

*The Chymical Touch-Stone of Mr John Kuncle,
Gentleman of the Bed-Chamber to the Elector of
Brandenburg, De Acido, & Urinosa Sale Calido
& Frigido, contra Doctor: Voights spirit: Vini
vindictum.*

*Submitted to the Royal Society of London &c, as to
the high Judges of this matter.*

Berlin the 6th. of July 1684.

THis book, having been sent the *R. S.* by the favor of that most Potent Prince, and great encourager of Learning, the *Electo*r of *Brandenburg*, may for that reason, deserve a large account to be given of it, as also for the merit of the persons therein concerned, who dispute, like Philosophers, with Experiments in their hands; partly also because the book is written in High Dutch, a language which few of us understand sufficiently.

The Author begins with an Epistle Dedicatory to the *Royal Society*; appealing to them, as to impartial judges: he says, that in his book, he offers at the nature of heat, and cold; in which, or any other thing, in case he has committed errors, he shall be made very happy, to receive better Instructions.

In the next place, he maketh an Epistle to the Reader, which is only an Apology, against some calumnies thrown upon him.

After this, follows a short Epistle of Mr. *Kunkels* Antagonist Dr. *Voight* to Dr. *Martin Weisen*, which is a short address made to him, as judge of the controversy.

Mr. *Kunkel* begins to lay down, his Opponents Depositions; which are three.

1. That there is no *Acid* under the Sun, that of it self gives

gives either heat or flame: for he says, that there is no *Acid*, of either the Vegetable, mineral, or Animal Kingdome, which affords it. He instances in the *Acidum Ventriculi*, & *succi Pancreatici*, whereas on the contrary, the Gall, which contains no *Acid*, but affords Oyl, gives also flame, and heat.

2. He endeavours to prove spirit of Wine, to be an Oyl.

3. He obviates some Objections.

Mr. *Kunkel* in answer to the first Proposition; says, he never declared it his opinion, that any body should produce heat, without the Accession of a *Frigidum*: (which in other places he calls *Urinosum*,) as also, that spirit of Wine was a pure *Acid*; but a *spiritus duplicatus*: but that there is more *Acid* in it, than of the *frigidum*, he is sure, cannot be denied.

He agrees with his Opponent, that no pure *Acidum* is inflammable, but that *Urinosum* and *terra* must be added. He denies that there is a pure *Acidum* in the World: for he says, where there is such a pure *Acidum*, there must be a pure salt; but there is no such thing in the Animal, or Vegetable World.

He examines 18 Ounces of the Gall of an Ox, from which he obtains 16 Ounces of cleer water by Distillation, of a stinking Oyl, and half an ounce of a salt Earth, in which he says there is a *Sal Acidum*: so that he would ascribe Inflammability to belong rather to the *Acidum* than *Oleosum*. He examines blood also, from whence his Antagonist may argue, namely that the Oyl in the blood, gives the naturall heat to the body; but he will ascribe more to the salt: for he says, that in case blood be gently evaporated *ad siccitatem*, and then exposed to the Air, a certain salt, of a Nitrous Nature, will grow upon it: by this you may see the salt to predominate, in case you edulcorate this dried blood by frequent ablutions with water, and then distill the mentioned exsiccated

ed Mafs, you fhall have much lefs Oyl: from whence we may learn, that Oyls are the moft fubtile parts of bodies; and may alfo conclude, that nothing is to be found without falt; or that bodies are fet together, and compounded with falt. He feems to deny, that *Salia Acida* (fuch as his Antagonift calls *Succus Citri*, *Berberum*, *spiritus Nitri*,) are cooling, or do fo well perform any Cures, as *Salia Urinofa*. He examines the *Succus Citri*, and *Berberis*, by diftillation, the latter of which, he fays, affords only a quantity of water, fome oyl, and fome earth, mixed with a falt he calls Alkali; which makes him demand, what is become of his *Acidum*.

Mr. *Kunkel* proceeds, and gives a further account of Dr. *Voights* oppofite fentence; who instances in his common diftillation of Wine, namely, that after the fpirit of Wine *Per Balneum Mariæ* is feparated from the Wine, that which remains in the Veffel, becomes fower, and will not burn, tho' perhaps fomewhat of a fubjugated oyl, may be mix'd with it: but in cafe you feparate any oyl from the *Acid*, it then burns *per fe*.

