10.

The Hiſtory.

ALthough thoſe things which we ſhall here ſet down have been, for the moſt part, ſpoken of before; yet becauſe this Operation is one of the principal, we will handle them over again more at large.

It is certain that *Draught-Oxen* which have been worn out with working, being put into freſh and rich paſtures, will gather tender and young fleſh again: and this will appear even to the taſte and palat; ſo that the *Inteneration* of fleſh is no hard matter. Now it is likely that this *Inteneration* of the *fleſh* being often repeated, will in time reach to the *Inteneration* of the *Bones* and *Membranes*, and like *parts* of the *body*. 1.

It is certain that Diets which are now much in uſe, principally of *Guaiacum*, and of *Sarſaperilla*, *China*, and *Saſſafras*, if they be continued for any time, and according to ſtrict rules, do firſt *attenuate* the whole *juice* of the body, and after conſume it and drink it up. Which is moſt manifeſt, becauſe that by theſe Diets the *French-Pox*, when it is grown even to an hardneſs, and hath eaten up and corrupted the very marrow of the body, may be effectually cured. And further, becauſe it is manifeſt that men who by theſe diets are brought to be extream lean, pale, and as it were ghoſts, will ſoon after become fat, well-coloured, and apparently young again. Wherefore we are abſolutely of opinion, that ſuch kind of diets in the decline of age, being uſed every year, would be very uſeful to our Intention; like the old skin or ſpoil of *Serpents*. 2.

We do confidently affirm, (neither let any man reckon us among thoſe *Hereticks* which were called *Cathari*) that often *Purges*, and made even familiar to the body, are more available to long life than *Exerciſes* and *Sweats*: and this muſt needs be ſo, if that be held, which is already laid for a ground, That Unctions of the body, and Oppletion of the paſſages from without, and Excluſion of air, and Detaining of the ſpirit within the maſs of the body, do much conduce to long life. For it is moſt certain, that by Sweats and outward Perſpirations not only the Humours and excrementitious vapours are exhaled and conſumed, but together with them the juices alſo and good ſpirits, which are not ſo eaſily repaired: but in Purges (unleſs they be very immoderate) it is not ſo, ſeeing they work principally upon the Humors. But the beſt Purges for this Intention are thoſe which are taken immediately before meat, becauſe they dry the body leſs; and therefore they muſt be of thoſe Purgers which do leaſt trouble the belly. 3.

Theſe Intentions *of the* Operations *which we have propounded* (*as we conceive*) *are moſt true, the* Remedies *faithful to the* Intentions. *Neither is it credible to be told* (*although not a few of theſe* Remedies *may ſeem but vulgar*) *with what care and choice they have been examined by us, that they might be* (*the* Intention *not at all impeached*) *both ſafe and effectual* Experience, *no doubt, will both verifie and promote theſe matters. And ſuch, in all things, are the* works *of every* prudent counſel, *that they are* Admirable *in their* Effects, Excellent *alſo in their* Order, *but ſeeming* Vulgar *in the* Way *and* Means.

The Porches of Death.

WE are now to enquire touching the Porches *of* Death, *that is, touching thoſe things which happen unto men at the point of* Death, *both a little before and after; that ſeeing there are many* Paths *which lead to* Death, *it may be underſtood in what* Common

way *they all end, especially in those* Deaths *which are caused by* Indigence *of* Nature *rather than by* Violence: *although something of this latter also must be inserted, because of the connexion of things.*

The History.

1. THe living Spirit stands in need of three things that it may subsist; *Convenient Motion, Temperate Refrigeration,* and *Fit Aliment.* Flame seems to stand in need but of two of these, namely, *Motion* and *Aliment*, because Flame is a simple substance, the Spirit a compounded, insomuch that if it approach somewhat too near to a flamy nature, it overthroweth it self.

2. Also Flame by a greater and stronger Flame is extinguished and slain, as *Aristotle* well noted, much more the *Spirit.*

3. Flame, if it be much compressed and streightned, is extinguished: as we may see in a Candle having a Glass cast over it; for the Air being dilated by the heat, doth contrude and thrust together the Flame, and so lesseneth it, and in the end extinguisheth it; and fires on hearths will not flame if the fuel be thrust close together without any space for the flame to break forth.

4. Also things fired are extinguished with compression; as if you press a burning coal hard with the Tongs or the foot, it is streight extinguished.

5. But to come to the Spirit: if Bloud or Phlegm get into the Ventricles of the Brain, it causeth sudden death, because the Spirit hath no room to move it self.

6. Also a great blow on the head induceth sudden death, the Spirits being streightned within the Ventricles of the Brain.

7. *Opium* and other strong *Stupefactives* do coagulate the Spirit, and deprive it of the motion.

8. A *venemous Vapour*, totally abhorred by the spirit, causeth sudden death: as in deadly poisons, which work (as they call it) by a specifical malignity; for they strike a loathing into the Spirit, that the spirit will no more move it self, nor rise against a thing so much detested.

9. Also extreme Drunkenness or extreme Feeding sometime cause sudden death, seeing the spirit is not onely oppressed with over-much *condensing*, or the malignity of the vapour, (as in *Opium* and malignant poisons) but also with the abundance of the Vapours.

10. Extreme Grief or Fear, especially if they be sudden, (as it is in a sad and unexpected message) cause sudden death.

11. Not onely over-much Compression, but also over-much Dilatation of the spirit, is deadly.

12. Joys excessive and sudden have bereft many of their lives.

13 In greater Evacuations, as when they cut men for the *Dropsie*, the waters flow forth abundantly; much more in great and sudden fluxes of bloud oftentimes present death followeth: and this happens by the mere flight of *Vacuum* within the body, all the parts moving to fill the empty places, and amongst the rest the spirits themselves. For as for slow fluxes of blood, this matter pertains to the indigence of nourishment, not to the diffusion of the spirits. And touching the motion of the spirit so far, either compressed or diffused, that it bringeth death, thus much.

14. We must come next to the want of Refrigeration. Stopping of the breath causeth sudden death, as in all suffocation or strangling. Now it seems this matter is not so much to be referred to the impediment of Motion, as to the impediment of Refrigeration; for air over-hot, though attracted freely, doth no less suffocate than if breathing were hindred; as it is in them who have been sometime suffocated with burning coals, or with walls newly plaistered in close chambers where a fire is made: which kind of death is reported to have been the end of the Emperor *Jovinian.* The like happeneth from dry Baths over heated, which was practised in the killing of *Fausta*, wife to *Constantine* the Great.

15. It is a very small time which Nature taketh to repeat the breathing, and in which

which ſhe deſireth to expel the foggy air drawn into the *Lungs*, and to take in new, ſcarce the third part of a minute.

16. Again, the beating of the *Pulſe*, and the motion of the *Syſtole* and *Diaſtole* of the heart, are three times quicker than that of breathing: inſomuch that if it were poſſible that that motion of the heart could be ſtopped without ſtopping the breath, death would follow more ſpedily thereupon than by ſtrangling.

17. Notwithſtanding, uſe and cuſtom prevail much in this natural action of breathing; as it is in the *Delian* Divers and Fiſhers for Pearl, who by long uſe can hold their breaths at leaſt ten times longer than other men can do.

18. Amongſt living Creatures, even of thoſe that have *Lungs*, there are ſome that are able to hold their breaths a long time, and others that cannot hold them ſo long, according as they need more or leſs refrigeration.

19. *Fiſhes* need leſs refrigeration than *Terreſtrial Creatures*, yet ſome they need, and take it by their Gills. And as *Terreſtrial Creatures* cannot bear the air that is too hot or too cloſe; ſo *Fiſhes* are ſuffocated in waters if they be totally and long frozen.

20. If the Spirit be aſſaulted by another *heat* greater than it ſelf, it is diſſipated and deſtroyed: for it cannot bear the proper *heat* without refrigeration, much leſs can it bear another heat which is far ſtronger. This is to be ſeen in *burning-Fevers*, where the heat of the putrefied humours doth exceed the native heat, even to extinction or diſſipation.

21. The want alſo and uſe of *Sleep* is referred to *Refrigeration*. For Motion doth attenuate and rarifie the ſpirit, and doth ſharpen and increaſe the heat thereof; contrarily, *Sleep* ſetleth and reſtraineth the motion and gadding of the ſame: for though Sleep doth ſtrengthen and advance the actions of the parts and of the liveleſs ſpirits, and all that motion which is to the circumference of the body; yet it doth in great part quiet and ſtill the proper motion of the *living Spirit*. Now ſleep regularly is due unto humane nature once within four and twenty hours, and that for ſix or five hours at the leaſt: though there are, even in this kind, ſometimes miracles of Nature; as it is recorded of *Mecænas*, that he ſlept not for a long time before his death. And as touching the want of *Refrigeration* for conſerving of the *Spirit* thus much.