Mr. *Kunkel* in the beginning of his anfwer, feems to run out againft the Doctors opinion, mentioned in another chapter; and endeavouring to prove *spiritus Vini* to be no oyl; becaufe oyl will not intoxicate a man; and becaufe *Acids*, tho' of differing families, do all unite and mix, and fo do oyls too, but if you mix that oyl drawn from Wine, with the fpirit of Wine, it will not by fhaking unite together, unlefs you firft fatiate the fpirit with its falt, and by that means you may caufe a union of fome little quantity. He now comes to overthrow the Doctors affertion, that *Acids* do not burn: he instances in oyl of Vitriol, as one of the pureft *Acids*, which produces great heat, which deftroys and fhatters many things. Judge of the contrary by the greateft cold. Take fpirit of Wine highly rectified, pour the coldeft water upon as much, as you can hold in your hand, and it will grow

grow pretty warm. Whence it undoubtedly follows, that it agrees with oyl of Vitriol in point of *Acidum*.

He concludes, charging his adversary that he says, Vegetables yield no *Acidum*; but gives an experiment to prove the contrary. *viz.* that the *Sal Alkali*, and *Sal Urinosum* of Plants, by a well proportioned quantity, may be brought to a *Sal Nitrum*. Item *ex sale Tartari*, or *Absinthii* by a meer addition of sand, a *Spiritus Salis* may be distilled.

Dr. Voight Mr. Kunkels opponent, proceeds to the *Regnum Minerale* and absolutely denys any heat, flame, or light, to be properly inherent in any *Acid*, but that some central oyls not easily separated from mineral *Acids*, do produce those incalcescent effects. He instances in *Oleum Vitrioli*, & *Tartari per Deliquium*: as also in *Spiritus Nitri & Vitrioli*, which derive much heat by mixture, from a latent oyl, and not from the apparent external *Acidum*. He gives an experiment, how, *Oleum Sulphuris* may be made inflammable, *viz.* by distilling a high tincture of *Oleum Terebinthinae* made with common brimstone, for you may by distillation recover your *Oleum Terebinthinae*, and leave in the bottom of the Retort, an inflammable oyl of Sulphur.

Rain water, he says, affords oyl, and volatile salt, but no inflammable *Acid*.

He says all *Acida* tho' never so pure, if evaporated or distilled off, will always leave in the bottom of the Retort, or other Vessel a *Materia pinguis & unctuosa*, out of which an inflammable oyl may be brought.

He concludes saying, that it suffices to prove, that *Acidity* does in no wise dispose a body to inflammability, because *Olea expressa & distillata* do burn and flame more readily, when they are purged of all mixture of *Acidity*: as *Oleum Lini*, *Terebinthinae*, *Anisi*, *Feniculi*, when distilled *per Cineres*, and other *Alcalia* that detain the *Acida*.

Mr. Kunkel in his answer denys, that in these Mine-

ral *Acids*, particularly oyl of Vitriol, any oyl is contained; he challenges him to give Demonstration.

He demands further, since he declares all heat to depend on bodies, upon the score of their being oylly, that he will shew him an experiment, how to produce heat, with the mixture of any oyl and water; as Mr. *Kunkel* has often done with *Acids* and water.

Mr. *Kunkel* refutes at large, his experiment about the oyl of Sulphur; urging that he did not perform his operation truly, but left his oyl of Turpentine at the bottom of the Retort, which is mistaken for the oyl of Sulphur, as he may easily discover by drawing off more of the remaining oyl, by which means, he leaves a kind of black Earth, and such as gives no oyl, and may have his former weight of Sulphur again.

The adversary Dr. *Voight*, proceeds to lay down several Positions.

1. That oyl of Vitriol is the most fixt *Acid*, and gives more heat, then spirit of Wine whilst flaming.

2. That fixt bodies are only respectively so.

3. That *Acids*, may by repeated distillations, be brought to such a degree of subtlety (*I suppose he means volatility,*) as spirit of Wine.

4. Any surmise about an *Acidum Occultum* signifies nothing, for even that may be easily parted.

5. All *Acida* are volatile, because they yield a strong scent, which comes from their Volatile salt.

Now since we can find no inflammable *Acid* in the World, we may properly infer, spirit of Wine to be no *Acid*, because it burns, and takes fire. He concludes with a definition of *Acidum*. *Quod Acidum sit Sal fluore potitum, Vim habens astringendi & coagulandi.*

Mr. *Kunkel* in his answer grants the first Position. To the second he gives a check, blaming his not distinguishing betwixt the *Acida Regni Mineralis & Vegetabilis*. The next Position he denies absolutely. The fourth Position

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he answers thus, that any *Acidum* may be concentrated in a body, and is there stronger, or have its parts extended and diffused, and so weaker; so that *magis & minus* do much vary the case. To the last, which says all *Acida* are *Volatilia*, because of an odor or sent that rises from them: he denys that all do give an odor, and instances in *Oleum Vitrioli*, that gives none; and by consequence no *Acida pura* afford it, but such as are mixt with an *Urinosè salt*. He pretends to know a method how to reduce spirit of Wine, to water, by separating its salt, with the help of salt of Tartar. As also to part the salt from oyl of Vitriol, and bring it to water: but none of these salts are reducible to oyl, tho' they may be made to heat and burn. In the end he seems to dislike his definition of an *Acidum*: because he says he does not distinguish betwixt *Acida pura & mixta*, such as *succus Berberum & Oleum Vitrioli*.

Dr. Voight goes on to prove from his definition of salt, that spirit of Wine is no *Acidum*, namely because it has no *Vim attenuandi & resolvendi*; he means properly and in its own nature, which consists in its inflammability, so that *Spiritus Vini*, when it acts the part of a *Menstruum* to dissolve bodies, does it upon the account of some *Salia Volatilia*, that are mixt with it: for the more you impregnate it with salt, the stronger *Menstruum* you shall have. Item if you separate the inherent salt in oyl of Turpentine, you will destroy its power of working upon *Rosins*, so as to dissolve them. Hence he infers, *Non dantur Menstrua Sulphurea Oleosa*.

2. He says *Spiritus Vini* is so far from agreeing with his definition of *Acids*, in having *Vim coagulandi*, that it rather hinders it. e. g. *Acids* coagulate Milk: spirit of Wine keeps it in a body together, and hinders that Coagulation.

3. Spirit of Wine corrects *Acida*, by dulcifying spirit of salt and Nitre, when mixed with them; which are great Corroders of themselves.

4. Spirit

4. Spirit of Wine keeps bodies from degenerating into *Acids*, thus it preserves Beer from sowing. Item it hinders the fermentation of *Vinum Mustum*, and the working of Beers.

5. *Acida* give a red tincture to syrup of Violets, spirit of Wine does not change it.

Thus far Dr. *Voight*. To the first proposition Mr. *Kunkel* replies, that since *Spiritus Vini*, according to his Concession, abounds with salt, and is upon that score a *Menstruum*, and can be sooner reduced to salt than oyl, that for his own reasons, it may better derive its properties from salt, than from his imaginary oyl. He gives us an experiment *viz.* That *Spiritus Vini* dissolves the Crystals of Silver which it could not do, he says, unless it consisted of an *Acidum & Urinosum*; for no *Oleosa* whatsoever, must pretend to this effect. He challenges him to separate the salt from the oyl of Turpentine, which he thinks cannot be done; unless you destroy the nature of the oyl.

To his second proposition, that *Spiritus Vini* hinders coagulation, and to his Instance in common Milk, he says the contrary; *viz.* That spirit of Wine and Milk in equal proportions, will coagulate as Vinegar and Milk doe.

To the 3d, which is only an instance, that spirit of Wine dulcifies *Acids*, he denies it to be *dulcis*, but yet very corrosive, and that it is diluted only as water will yet more effectually take off the pungency of the *Acid*.

To the 4th, where spirit of Wine preserves bodies from turning to Vinegar, and stum liquors, Mr. *Kunkel*, says, that this is a plain proof of its being an *Acidum*; for the sower vapour of accended Brimstone produces the same effect: only with this difference, that the like *Acidum* in spirit of Wine is less copious, and for that reason you must use a much greater proportion of spirit. So that
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the induction is false, that there is no *Acid* in spirit of Wine, since *Acids* do generally, if not always hinder the fermenting of bodies.