22. As concerning the third *Indigence*, namely of *Aliment*, it ſeems to pertain rather to the *parts* than to the *living Spirit*; for a man may eaſily believe that the *living Spirit* ſubſiſteth in Identity, not by ſucceſſion or renovation. And as for the *reaſonable Soul* in man, it is above all queſtion that it is not engendred of the Soul of the Parents, nor is repaired, nor can die. They ſpeak of the *Natural Spirit* of living Creatures, and alſo of Vegetables, which differs from that other Soul eſſentially and formally. For out of the confuſion of theſe that ſame tranſmigration of Souls, and innumerable other devices of Heathens and Hereticks have proceeded.

23. The Body of man doth regularly require *Renovation* by *Aliment* every day, and a body in health can ſcarce endure faſting three days together; notwithſtanding uſe and cuſtome will do much even in this caſe: but in ſickneſs faſting is leſs grievous to the body. Alſo *Sleep* doth ſupply ſomewhat to nouriſhment; and on the other ſide *Exerciſe* doth require it more abundantly. Likewiſe there have ſome been found who ſuſtained themſelves (almoſt to a miracle in nature) a very long time without meat or drink.

24. *Dead Bodies* if they be not intercepted by *putrefaction*, will ſubſiſt a long time without any notable *Abſumption*; but *Living bodies* not above three days, (as we ſaid) unleſs they be repaired by nouriſhment: which ſheweth that quick *Abſumption* to be the work of the *living Spirit*, which either repairs it ſelf, or puts the parts into a neceſſity of being repaired, or both. This is teſtified by that alſo which was noted a little before, namely, that *living creatures* may ſubſiſt ſomewhat the longer without *Aliment* if they ſleep: now ſleep is nothing elſe but a reception and retirement of the *living Spirit* into it ſelf.

25. An abundant and continual *effluxion* of blood, which ſometimes happeneth in the *Hæmorrhoides*, ſometimes in vomitting of blood, the inward Veins being unlocked or broken, ſometimes by wounds, cauſeth ſudden death, in regard that the bloud of the *Veins* miniſtreth to the *Arteries*, and the bloud of the *Arteries* to the *Spirit*.

26. The quantity of meat and drink which a man, eating two meals a day, receiveth into his body is not ſmall; much more than he voideth again either by ſtool, or by urine, or by ſweating. You will ſay, No marvel, ſeeing the remainder goeth into the juices and ſubſtance of the body. It is true; but conſider then that this addition is made twice a day, and yet the body aboundeth not much. In like manner, though the ſpirit be repaired, yet it grows not exceſſively in the quantity.

27. It doth no good to have the Aliment ready, in a degree removed, but to have it of that kind, and ſo prepared and ſupplied that the ſpirit may work upon it: for the ſtaff of a *Torch* alone will not maintain the flame, unleſs it be fed with wax, neither can men live upon herbs alone. And from thence comes the *Inconcoction* of old age, that though there be fleſh and bloud, yet the ſpirit is become ſo penurious and thin, and the juices and bloud ſo heartleſs and obſtinate, that they hold no proportion to *Alimentation.*

28. Let us now caſt up the *accounts* of the *Needs* and *Indigences*, according to the ordinary and uſual courſe of nature. The Spirit hath need of opening and moving it ſelf in the *Ventricles* of the Brain and Nerves even continually, of the motion of the *Heart* every third part of a moment, of breathing every moment, of ſleep and nouriſhment once within three days, of the power of nouriſhment commonly till eighty years be paſt: And if any of theſe *Indigences* be neglected, *Death* enſueth. So there are plainly three *Porches* of *Death*; Deſtitution of the Spirit in the *Motion*, in the *Refrigeration*, in the *Aliment.*

It is an error to think that the Living Spirit *is perpetually generated and extinguiſhed, as* Flame *is, and abideth not any notable time: for even* Flame *it ſelf is not thus out of its own proper nature, but becauſe it liveth amongſt enemies, for* Flame *within* Flame *endureth. Now the* Living Spirit *liveth amongſt friends, and all due obſequiouſneſs. So then, as* Flame *is a momentany ſubſtance,* Air *is a fixed ſubſtance, the* Living Spirit *is betwixt both.*

Touching the extinguiſhing *of the* Spirit *by the* deſtruction *of the* Organs (*which is cauſed by Diſeaſes and Violence*) *we enquire not now, as we foretold in the beginning, although that alſo endeth in the ſame three* Porches. *And touching the* Form *of* Death *it ſelf thus much.*

29. There are two great *forerunners* of Death, the one ſent from the *Head*, the other from the *Heart*; *Convulſion*, and the extreme labour of the *Pulſe*; for, as for the deadly *Hiccough*, it is a kind of *Convulſion.* But the deadly labour of the *Pulſe* hath that unuſual ſwiftneſs, becauſe the *Heart* at the point of death doth ſo tremble, that the *Syſtole* and *Diaſtole* thereof are almoſt confounded. There is alſo conjoyned in the *Pulſe* a weakneſs and lowneſs, and oftentimes a great intermiſſion, becauſe the motion of the *Heart* faileth, and is not able to riſe againſt the aſſault ſtoutly or conſtantly.

30. The immediate proceeding ſigns of *Death* are, great unquietneſs and toſſing in the bed, fumbling with the hands, catching and graſping hard, gnaſhing with the teeth, ſpeaking hollow, trembling of the neather lip, paleneſs of the face, the memory confuſed, ſpeechleſs, cold ſweats, the body ſhooting in length, lifting up the white of the eye, changing of the whole viſage, (as the noſe ſharp, eyes hollow, cheeks fallen) contraction and doubling of the coldneſs in the *extreme parts* of the body; in ſome, ſhedding of bloud or ſperm, ſhrieking, breathing thick and ſhort, falling of the neather chap, and ſuch like.

31. There follow Death a privation of all ſenſe and motion, as well of the Heart and Arteries as of the Nerves and Joynts, an inability of the body to ſupport it ſelf upright, ſtiffneſs of the Nerves and parts, extream coldneſs of the whole body; after a little while, putrefaction and ſtinking.

32. *Eeles*, *Serpents* and the *Inſecta* will move a long time in every part after they are cut aſunder, inſomuch that Country people think that the parts ſtrive to joyn together again. Alſo *Birds* will flutter a great while after their heads are pulled off; and the hearts of living creatures will pant a long time after they are plucked out. I remember I have ſeen the heart of one that was bowelled, as ſuffering for High Treaſon, that being caſt into the fire, leaped at the firſt at leaſt a foot and half in height, and after by degrees lower and lower, for the ſpace, as I remember, of ſeven or eight minutes. There is alſo an ancient and credible Tradition of an *Ox* lowing after his bowels were plucked out. But there is a more certain tradition of a man, who being under the

Execu-

Executioner's hand for high Treason, after his *Heart* was plucked out and in the Executioner's hand, was heard to utter three or four words of prayer: which therefore we said to be more credible than that of the *Ox* in *Sacrifice*, because the friends of the party suffering do usually give a reward to the Executioner to dispatch his office with the more speed, that they may the sooner be rid of their pain; but in *Sacrifices* we see no cause why the Priest should be so speedy in his office.

33. For *reviving* those again which fall into sudden *Swooning* and *Catalepses* of *astonishments*, (in which Fits many, without present help, would utterly expire) these things are used; Putting into their mouths Water distilled of Wine, which they call *Hot-waters*, and *Cordial-Waters*, bending the body forwards, stopping the mouth and nostrils hard, bending or wringing the fingers, pulling the hairs of the beard or head, rubbing of the parts, especially the face and legs, sudden casting of cold water upon the face, shrieking out aloud and suddenly; putting *Rose-water* to the nostrills with *Vinegar* in faintings; burning of Feathers or Cloth in the suffocation of the *Mother*: but especially a *Frying-pan* heated red hot is good in *Apoplexies*; also a close embracing of the body hath helped some.

34. There have been many examples of men in shew dead, either laid out upon the cold floor, or carried forth to burial; nay, of some buried in the earth, which notwithstanding have lived again, which hath been found in those that were buried (the earth being afterwards opened) by the bruising and wounding of their head, through the strugling of the body within the Coffin; whereof the most recent and memorable example was that of *Joannes Scotus*, called the *Subtil*, and a *School-man*, who being digged up again by his Servant, (unfortunately absent at his burial, and who knew his Masters manner in such fits) was found in that state: And the like happened in our days in the person of a Player, buried at *Cambridge*. I remember to have heard of a certain *Gentleman*, that would needs make trial in curiosity what men did feel that were hanged; so he fastened the Cord about his neck, raising himself upon a stool, and then letting himself fall, thinking it should be in his power to recover the stool at his pleasure, which he failed in, but was helped by a friend then present. He was asked afterward what he felt. He said he felt no pain, but first he thought he saw before his eyes a great fire and burning; then he thought he saw all black and dark; lastly it turned to a pale blew, or Sea-water green; which colour is also often seen by them which fall into *Swoonings*. I have heard also of a Physician, yet living, who recovered a man to life which had hanged himself, and had hanged half an hour, by *Frications* and hot *Baths*: And the same Physician did profess, that he made no doubt to recover any man that had hanged so long, so his Neck were not broken with the first swing.

The Differences of Youth and Old Age.

To the 16 Article.

THe Ladder of Man's Body is this, To be conceived, to be quickned in the womb, to be born, to suck, to be weaned, to feed upon Pap, to put forth Teeth the first time about the second year of age, to begin to go, to begin to speak, to put forth Teeth the second time about seven years of age, to come to *Puberty* about twelve or fourteen years of age, to be able for generation and the flowing of the *Menstrua*, to have hairs about the legs and arm-holes, to put forth a Beard; and thus long, and sometimes later, to grow in stature, to come to full years of strength and agility, to grow gray and bald; the *Menstrua* ceasing, and ability to generation, to grow decrepit and a monster with three legs, to die. Mean-while the Mind also hath certain periods, but they cannot be described by years, as to decay in the *Memory*, and the like; of which hereafter.

1.

2. The differences of *Youth* and *old Age* are these: A young man's skin is smooth and plain, an old man's dry and wrinkled, especially about the forehead and eyes; a young man's flesh is tender and soft, an old man's hard; a young man hath strength and agility, an old man feels decay in his strength and is slow of motion; a young man hath

hath good digestion, an old man bad; a young man's bowels are soft and succulent, an old man's salt and parched: a young man's body is erect and streight, an old man's bowing and crooked; a young man's limbs are steady, an old man's weak and trembling; the humours in a young man are cholerick, and his bloud inclined to heat, in an old man phlegmatick and melancholick, and his bloud inclined to coldness; a young man ready for the act of *Venus*, an old man slow unto it: in a young man the juices of his body are more roscid, in an old man more crude and wateriſh; the spirit in a young man plentiful and boiling, in an old man scarce and jejune: a young man's spirit is dense and vigorous, an old man's eager and rare; a young man hath his senses quick and intire, an old man dull and decayed; a young man's teeth are strong and entire, an old man's weak, worn, and faln out; a young man's hair is coloured, an old man's (of what colour soever it were) gray; a young man hath hair, an old man baldness; a young man's pulse is stronger and quicker, an old man's more confused and slower; the diseases of young men are more acute and curable, of old men longer and hard to cure; a young man's wounds soon close, an old man's later; a young man's cheeks are of a fresh colour, an old man's pale, or with a black bloud; a young man is less troubled with rheums, an old man more. Neither do we know in what things old men do improve as touching their body, save onely sometime in fatness; whereof the reason is soon given, Because old men's bodies do neither perspire well, nor assimilate well: now Fatness is nothing else but an exuberance of nourishment above that which is voided by excrement, or which is perfectly assimilated. Also some old men improve in the appetite of feeding by reason of the *acid humors*, though old men digest worst. And all these things which we have said, *Physicians* negligently enough will refer to the *diminution* of the *Natural heat* and *Radical moisture*, which are things of no worth for use. This is certain *Drineſs* in the coming on of years doth forego *Coldneſs*; and bodies when they come to the top and strength of heat do decline in *Drineſs*, and after that follows *Coldneſs*.

3. Now we are to consider the *Affections* of the *Mind*. I remember when I was a young man, at *Poictiers* in *France* I conversed familiarly with a certain *French-man*, a witty young man, but something talkative, who afterwards grew to be a very eminent man: he was wont to inveigh against the manners of *old men*, and would say, That if their Minds could be seen as their Bodies are, they would appear no less deformed. Besides, being in love with his own wit, he would maintain, That the vices of old men's Minds have some correspondence and were parallel to the putrefactions of their Bodies: For the drineſs of their skin he would bring in *Impudence*; for the hardness of their bowels, *Unmercifulneſs*: for the *lippitude* of their eyes, an *evil Eye* and *Envy*: for the casting down of their eyes, and bowing their body towards the earth, *Atheism*; (for, saith he, *they look no more up to Heaven as they are wont*) for the trembling of their members, *Irresolution* of their *decrees* and *light Inconstancy*; for the bending of their fingers, as it were to catch, *Rapacity* and *Covetousneſs*; for the buckling of their knees, *Fearfulneſs*; for their wrinkles, *Craftineſs* and *Obliquity*: and other things which I have forgotten. But to be serious, a young man is modest and shamefac'd, an old man's fore-head is hardned; a young man is full of bounty and mercy, an old man's heart is brawny; a young man is affected with a laudable emulation, an old man with a malignant envy; a young man is inclined to Religion and Devotion, by reason of his fervency and inexperience of evil, an old man cooleth in piety through the coldness of his charity, and long conversation in evil, and likewise through the difficulty of his belief; a young man's desires are vehement, an old man's moderate; a young man is light and moveable, an old man more grave and constant; a young man is given to liberality, and beneficence, and humanity, an old man to covetousness, wisdom for his own self, and seeking his own ends; a young man is confident and full of hope, an old man diffident and given to suspect most things; a young man is gentle and obsequious, an old man froward and disdainful; a young man is sincere and open hearted, an old man cautelous and close; a young man is given to desire great things, an old man to regard things necessary; a young man thinks well of the present times, an old man preferreth times past before them; a young man reverenceth his Superiours, an old man is more forward to tax them: And many other things, which pertain rather to Manners than to the present Inquisition. Notwithstanding old men, as in some things they improve in their Bodies, so also in their Minds, unless they be altogether out of date: namely, that as they are less apt for invention,

tion, so they excel in judgment, and prefer safe things and sound things before specious; also they improve in Garrulity and Ostentation, for they seek the fruit of speech, while they are less able for action: So as it was not absurd that the *Poets* feigned old *Tithon* to be turned into a *Grashopper*.

Moveable Canons of the Duration of Life and Form of Death.

Canon I.

CONsumption *is not caused, unless that which is departed with by one body passeth into another.*

The Explication.

THere is in Nature no *Annihilating*, or *Reducing* to *Nothing*: therefore that which is consumed is either resolved into Air, or turned into some Body adjacent. So we see a *Spider*, or *Fly*, or *Ant* in Amber, entombed in a more stately Monument than *Kings* are, to be laid up for Eternity, although they be but tender things, and soon dissipated: But the matter is this, that there is no air by, into which they should be resolved; and the *substance* of the *Amber* is so *heterogeneous*, that it receives nothing of them. The like we conceive would be if a Stick, or Root, or some such thing were buried in *Quick-silver*: also *Wax*, and *Honey*, and *Gums* have the same *Operation*, but in part onely.

Canon II.

THere is in every Tangible body *a* Spirit, *covered and encompassed with the grosser parts of the body, and from it all* Consumption *and* Dissolution *hath the beginning.*

The Explication.

NO Body known unto us here in the upper part of the Earth is without a Spirit, either by *Attenuation* and *Concoction* from the heat of the Heavenly Bodies, or by some other way: for the *Concavities* of *Tangible things* receive not *Vacuum*, but either Air, or the proper *Spirit* of the thing. And this *Spirit* whereof we speak is not some *Virtue*, or *Energie*, or *Act*, or a *Triste*, but plainly a *Body*, rare and invisible; notwithstanding circumscribed by Place, Quantitative, Real. Neither again is that Spirit Air, (no more than Wine is Water) but a body rarefied, of kin to Air, though much different from it. Now the grosser parts of bodies (being dull things, and not apt for motion) would last a long time; but the Spirit is that which troubleth, and plucketh, and undermineth them, and converteth the moisture of the body, and whatsoever it is able to digest, into new Spirit; and then as well the pre-existing Spirit of the body as that newly made flie away together by degrees. This is best seen by the *Diminution* of the *weight* in bodies dried through *Perspiration*: for neither all that which is issued forth was Spirit when the body was ponderous, neither was it not Spirit when it issued forth.