To the 5th, he answers, that spirit of Wine digested with Syrup of Violets, will change the colour.

Dr. *Voight* having thus far been upon the Negative, by declaring what spirit of Wine is not, ; he now asserts it to be an oyl, which is ardent or inflammable, by no means upon the score of its Volatile salt, for then salt of urine must burn ; nor upon the account of any *Acid*, which has been already refuted ; much less upon the account of its water and Earth, for that were absurd : *ergo ratiōe Olei*. He gives an Instance how spirit of Wine may be reduced to a true oyl, for as it is a spirit, he says it has only lost the outward form and consistence of oyl, being made more fine and subtle, yet notwithstanding, he proposes a way to bring it to oyl again. Take a quantity of high spirit of Wine, put it into a Cucurbit, which is not very well closed, let it stand for 3 months, then endeavour to rectify it in a gentle *Balneo*, you will find little spirit that will rise, but a good quantity of inflammable oyl will remain at the bottom.

Mr. *Kunkels* answer does principally consist in denying the experiment, of reducing spirit of Wine to oyl, by the way and method proposed, or by any other : unless he perhaps first united some oyl with his spirit, and then the Air having sublimed the spirit, which was lighter than the oyl or water, by this means perhaps, he obtained some little oyl.

Dr. *Voight* examines an Epistle of Mr. *Kunkels*, sent to him for that purpose.

The first Præsupposition of the Author of the Epistle is, that all Vegetables contain an *Acidum* & *Urinosum*. The 2d. that all Fermentations produce *Acids*, which are separable by Art.

In answer to the first, Dr. *Voight* complains of his

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having omitted *Oleum*, which is more certain, and constant in all Vegetables, then *Acidum*. For pepper, Ginger, Camphire, Nutmeg, &c. have no *Acidum*. Thus we see oyl in abundance in *Seminibus Lini, Citri, &c.* and Flax affords this oyl before and after many Variations, into cloath, Paper, &c. which upon burning gives volatile salts and oyls, but no *Acids*.

Mr. *Kunkel* will not allow his instances in Pepper, &c. to be just, but on the contrary, that they contain a *Sal Volatile & fixum*, or an Alkali salt; In like manner does flax, and Paper, consist of much the same principles.

Dr. *Voight* goes to the second supposition, of the Author of the Letter, that all Fermentations produce *Acids*, which are separable by distillation. This he refutes, as contrary to experience, since mead, and Canary Wines, and even their Berlin Beer it self, will ferment very high, without any Acidity; but rather continue very pleasant, and sweet. He owns that there are Wines, both French, & Rhenish, that after fermentation, do tast a little sourish or sharp, but that he says, follows fermentation *ex accidenti ratione materiae*, for these Wines contain before fermentation, *Partes salinas* in that quantity, that they exceed the *Oleofas*. and so by fermentation, are brought into a *fluor*, or state of Acidity. In Spanish or sweet Wines, if you suffer their salts, by a considerable addition of water, or otherwise, to break the *Vinculum Unionis*, so that they are brought to be sour, this is not properly a *Vinum Fermentatum*, but *corruptum*. However, tho' this were true in Wine, it will not make it good in spirit of Wine.

Mr. *Kunkel* replies here, that he has not fairly prosecuted the work of Fermentation, which if he had done, out of all Vegetables, an *Acid* might be made.

In reference to other Wines, he confesses, they have a sour Ingredient in them, which he can easier produce, than a true oyl.

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He dislikes his too subtile distinction into *Vinum corruptum* & *Fermentatum*, both being slower, and effects of fermentation, may properly be called *Acetum* or Vinegar.

Dr. Voight proceeds; in the Epistle, he animadverts upon Mr. Kunkels Notion, viz. That salts by Virtue of their *Acidity*, do preserve bodys from corruption. This he says, is against reason and experience: for salts are endowed with a power *Solvendi, incidendi, corrodendi, dissolviendi, dividendi*: the most corrosive Menstruums, as *Aqua fortis, Regis, &c.* do justify it. As also the constitution of Vegetables, and Animals, both which do soon corrupt and dissolve, upon the account of their abounding with this saline principle. Nay salt it self, cannot resist the moisture of the Air, being soon resolved in it. He instances yet farther, in the common way of powdering or pickling flesh, declaring against the ill quality of salt, for depriving flesh of its proper and genuine taste, bringing it to an *Acorem*, and corrupting instead of conserving it; by making it unfit for nourishment, in producing diseases, &c. After this manner does Vinegar, instead of conserving a body, deprive it of its good Juice and relish: on the contrary he knows, how to make a Balsam of sugar, which is an oily body, that will easily preserve bodys; and 'tis well known, that oyls of Turpentine, of Myrrh, and spirit of Wine, do best conserve *Cadavera*. Moreover, he's so far from allowing this effect to his *Acidum*, that he will much rather yield it to his *Urinofum*.