Canon III.

THe Spirit issuing forth Drieth; Detained *and working within either* Melteth, *or* Putrefieth, *or* Vivifieth.

The Explication.

THere are four Processes of the Spirit, to *Arefaction*, to *Colliquation*, *Putrefaction*, to *Generation* of bodies. *Arefaction* is not the proper work of the Spirit, but of the grosser parts after the Spirit issued forth: for then they contract themselves partly by their flight of *Vacuum*, partly by the *union* of the *Homogeneals*: as appears in all things which are arefied by age, and in the drier sort of bodies which have passed the fire, as *Bricks*, *Char-coal*, *Bread*. *Colliquation* is the mere work of the Spirit: neither is it done but when they are excited by heat: for when the Spirits dilating themselves, yet not getting forth, do insinuate and disperse themselves among the grosser parts, and so make them soft and apt to run, as it is in *Metalls* and *wax*: for *Metalls* and all tenacious things are apt to inhibit the Spirit, that being

excited it issueth not forth. *Putrefaction* is a mixed work of the *Spirits* and of the grosser parts: for the Spirit (which before restrained and bridled the parts of the thing) being partly issued forth and partly infeebled, all things in the body do dissolve and return to their *Homogeneities*, or (if you will) to their Elements: that which was *Spirit* in it is congregated to it self, whereby things putrefied begin to have an ill savour: the *Oily* parts to themselves, whereby things putrefied have that slipperiness and unctuosity; the *watry* parts also to themselves: the *Dregs* to themselves: whence followeth that *confusion* in *bodies putrefied*. But *Generation* or *Vivification* is a work also mixed of the Spirit and grosser parts, but in a far different manner: for the Spirit is totally detained, but it swelleth and moveth locally: and the grosser parts are not dissolved, but follow the motion of the spirit, and are, as it were, blown out by it, and extruded into divers figures, from whence cometh that *Generation* and *Organization*: and therefore *Vivification* is always done in a matter tenacious and clammy, and again, yielding and soft, that there may be both a detention of the spirit, and also a gentle cession of the parts, according as the spirit forms them. And this is seen in the matter as well of all Vegetables as of living Creatures, whether they be engendred of Putrefaction or of Sperm; for in all these things there is manifestly seen a matter hard to break through, easie to yield.

Canon IV.

IN all living Creatures *there are two kinds of* Spirits: Liveless Spirits, *such as are in bodies* Inanimate; *and a* Vital Spirit *superadded.*

The Explication.

IT was said before, that to procure long life the Body of man must be considered, first, as *Inanimate*, and not repaired by nourishment: secondly, as *Animate*, and repaired by nourishment: for the former consideration gives Laws touching *Consumption*, the latter touching *Reparation*. Therefore we must know that there are in humane flesh bones, Membranes, Organs: finally, in all the parts such spirits diffused in the substance of them while they are alive, as there are in the same things (Flesh, Bones, Membranes, and the rest) separated and dead: such as also remain in a *Carkass*: but the *Vital Spirit*, although it ruleth them, and hath some consent with them, yet it is far differing from them, being integral, and subsisting by it self. Now there are two special differences betwixt the *Liveless Spirits* and the *Vital Spirits*. The one, that the *Liveless Spirits* are not continued to themselves, but are, as it were, cut off, and encompassed with a gross body which intercepts them; as *Air* is mixed with *Snow* or *Froth*: but the *Vital Spirit* is all continued to it self by certain Conduit-pipes through which it passeth, and is not totally intercepted. And this Spirit is two-fold also: the one branched, onely passing through small pipes, and, as it were, strings: the other hath a *Cell* also, so as it is not onely continued to it self, but also congregated in an hollow space in reasonable good quantity, according to the Analogy of the body, and in that *Cell* is the fountain of the Rivulets which branch from thence. That *Cell* is chiefly in the Ventricles of the Brain, which in the ignobler sort of creatures are but narrow, insomuch that the spirits in them seem scattered over their whole body rather than Celled; as may be seen in *Serpents*, *Eels* and *Flies*, whereof every of their parts move long after they are cut asunder. *Birds* also leap a good while after their heads are pulled off, because they have little heads and little Cells. But the nobler sort of creatures have those Ventricles larger, and Man the largest of all. The other difference betwixt the Spirits is, that the Vital Spirit hath a kind of enkindling, and is like a Wind or Breath compounded of Flame and Air, as the Juices of living creatures have both *Oil* and *Water*. And this enkindling ministreth peculiar motions and faculties: for the smoke which is inflamable, even before the flame conceived, is hot, thin and movable, and yet it is quite another thing after it is become flame: but the enkindling of the vital spirits is by many degrees gentler than the softest flame, as of *Spirit* of *Wine*, or otherwise; and besides, it is in great part mixed with an *Aerial* substance, that it should be a *Mystery* or *Miracle*, both of a *Flammeous* and *Aereous* nature.

Canon V.

THe Natural Actions *are proper to the* several Parts, *but it is the* Vital Spirit *that excites and sharpens them.*

The

The Explication.

THe *Actions* or *Functions* which are in the several *Members* follow the nature of the *Members* themselves, (*Attraction, Retention, Digestion, Assimilation, Separation, Excretion, Perspiration*, even *Sense* it self) according to the propriety of the several *Organs*, (the *Stomach, Liver, Heart, Spleen, Gall, Brain, Eye, Ear*, and the rest:) yet none of these Actions would ever have been actuated but by the vigour and presence of the *Vital Spirit* and heat thereof: as one *Iron* would not have drawn another *Iron*, unless it had been excited by the *Load stone*, nor an *Egge* would ever have brought forth a *Bird*, unless the substance of the *Hen* had been actuated by the treading of the *Cock*.

Canon VI.

THe liveless Spirits *are next Consubstantial to* Air; *the* vital Spirits *approach more to the substance of* Flame.

The Explication.

THe Explication of the precedent fourth *Canon* is also a declaration of this present *Canon*: but yet further, from hence it is that all fat and oily things continue long in their Being; For neither doth the *Air* much pluck them, neither do they much desire to joyn themselves with *Air*. As for that conceit it is altogether vain, That Flame should be Air set on fire, seeing *Flame* and *Air* are no less *heterogeneal* than *Oil* and *Water*. But whereas it is said in the *Canon*, that the *vital spirits* approach more to the substance of *Flame*; it must be understood, that they do this more than the *liveless spirits*, not that they are more *Flamy* than *Airy*.

Canon VII

THe Spirit *hath two* Desires; *one of* multiplying *it self, the other of* flying forth *and congregating it self with the* Connaturals.

The Explication.

THe *Canon* is understood of the *liveless spirits*; for as for the *second Desire*, the *vital spirit* doth most of all abhor flying forth of the body, for it finds no *Connatural* here below to joyn withal: Perhaps it may sometimes flie to the outward parts of the body, to meet that which it loveth; but the flying forth, as I said, it abhorreth. But in the *liveless spirits* each of these two *Desires* holdeth. For to the former this belongeth, *Every spirit seated amongst the grosser parts dwelleth unhappily*; and therefore when it finds not a *like* unto it self, it doth so much the more labour to create and make a like, as being in a great solitude, and endeavour earnestly to multiply it self, and to prey upon the *volatile* of the *groser parts*, that it may be encreased in quantity. As for the *second Desire* of flying forth, and betaking it self to the *Air*, it is certain that all light things (which are ever movable) do willingly go unto their *likes* near unto them, as a *Drop* of water is carried to a *Drop*, *Flame* to *Flame*: but much more this is done in the flying forth of *spirit* into the *Air* ambient, because it is not carried to a particle like unto it self, but also as unto the *Globe* of the *Connaturals*. Mean-while this is to be noted, That the *going forth* and *flight* of the *spirit* into *air* is a redoubled action, partly out of the *appetite* of the *spirit*, partly out of the *appetite* of the *air*; for the *common air* is a needy thing, and receiveth all things speedily, as *Spirits, Odours, Beams, Sounds*, and the like.

Canon VIII.

SPirit detained, *if it have no possibility of begetting new* spirits, itenerateth *the grosser parts*.

The Explication.

GEneration of new Spirit is not accomplished but upon those things which are in some degree near to spirit, such as are humid bodies. And therefore if the grosser parts (amongst which the Spirit converseth) be in a remote degree, although the spirit cannot convert them, yet (as much as it can) it weakneth, and softneth, and subdueth them, that seeing it cannot increase in quantity, yet it will dwell more at large, and live amongst good neighbours and friends. Now this *Aphorism* is most useful to our End, because it tendeth to the Inteneration of the obstinate parts by the detention of the spirit.

Canon IX.

THe Inteneration *of the* harder parts *cometh to good effect, when the* Spirit *neither* flyeth forth, *nor* begetteth new Spirit.

The Explication.

THis *Canon* solveth the knot and difficulty in the Operation of Intenerating by the Detention of the *Spirit*: for if the *Spirit* not flying forth wasteth all within, there is nothing gotten to the *Intenération* of the parts in their subsistence, but rather they are dissolved and corrupted. Therefore together with the *Detention* the *Spirits* ought to be cooled and restrained, that they may not be too active.

Canon X.

THe heat *of the* Spirit *to keep the body fresh and green, ought to be* Robust, *not* Eager.

The Explication.

ALso this *Canon* pertaineth to the solving of the knot aforesaid, but it is of a much larger extent, for it setteth down of what *temperament* the *heat* in the body ought to be for the obtaining of Long life. Now this is useful, whether the *Spirits* be detained, or whether they be not. For howsoever the *heat* of the *Spirits* must be such, as it may rather turn it self upon the hard parts than waste the soft; for the one Desiccateth, the other Intenerateth. Besides, the same thing is available to the well perfecting of *Assimilation*; for such an heat doth excellently excite the *faculty* of *Assimilation*, and withall doth excellently prepare the matter to be *Assimilated*. Now the properties of this kind of *heat* ought to be these. First, that it be *slow*, and heat not suddenly: Secondly, that it be not very *intense*, but *moderate*: Thirdly, that it be *equal*, not *incompesed*, namely, intending and remitting it self: Fourthly, that if this heat meet any thing to resist it, it be not easily suffocated or languish. This *Operation* is exceeding subtil, but seeing it is one of the most useful, it is not to be deserted. Now in those *Remedies* which we propounded to invest the spirits with a *Robust heat*, or that which we call *Operative*, not *Predatory*, we have in some sort satisfied this matter.

Canon XI.

The Condensing *of the Spirits in their* Substance *is available to Long life.*

The Explication.

THis *Canon* is subordinate to the next precedent: for the *Spirit condensed* receiveth all those four properties of heat whereof we speak; but the ways of *Condensing* them are set down in the first of the Ten *Operations*.

Canon XII.

THe Spirit *in* great quantity *hasteth more to flying forth, and preyeth upon the body more, than in* small quantity.

The Explication.

THis *Canon* is clear of it self, seeing mere Quantity doth regularly increase virtue. And it is to be seen in flames, that the bigger they are, the stronger they break forth, and the more speedily they consume. And therefore over-great *plenty* or *exuberance* of the spirits is altogether hurtful to Long life; neither need one wish a greater store of spirits than what is sufficient for the function of life, and the office of a good Reparation.

Canon XIII.

THe Spirit equally *dispersed maketh less haste to flie forth, and preyeth less upon the body, than* unequally *placed.*

The Explication.

NOt onely abundance of spirits in respect of the whole is hurtful to the Duration of things, but also the same abundance unevenly placed is in like manner hurtful; and therefore the more the spirit is shred and inserted by small portions, the less it preyeth; for Dissolution ever beginneth at that part where the spirit is looser. And therefore both Exercise and Frications conduce much to long life, for Agitation doth finelieſt diffuse and commix things by small portions.

Canon XIV.

THe inordinate *and* subsultory motion *of the* spirits *doth more hasten to going forth, and doth prey upon the body more, than the* constant *and* equal.

The Explication.

IN *Inanimates* this *Canon* holds for certain; for Inequality is the Mother of Dissolution: but in *Animates* (because not onely the Consumption is considered, but the Repara-

Reparation, and Reparation proceedeth by the Appetites of things, and Appetite is ſharpned by variety) it holdeth not rigorouſly; but it is ſo far forth to be received, that this variety be rather an alternation or enterchange than a confuſion, and as it were conſtant in inconſtancy.

Canon XV.

The Spirit *in a* Body *of a* ſolid compoſure *is detained, though unwillingly.*

The Explication.

ALl things do abhor a *Solution* of their *Continuity*, but yet in proportion to their *Denſity* or *Rarity*: for the more *rare* the *bodies* be, the more do they ſuffer themſelves to be thruſt into ſmall and narrow paſſages; for *water* will go into a paſſage which *duſt* will not go into, and *air* which water will not go into, nay, *flame* and *ſpirit* which *air* will not go into. Notwithſtanding of this thing there are ſome bounds: for the *ſpirit* is not ſo much tranſported with the deſire of going forth, that it will ſuffer it ſelf to be too much diſcontinued, or be driven into over-ſtreight pores and paſſages; and therefore if the ſpirit be encompaſſed with an *hard* body, or elſe with an *unctuous* and *tenacious*, (which is not eaſily divided) it is plainly bound, and, as I may ſay, impriſoned, and layeth down the appetite of going out: wherefore we ſee that *Metalls* and *Stones* require a long time for their ſpirit to go forth, unleſs either the ſpirit be excited by the fire, or the groſſer parts be diſſevered with corroding and ſtrong waters. The like reaſon is there of *tenacious bodies*, ſuch as are *Gums*, ſave onely that they are melted by a more gentle heat: and therefore the *juices* of the body *hard*, a *cloſe* and *compact skin*, and the like, (which are procured by the *drineſs* of the *Aliment*, and by *Exerciſe*, and by the *coldneſs* of the *air*) are good for long life, becauſe they detain the ſpirit in cloſe priſon that it goeth not forth.

Canon XVI.

In Oily *and* Fat *things the* Spirit *is detained willingly, though they be not* tenacious.

The Explication.

THe ſpirit, if it be not irritated by the *antipathy* of the body encloſing it, nor fed by the over-much *likeneſs* of that body, nor ſollicited nor invited by the *external body*, it makes no great ſtir to get out: all which are wanting to *Oily bodies*; for they are neither ſo preſſing upon the ſpirits as *hard bodies*, nor ſo *near* as *watry bodies*, neither have they any good *agreement* with the *air ambient*.

Canon XVII.

THe ſpeedy flying forth *of the* Watry humor *conſerves the* Oily *the longer in his being.*

The Explication.

WE ſaid before that the *Watry humors*, as being conſubſtantial to the *Air*, flie forth ſooneſt; the *Oily* later, as having ſmall agreement with the *Air*. Now whereas theſe two *humors* are in moſt bodies, it comes to paſs that the *watry* doth in a ſort betray the *Oily*, for that iſſuing forth inſenſibly carrieth this together with it. Therefore there is nothing more furthereth the conſervation of bodies than a *gentle drying* of them, which cauſeth the *watry humour* to expire, and inviteth not the *Oily*; for then the *Oily* enjoyeth the proper nature. And this tendeth not onely to the inhibiting of *Putrefaction*, (though that alſo followeth) but to the conſervation of *Greenneſs*. Hence it is, that *gentle Fricationſ* and *moderate Exerciſes*, cauſing rather *Perſpiration* than *Sweating*, conduce much to long life.

Canon XVIII.

Air excluded *conferreth to Long life, if other* inconveniences *be avoided.*

The Explication.

WE ſaid a little before, that the *flying forth* of the *ſpirit* is a redoubled action, from the *appetite* of the *ſpirit* and of the *air*, and therefore if either of theſe be taken out of the way, there is not a little gained. Notwithſtanding divers *Inconveniences* follow hereupon, which how they may be prevented we have ſhewed in the ſecond of our *Operations*.

Canon XIX.

YOuthful Spirits *inſerted into an* old Body *might ſoon turn* Nature's courſe *back again.*

The Explication.

THe *nature* of the *Spirits* is as the uppermoſt *wheel*, which turneth about the other *wheels* in the body of man, and therefore in the *Intention* of Long life, that ought to be firſt placed. Hereunto may be added, that there is an eaſier and more expedite way to alter the *ſpirits*, than to other *Operations*. For the *Operation* upon the *ſpirits* is two-fold: the one by *Aliments*, which is ſlow, and, as it were, about; the other, (and that two fold) which is ſudden, and goeth directly to the ſpirits, namely, by *Vapours*, or by the *Affections*.