Mr. Kunkel in his reply, refers himself to the good housewifery, and common custome, and universal experience, which justifies his salt, tho' an *Acid*, to be a true preserver of bodys from corruption: he then dislikes his conceit, that flesh abounding with salt, should therefore corrupt; but on the contrary, being sweet, and wanting salt, does therefore the sooner putrify. This he proves

by an instance, that a whole Ox has very little salt in it (I suppose he means of fixt salt,) he thinks a Pickled herring, or powderd beef, very unjustly termed corrupted Fish and Flesh. He wonders at his choice in preferring *Salia Urinosa*, for the preservation of bodys, before his *Acida*; these destroying the tast, and scent of bodys.

Dr. *Voight* takes up the Author of the Epistle, for urging an experiment, which he calls, against reason and experience: namely that a pound of rotten Wood, contains more *Acidum* or Alkali, then five pound of green Wood: he pronounces the quite contrary for truth, proceeding from one degree of Putrefaction, to what he calls a Central Corruption, or rottenness of Wood, where he found, that Wood no ways tainted, afforded the most salt, and that in every degree of greater putrefaction, or the more the Wood inclined to rottenness, the less salt it afforded, untill he came to that, which was quite rotten, this afforded none at all.

Mr. *Kunkel* answers as positively in his own behalf, that he is certain of the contrary, and could make it good.

Dr. *Voight* complains of the Authors Epistle, that he confounds *Salia Alkalia* & *Acida*; for they must needs differ in their natures, which make so great an effervescence in their mixture, as *Sal Tartari*, & *Spiritus Vitrioli* do. He demands an experiment how to make an *Acidum ex Sale Alkali*.

Mr. *Kunkel* answers, that while these salts are in their gross form (as he styles, it) they are very differing: but in a Book he calls his Annotations, he shews a way how to reduce *Alkalia* to *Acida*, & *Vice Versa*: and that only by depriving one of its Terrestricity, and giving it to the other. He instances in *Sal Absinthii*, out of which a spirit may be drawn to dissolve Gold.

He animadverts farther upon the Epistle, where he finds this assertion; [no body can deny, where you have heat and light, you must needs have two contraries, name-

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ly heat and cold, or an *Acidum* and a *Urinosum*.] This the animadvertor says, is *contra rationem*: for two contraries, *non possunt immediate eundem effectum producere*. He says *Acidum* & *Urinosum* may perhaps be externall or chance causes of heat, by promoting a sudden motion, and conflict in some bodys, but must not be confounded with the matter, that is inflammable. Thus water, and oyls of Vitriol mixt together, produce a much greater heat, then if you should put into the oyl of Vitriol, a quantity of Urinous salt: but 'tis plain, that in the water there is an *Urinosum*. Thus if you pour water upon *Calx Viva* (which is an Alkali, and has nothing to do with *Acidity*,) you will produce a great heat, yet we want here one of the two Principles of heat, *viz.* the *Acidum*.

Mr. *Kunkel* thinks he has made it clear, that these two Principles were demonstrated very plainly: he to elucidate the matter, gives us some effects of *Spiritus Acidi* (as for instance *Aquafortis*,) and *Urinosi* (as *Spiritus Urine* it self,) these two in conjunction dissolve Gold, make *Aurum Fulminans*, produce heat, flame, and even lightning. As to the experiment of water, and oyl of Vitriol, he answers, that tho' he should still continue to deny, that water holds no *Urinosum*, yet he must allow it to be a *frigidum*, which yet afforded this warming effect. As to the experiment of *Calx Viva*, he will not allow it to be without an *Acidum*. He would confirm his opinion, by an Instance of the great *Phosphorus*, (called in *England* the solid,) which he says hath nothing either Oleaginous or Resinous, but holds *Salia Acida* & *Urinosa*: and yet performs so many Luminous effects.