Canon XX.

Juices *of the* Body hard *and* roſcid *are good for Long life.*

The Explication.

THe reaſon is plain, ſeeing we ſhewed before, that *hard* things, and *oily* or *roſcid* are hardly diſſipated: notwithſtanding there is difference, (as we alſo noted in the tenth *Operation*) That *juice* ſomewhat *hard* is indeed leſs *diſſipable*, but then it is withal leſs *reparable*; therefore a *Convenience* is interlaced with an *Inconvenience*, and for this cauſe no wonderful matter will be atchieved by this. But *roſcid juice* will admit both *operations*; therefore this would be principally endeavoured.

Canon XXI.

WHatſoever is of thin parts *to penetrate, and yet hath no* Acrimony *to* bite, *begetteth* Roſcid Juices.

The Explication.

THis *Canon* is more hard to practiſe than to underſtand. For it is manifeſt, whatſoever *penetrateth* well, but yet with a *ſting* or *tooth*, (as do all ſharp and four things) it leaveth behind it whereſoever it goeth ſome mark or print of *drineſs* and *cleaving*, ſo that it hardneth the *juices*, and chappeth the *parts*: contrarily, whatſoever things *penetrate* through their *thinneſs* merely, as it were by ſtealth, and by way of inſinuation, without violence, they *bedew* and *water* in their paſſage. Of which ſort we have recounted many in the fourth and ſeventh *Operations*.

Canon XXII.

Aſſimilation *is beſt done when all* Local Motion *is expended.*

The Explication.

THis *Canon* we have ſufficiently explained in our Diſcourſe upon the eighth *Operation*.

Canon XXIII.

ALimentation from without, *at leaſt ſome other way than by the* Stomach, *is moſt profitable for Long life, if it can be done.*

The Explication.

WE ſee that all things which are done by *Nutrition*, ask a long time, but thoſe which are done by *embracing* of the *like* (as it is in *Infuſions*) require no long time. And therefore *Alimentation* from without would be of principal uſe, and ſo much the more, becauſe the *Faculties* of *Concoction* decay in old age: ſo that if there could be ſome auxiliary *Nutritions*, by *Bathings*, *Unctions*, or elſe by *Clyſters*, theſe things in conjunction might do much, which ſingle are leſs available.

Canon XXIV.

WHere the Concoction *is weak to* thruſt *forth the* Aliment, *there the* Outward parts *ſhould be ſtrengthned to* call *forth the* Aliment.

The Explication.

THat which is propounded in this *Canon* is not the ſame thing with the former; for it is one thing for the *outward Aliment* to be *attracted inward*, another for the *inward Aliment* to be *attracted outward*: yet herein they concur, that they both help the weakneſs of the *inward Concoctions*, though by divers ways.

Canon XXV.

ALL ſudden Renovation *of the Body is wrought either by the* Spirit, *or by* Malaciſſations.

The Explication.

THere are two things in the body, *Spirits* and *Parts*: to both theſe the way by Nutrition is long and about; but it is a ſhort way to the *Spirits* by *Vapours* and by the *Affections*, and to the *Parts* by *Malaciſſations*. But this is diligently to be noted, that by no means we confound *Alimentation from without* with *Malaciſſation*; for the intention of *Malaciſſation* is not to nouriſh the parts, but onely to make them more fit to be nouriſhed.

Canon

Canon XXVI.

MAlaciſſation *is wrought by* Conſubſtantials, *by* Imprinters, *and by* Cloſers up.

The Explication.

THe reaſon is manifeſt, for that *Conſubſtantials* do properly ſupple the body, *Imprinters* do carry in, *Cloſers up* do retain and bridle the *Perſpiration*, which is a motion oppoſite to *Malaciſſation*. And therefore (as we deſcribed in the ninth *operation*) *Malaciſſation* cannot well be done at once, but in a courſe or order. Firſt, by *excluding* the *Liquor* by *Thickners*: for an outward and groſs Infuſion doth not well compact the body: that which entreth muſt be ſubtil, and a kind of vapour. Secondly, by *Intenerating* by the conſent of *Conſubſtantials*: for bodies upon the touch of thoſe things which have good agreement with them, open themſelves, and relax their pores. Thirdly, *Imprinters* are *Convoys*, and inſinuate into the parts the *Conſubſtantials*, and the mixture of gentle *Aſtringents* doth ſomewhat reſtrain the *Perſpiration*. But then, in the fourth place, follows that great *Aſtriction* and *Cloſure* up of the body by *Emplaiſtration*, and then afterward by *Inunction*, until the *Supple* be turned into *Solid*, as we ſaid in the proper place.

Canon XXVII.

FRequent Renovation *of the* Parts Repairable *watereth and reneweth the leſs* Reparable *alſo*.

The Explication.

WE ſaid in the Preface to this Hiſtory, that the *way* of *Death* was this, That the *Parts Reparable* died in the fellowſhip of the *Parts leſs Reparable*: ſo that in the *Reparation* of theſe ſame *leſs Reparable Parts* all our forces would be employed. And therefore being admoniſhed by *Ariſtotle*'s obſervation touching *Plants*, namely, *That the putting forth of new ſhoots and branches refreſheth the body of the Tree in the paſſage*; we conceive the like reaſon might be, if the *fleſh* and *bloud* in the body of man were often renewed, that thereby the *bones* themſelves, and *membranes*, and other parts which in their own nature are *leſs Reparable*, partly by the chearful paſſage of the *juices*, partly by that new cloathing of the young *fleſh* and *bloud*, might be *watered* and *renewed*.

Canon XXVIII.

REfrigeration *or* Cooling *of the body, which paſſeth ſome other ways than by the* Stomach, *is uſeful for Long life.*

The Explication.

THe reaſon is at hand: for ſeeing a *Refrigeration* not temperate, but powerful, (eſpecially of the *bloud*) is above all things neceſſary to Long life: this can by no means be effected from within as much as is requiſite, without the deſtruction of the *Stomach* and *Bowels*.

Canon XXIX.

THat Intermixing *or* Intangling, *that as well* Conſumption *as* Reparation *are the works of Heat, is the greateſt obſtacle to Long life.*

The Explication.

ALmoſt all great works are deſtroyed by the *Natures* of things *Intermixed*, whenas that which helpeth in one reſpect hurteth in another: therefore men muſt proceed herein by a ſound judgement, and a diſcreet practice. For our part, we have done ſo as far as the matter will bear, and our memory ſerveth us, by ſeparating *benign heats* from *hurtful*, and the *Remedies* which tend to both.

Canon XXX.

CUring *of Diſeaſes is effected by* Temporary Medicines; *but* Lengthning *of* Life *requireth* Obſervation *of* Diets.

The Explication.

THoſe things which come by accident, as ſoon as the cauſes are removed ceaſe again; but the continued courſe of nature, like a running River, requires a continual rowing and ſailing againſt the ſtream: therefore we muſt work regularly by Diets. Now Diets are of two kinds: *Set Diets*, which are to be obſerved at certain times; and *Familiar Diet*, which is to be admitted into our daily repaſt, But the *Set Diets* are the more potent, that is, a courſe of *Medicines* for a time: for thoſe things which are of ſo great virtue that they are able to turn Nature back again, are, for the moſt part, more ſtrong, and more ſpeedily altering, than thoſe which may without danger be received into a continual uſe. Now in the Remedies ſet down in our *Intentions* you

ſhall

shall find onely three *Set Diets*, the *Opiate Diet*, the *Diet Malaciſſant* or *Suppling*, and the *Diet Emaciant* and *Renewing*. But amongſt thoſe which we preſcribed for *Familiar Diet*, and to be uſed daily, the moſt efficacious are theſe that follow, which alſo come not far ſhort of the vertue of *Set Diets*: *Nitre* and the *ſubordinates* to *Nitre*; the *Regiment* of the *Affections* and *Courſe* of our *Life*; *Refrigeratours* which paſs not by the Stomach; *Drinks Roſcidating*, or *ingendring Oily Juices*; beſprinkling of the bloud with ſome *firmer Matter*, as *Pearls*, certain *Woods*, competent *Unctions* to keep out the Air, and to keep in the Spirit; Heaters from without, during the Aſſimilation after ſleep; avoiding of thoſe things which inflame the Spirit, and put it into an *eager heat*, as *wine* and *ſpices*; laſtly, a moderate and ſeaſonable uſe of thoſe things which endue the Spirits with a *robuſt Heat*, as *Saffron*, *Croſſes*, *Garlick*, *Elecampane*, and *compound Opiates*.