Dr. *Voight* makes further search into the Letter, and observes, that the Author gives the reason, why spirit of Nitre, and spirit of Wine, make so great an Ebullition, but spirit of Wine, and oyl of Vitriol none at all: *viz.* because Nitre is not so pure an *Acid* as Vitriol, for that reason, they may stand the quieter, and without Altera-

tion together. To this reason the Doctor gives no credit, for he says, spirit of Nitre is as pure as that of Vitriol, and that with spirit of Wine, they doe make an alteration: and the higher they are, the more they heat, but if very highly rectified, they will produce flame upon their mixture.

Mr. *Kunkel* seems to be in no wise of his judgment, that the mentioned *Acid* spirits, are of an equall purity; he thinks, in that of Nitre, there is some thing of an *Urinosum*; in the oyl of Vitriol, none at all. As to the experiment of flame, produced by oyl of Vitriol, and spirit of Wine, he tells him, that he read it out of an Author, but it never succeeded.

Since spirit of Wine is an oily body, the Author of the Letter, makes a question, how it comes to pass, that it makes no ebullition, and gives no colour to any spirit, except that of Nitre? to which Dr. *Voight* answers, because it causes no more ebullitions, for that reason, it approaches the nature of oyls; for *Acidum & Urinosum*, does only excite those ebullitions. He answers further, that it does indeed make ebullitions, both with spirit of Nitre, and of salt, but that it does so, by reason of an *Urinous* salt, it contains.

To this Mr. *Kunkel* thinks, he has copiously answered, and therefore supercedes.

In the Epistle, Dr. *Voight* answers, to this objection, that if spirit of Wine were an *Oleosum*, why it would not mix with oyl: he answers it, by proving the contrary, that if you put into high rectified spirit of Wine, oyl of Fennel, or Anniseeds, it will dissolve.

Mr. *Kunkel* replies, that it retains some few drops of this oyl, by reason of that small quantity of *Acidum* in the spirit; but if you impregnate it with more salts, it will take up, and dissolve more oyl. Also that it easily parts with this imbibed oyl again: but true oyls do all equally and thoroughly mix.

The Author of the Letter, having put another Query, about the *Causam Ebrietatis*, namely, whether it depended on a body, as Oleaginous, or as sweet, Urinous Alkalifate, answers *propter Acidum*? To which, Dr. *Vought* demands of him to shew an *Acidum inflammabile* taken out of spirit of Wine. He proceeds then himself, to give an account of drunkenness: that Wine affects the Animal spirits, not as an *Acidum Volatile*, for that does rather fix and coagulate the spirits, then excite them; that the *Salia Coagulata* will not operate, when *Resoluta* they only do perform quick actions; so that *ratione Olei*, rather than *Salis Acidi* Ebriety may be accounted for.

The Author of the Letter, will not allow it to produce drunkenness as an oyl: He quite de vests oyls of that quality, having never heard of any that got fuddled by drinking oyls: but that oyls have been taken into the body, as Preservatives against drunkenness.

Mr. *Kunkel* concludes with his address to the *R. S.* excusing himself upon this consideration of the great necessity of knowing the true nature of things: particularly of heat and cold: and that without a true account of the nature of salts, the harvest of Chymistry will be very poor. He complains of the great mistakes of Chymists, who for want of a thorough examining the parts of bodys, have mightily deceived themselves, and others: and also of the little agreement amongst the Analyzers of bodys, *Chimicè*, even in matter of fact. For which reason being resolved to bring things to an exact examen, he says, I began first to work upon salts, and because those of Vegetables were the easiest, I chose them. I observed that since the *Animalia* lived on *Vegetabilia*, that there was an Assimilation in their salts. In like manner I observed a very great affinity in the nature or constitution of Metals, excepting Gold, which required some extraordinary preparation to deal with it. This made me at length conclude,