Canon XXXI.

THe Living Spirit *is inſtantly extinguiſhed if it be deprived either of* Motion, *or of* Refrigeration, *or of* Aliment.

The Explication.

NAmely, theſe are thoſe three which before we called the *Porches* of *Death*, and they are the proper and immediate paſſions of the Spirit. For all the *Organs* of the principal parts ſerve hereunto, that theſe three *offices* be performed; and again, all deſtruction of the *Organs* which is deadly brings the matter to this point, that one or more of theſe three fail. Therefore all other things are the divers ways to *Death*, but they end in theſe three. Now the *whole Fabrick* of the *Parts* is the *Organ* of the *Spirit*, as the *Spirit* is the *Organ* of the *Reaſonable Soul*, which is *Incorporeous* and *Divine*.

Canon XXXII.

FLame *is a* Momentany Subſtance, Air *a* Fixed; *the* Living Spirit *in Creatures is of a* middle Nature.

The Explication.

THis matter ſtands in need both of an higher Indagation and of a longer Explication than is pertinent to the preſent Inquiſition. Mean-while we muſt know this, that *Flame* is almoſt every moment generated and extinguiſhed; ſo that it is continued only by ſucceſſion: but *Air* is a *fixed body*, and is not diſſolved; for though Air begets new Air out of watery moiſture, yet notwithſtanding the old Air ſtill remains; whence cometh that Super-oneration of the Air whereof we have ſpoken in the Title *De Ventis*. But *Spirit* is participant of both Natures, both of *Flame* and *Air*, even as the nouriſhments thereof are, as well *Oil*, which is homogeneous to *Flame*, as *Water*, which is homogeneous to *Air*: for the Spirit is not nouriſhed either of *Oily* alone, or of *watry* alone, but of both together; and though *Air* doth not agree well with *Flame*, nor *Oil* with *water*, yet in a *mix'd body* they agree well enough. Alſo the *Spirit* hath from the *Air* his eaſie and delicate impreſſions and yieldings, and from the *Flame* his noble and potent motions and activities. In like manner the *Duration* of *Spirit* is a *mixed thing*, being neither ſo *momentany* as that of *Flame*, nor ſo *fixed* as that of *Air*: And ſo much the rather it followeth not the condition of *Flame*, for that *Flame* it ſelf is extinguiſhed by accident, namely, by Contraries and Enemies environing it; but *Spirit* is not ſubject to the like conditions and neceſſities. Now the *Spirit* is repaired from the lively and florid bloud of the ſmall *Arteries* which are inſerted into the *Brain*; but this Reparation is done by a peculiar manner, of which we ſpeak not now.

FINIS.

ARTICLES
OF
ENQUIRY,
TOUCHING
METALS & MINERALS.

Written by the Right Honorable,
FRANCIS BACON,
BARON of *VERULAM*,
Viſcount St. *Alban*.

Thought fit to be added, to this WORK
OF HIS
NATURAL HISTORY.
Newly put forth in the Year, 1661.
By the former Publisher.

LONDON,
Printed for *William Lee* at the Turks-head
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ARTICLES
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CONCERNING
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BY
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BARON OF VERULAM,
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ARTICLES OF ENQUIRY, TOUCHING METALS & MINERALS.

THe first Letter of the Alphabet is, the Compounding, Incorporating, or Union, of Metals or Minerals.

With what Metals, Gold will incorporate, by Simple Colliquefactions, and with what not? And in what quantity it will incorporate? and what kinde of Body the Compound makes?

Gold with Silver, which was the ancient *Electrum.*
Gold with Quick-silver.
Gold with Lead.
Gold with Copper.
Gold with Brass.
Gold with Iron.
Gold with Tin.

So likewise of Silver.

Silver with Quick-silver.
Silver with Lead.
Silver with Copper.
Silver with Brass.
Siver with Iron.
Silver with Tin.

So likewise of Quick-silver.
Quick-silver with Lead.
Quick-silver with Copper.
Quick-silver with Brass.
Quick-silver with Iron.
Quick-silver with Tin.

So of Lead.
Lead with Copper.
Lead with Brass.
Lead with Iron.
Lead with Tin.

So of Copper.
Copper with Brass.
Copper with Iron.
Copper with Tin.

So of Brass.
Brass with Iron.
Brass with Tin.

So of Iron.
Iron with Tin.

What are the Compound Metals, which are common, and known? And what are the Proportions of their mixtures? As
Lattin of Brass, and the Calaminar-stone.
Bell-metal of, &c.
The counterfeit Plate, which they call Alchumy.
The Decompositions of three Metals, or more, are too long to enquire, except there be some Compositions of them already observed.

It is also to be observed, Whether any two Metals which will not mingle of themselves, will mingle with the help of another; and what?

What Compounds will be made of Metal, with Stone, and other Fossiles? As Lattin is made with Brass, and the Calaminar-stone. As all the Mettals with Vitriol: All with Iron poudered. All with Flint, &c.

Some few of these would be enquired of, to disclose the Nature of the rest.

WHether Metals, or other Fossiles, will incorporate with Molten Glass? And what Body it makes?

The quantity in the mixture would we well considered: For some small quantity, perhaps, would incorporate; as in the Allays of Gold, and Silver Coyn.

Upon the Compound Body, three things are chiefly to be observed. The Colour, the Fragility or Pliantness, the Volatility or Faxation, compared with the Simple Bodies.

For present use or profit, this is the Rule. Consider the price of the two Simple Bodies; consider again the Dignity of the one above the other

other, in use. Then see, if you can make a compound that will save more in the price, then it will lose in the dignity of the use. As for example, Consider the price of Brass Ordnance; consider again the price of Iron Ordnance; and consider, wherein the Brass Ordnance doth excel the Iron Ordnance in use. Then if you can make a Compound of Brass and Iron Ordnance, that will be near as good in use, and much cheaper in price, there is profit both to the private and to the Commonwealth.

So of Gold and Silver, the price is double of Twelve. The dignity of Gold above Silver is not much; the splendor is alike, and more pleasing to some eye, As in Cloth of Silver, Silver Lace, silvered Rapiers, &c. The main dignity is, that Gold bears the Fire, which Silver doth not; but that is an excellency in Nature, but it is nothing at all in use. For any dignity in use, I know none, but that Silvering will sully and canker more then Gilding; which, if it may be corrected, with a little mixture of Gold, there is profit: And I do somewhat marvel, that the later ages have lost the ancient *Electrum*, which was a mixture of Silver with Gold; whereof, I conceive, there may be much use both in Coyn, Plate, and Gilding.

It is to be noted, that there is in the Version of Metals, impossibility, or at least great difficulty; as in making of Gold, Silver, Copper: On the other side, in the adulterating or counterfeiting of Metals there is deceit and villainy; but it should seem there is a middle way, and that is, by new compounds, if the ways of incorporating were well known.

What Incorporation or Imbibition, Metals will receive from Vegetables, without being dissolved might be inquired. As when the Armorers make their Steel more tough and plyant, by the aspersion of Water, or Juyce of Herbs: When Gold being grown somewhat churlish by recovering, is made more plyant by throwing in shreds of Tanned Leather, or by Leather oyled.

Note, that in these, and the like shews of Imbibition, it were good to try by the weight, whether the weight be increased, or no? For if it be not, it is to be doubted, that there is no Imbibition of Substance; but onely, that the Application of the other Body, doth dispose and invite the Metal to another posture of parts then of it self, it would have taken.

After the Incorporation of Metals, by simple Colliquefaction, for the better discovery of the Nature: And Consents and Dissents of Metals by incorporating of their Dissolutions, it would be enquired.

What Metals being dissolved by Strong-waters, will incorporate well together, and what not? which is to be inquired particularly, as it was in Colliquefactions.

There is to be observed in those Dissolutions, which will not incorporate what the effects are: As the Ebullition, the Precipitation to the bottom, the Ejaculation towards the top, the Suspension in the midst, and the like.

Note, that the Dissents of the Menstrua, or Strong-waters, may hinder the Incorporation, as well as the Dissents of the Metals themselves: Therefore where the Menstrua are the same, and yet the Incorporation followeth not, you may conclude, the Dissent is in the Metals, but where the Menstrua are several, not so certain.

THe Second Letter of the Croſs Row, is the Separation of Metals, and Minerals. Separation is of three ſorts; the firſt is, The ſeparating of the pure Metal from the Ure or Droſs, which we call Refining. The ſecond is, The drawing one Metal or Mineral out of another, which we may call Extracting. The third, The ſeparating of any Metal into his Original or Elements, or call them what you will) which work we call Precipitation.

For Refining, we are to enquire of it according to the ſeveral Metals; As Gold, Silver, &c. Incidently, we are to enquire of the firſt Stone, or Ure, or Spar, or Marcaſite of Metals ſeverally; and what kinde of Bodies they are; and of the degrees of Richneſs.

Alſo, we are to enquire of the Means of ſeparating, whether by Fire, parting Waters, or otherwiſe.

Alſo, for the manner of Refining, you are to ſee how you can multiply the Heat, or haſten the Opening; and to ſave charge, in the Refining.

The means of this is in three manners; that is to ſay, In the Blaſt of the Fire: In the manner of the Furnace to multiply Heat, by Union and Reflexion: And by ſome Additament or Medicines, which will help the Bodies to open them the ſooner:

Note, the quickning of the Blaſt, and the multiplying of the Heat in the Furnace, may be the ſame for all Metals; but the Additaments muſt be ſeveral according to the natures of the Metals.

Note again, That if you think the multiplying of the Additament in the ſame Proportion that you multiply the Ure, the work will follow, you may be deceived: For quantity in the Paſſive will add more reſiſtance, then the ſame quantity in the Active will add force.

For Extracting, you are to enquire what Metals contain others, and likewiſe what not? As Lead Silver, Copper Silver, &c.

Note, although the charge of Extraction ſhould exceed the worth, yet that is not the matter; For, at leaſt, it will diſcover Nature and Poſſibility, the other may be thought on afterwards.

We are likewiſe to enquire, what the differences are of thoſe Metals, which contain more or leſs, other Metals; and how that agrees with the poorneſs or richneſs of the Metals, or Ure, in themſelves: As the Lead, that contains moſt Silver, is accounted to be more brittle; and yet otherwiſe poorer in it ſelf.

For Principiation, I cannot affirm, whether there be any ſuch thing, or no. And, I think, the Chymiſts make too much ado about it. But howſoever it be, whether Solution or Extraction, or a kinde of Converſion by the Fire, it is diligently to be enquired, What Salts, Sulphur, Vitriol, Mercury, or the like Simple Bodies are to be found in the ſeveral Metals; and in what quantity.

THe third Letter of the Cross-Row, is the variation of Metals into several Shapes, Bodies, or Natures; the particulars whereof follow.

Tincture.
Turning to Rust.
Calcination.
Sublimation.
Precipitation.
Amalgamatizing, or turning into a soft Body.
Vitrification.
Opening or Dissolving into Liquor.
Sprouting, or Branching, or Arborescence.
Induration and Mollification.
Making tough or brittle.
Volatility and Fixation.
Transmutation or Version.

For Tincture, it is to be enquired how Metals may be tincted, through and through; and with what, and into what colours: As Tincting-Silver yellow, Tincting-Copper white, and Tincting red, green, blew, especially with keeping the lustre.

Item, Tincture of Glass.
Item, Tincture of Marble, Flint, or other Stone.

For turning to Rust, two things are chiefly to be enquired: By what Corrosives it is done, and into what colours it turns: As Lead into white, which they call *Serus*; Iron into yellow, which they call *Crocus Martis:* Quick-silver into Vermilion, Brass into green, which they call *Verdegrass*, &c.

For Calcination, to enquire how every Metal is calcined? And into what kinde of Body? And what is the exquisitest way of Calcination?

For Sublimation, to enquire the manner of Subliming; and what Metals endure Subliming; and what Body the Sublimate makes?

For Precipitation likewise, By what strong Waters every Metal will precipitate? or with what Additaments? and in what time? and into what Body?

So for Amalgama, what Metals will endure it? What are the means to do it? And what is the manner of the Body?

For Vitrification likewise, what Metals will endure it? what are the means to do it? into what colour it turns? and further, where the whole

Metal

Metal is turned into Glass? and when the Metal doth but hang in the Glassie part? also what weight the vitrified Body bears, compared with the crude Body? Also because Vitrification is accounted, a kinde of death of Metals, what Vitrification will admit, of turning back again, and what not?

For Dissolution into Liquor, we are to enquire, what is the proper *Menstruum* to dissolve any Metal? And in the Negative, what will touch upon the one, and not upon the other? And what several *Menstrua* will dissolve any Metal? And which most exactly? *Item*, the process or motion of the Dissolution? The manner of Rising, Boiling, Vaporing? More violent or more gentle? Causing much heat, or less? *Item*, the quantity or charge the Strong-Water will bear, and then give over? *Item*, the colour into which the Liquor will turn? Above all, it is to be enquired, whether there be any *Menstruum*, to dissolve any Metal that is not fretting and corroding; but openeth the Body by sympathy, and not by mordacity or violent penetration?

For Sprouting or Branching, though it be a thing but transitory, and a kinde of toy or pleasure; yet there is a more serious use of it: For that it discovers the delicate motions of spirits, when they put forth, and cannot get forth, like unto that which is in vegetables.

For Induration or Mollification, it is to be enquired, what will make Metals harder and harder, and what will make them softer and softer? And this Enquiry tendeth to two ends;

First, for Use: As to make Iron soft by the Fire, makes it malleable.

Secondly, Because Induration is a degree towards Fixation; and Mollification towards Volatility: And therefore the Inquiry of them, will give light towards the other.

For tough and brittle, they are much of the same kinde with the two former, but yet worthy of an Inquiry apart: Especially to joyn Hardness to Toughness; as making Glass malleable, &c. And making Blades, strong to resist, and pierce, and yet not easie to break.

For Volatility and Fixation, it is a principal Branch to be enquired. The utmost degree of Fixation is, That whereupon no Fire will work, nor Strong-water joyned with Fire, if there be any such Fixation possible: The next is, when Fire simply will not work without Strong-waters: The next is, when it will endure Fire not blown, or such a strength of Fire: The next is, when it will not endure Fire, but yet is malleable: The next is, when it is not malleable, but yet it is not fluent, but stupified. So of Volatility, the utmost degree is, when it will flee away without returning: The next is, when it will flee up, but with easie return: The next, when it will flee upwards, over the Helm, by a kinde of Exufflation, without Vaporing:

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The next is, when it will melt, though not riſe; And the next, when it will ſoften, though not melt. Of all theſe, diligent inquiry is to be made, in ſeveral *Metals*; eſpecially of the more extream degrees.

For Tranſmutation or Verſion, if it be real and true, it is the furtheſt point of Art; and would be well diſtinguiſhed from Extraction, from Reſtitution, and from Adulteration. I hear much of turning Iron into Copper; I hear alſo of the growth of Lead in weight, which cannot be without a Converſion of ſome Body into Lead: But whatſoever is of this kinde, and well approved, is diligently to be inquired, and ſet down.

THe fourth Letter of the Croſs Row, is Reſtitution. Firſt therefore, it is to be enquired in the Negative; what Bodies will never return, either by reaſon of their extream fixing, as in ſome Vitrifications, or by extream Volatility.

It is alſo to be enquired of the two Means of Reduction; and firſt by the Fire, which is but by Congregation of Homogeneal parts.

The ſecond is, by drawing them down, by ſome Body, that hath conſent with them: As Iron draweth down Copper in Water; Gold draweth Quick-ſilver in vapor; whatſoever is of this kinde, is very diligently to be enquired.

Alſo it is to be enquired, what Time or Age will reduce without the help of Fire or Body?

Alſo it is to be enquired, what gives Impediment to Union or Reſtitution, which is ſometimes called Mortification; as when Quick-ſilver is mortified with Turpentine, Spittle, or Butter.

Laſtly, it is to be enquired how the Metal reſtored, differeth in any thing from the Metal raw or crude? As whether it becometh not more churliſh, altered in colour, or the like?

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THE BOOK-SELLER UNTO THE READER.

I *Received some Moneths since these* Articles of Enquiry, touching Metals and Minerals, *from the hands of the Reverend Dr.* Rawley, *who hath published several of the Lord* Verulams *Works since his Death (he having been his Lordships Chaplain) and who hath been careful to Correct at the Press this little Piece (an Addition to the* Natural History*) according to the Original Copy, remaining amongst his Lordships Manuscripts: Amongst which there is nothing more of that subject to be found, so as no more Additions can be expected.*

W. Lee.

FINIS.