clude, that there were two differing natures, both in salt and metals. This lead me to the consideration of heat, and cold, of the properties of Light, and of the Sun. But nothing has more taken up my thoughts, and engaged my contemplation, then that of light: of this I may perhaps, some time speak at large. The nature of water I find to be cold; and as there is an Universal cold, so there must be an Universal warmth: by vertue of these two, all things are generated; the Sperm of the Earth it self, is in the water. There is nothing comes nearer the nature of water, then salt, because that is first generated in it, and does easiest dissolve again there. I have also found, that because under ground there is a constant degree of heat, therefore those salts that are there generated, do maintain a greater degree of naturall heat, then such salts have, which had their Original above ground. Also because I found a remarkable difference in the separation of salts, and in the solution of Metalls, I sought after the purest salt; which I found to be in Vitriol, or Sulphur, having both the same Minera: but since in this, I found a hot and fiery temper or quality, in some other salt, I expected its contrary. Having often perceived *Salia Volatilia, & Urinosa*, to produce degrees of cold, without any Corrosive disposition; it made me search, and enquire after, an Universal *frigidum*, which I found in Water: but moreover, as soon as a Salt was generated there, I perceived it also to be warm, or of a mixt Nature, holding both heat and Cold together. In so much, that I could find no pure Salt, of one simple nature: But discerned, by reason of an ascending heat, and a descending cold, we had always a Præcipitat, which was for the most part, a salt, or the *Materia Salis*, which first of all seemed to become a very subtile Earth, which in time, as it hapned to be situated, became a more gross and conspicuous salt. If this water happen to fall upon a sandy ground, it cannot sink and rest there, but by a constant

constant Circulation, is driven and born upwards, wherefore such places prove barren. On the other hand, those places which do embrace water like a sponge, as the marsh lands do, these grow warm, and make almost an inseparable union, with the salt contained in the water, which makes that land very fruitfull. So that I cannot but believe, that there must be two contrary salts in *Regno Vegetabili & Animali*, that contraries are necessarily found in bodys soluble, and combustible, which overthrowes the Maxim: *Contraria in uno Corpore non, &c.* Again, in some measure tis true, *contraria inter se pugnare*, when by Motion, they are brought to a disproportion: but, when by nature, or Art, they are brought to contain true proportions, this proverb hath an end. Thus heat and cold, when one much prevails over the other, produce Thunder, and Lightning. But of this notion, I hope another time, to give a farther explication. I shall only speak a word, to the opinion of those, that think Thunder, & Lightning, proceeds from Sulphur, because they have found it to rain Brimstone; which is nothing else, but the yellow dust, to be found in the blossoms of the Fir Tree, and of the Pine Tree, and also of the Hazel, blown off, and carryed by the Winds into the Air, which is again thrown down upon the ground, by Violent storms of rain: upon the examination of this powder, they may soon find it no Brimstone. Others are carryed into this error, that heat, and flame, must needs proceed from oyl: but we must leave them in their meaning, because these imagine, they have hit upon some new thing. All new matters, if they have but a foundation of truth, are good, or bad, as they are made use of.

That I may not in an affair, wherein perhaps, you have made much better Observations, too long detain you, I shall only select an Observation, or two, wherein I have particularly observed, that a *Calidum & Frigidum*, are to be found in a Fulminating, and combustible body. I shall also be glad to be informed of the contrary by any

Chymist in Europe, if he can find out any body, that by a fair Chymical examen, does not contain *Calidum* & *frigidum*, except the true oyl of Vitriol, which (as we have already said,) has only so much *frigidum*, as it contains *Humidum* or common water, which is so far overballanced by the *Acidum*, that we can discern no *Frigidum* at all. In this Menstruum all metals can be dissolved, excepting gold, which requires a *frigidum*, to be joined with a *Calidum*.

These terms of *Acidum*, *Urinosum*, and Alkali, have so much confounded all men, that it has moved me, to write particularly, and copiously of them, *in Laboratorio meo Experimentalis*. But in short, I find all *Acida*, excepting *Oleum Vitrioli*, to consist of *Salia composita*, mixt with a *Sal Frigidum*. Alkali salts, are all much the same, if clean and pure, and nothing else but *Salia Acida cum frigidis*, and are much a kin to common sea salt, when that is dispirited.

The *Acids*, if you fix them by a mixture of Earth, become Alkali salts. But in case you joyn pure oyl of Vitriol with such an Earth, as *Cornu Cervi calcinatum*, which carry's in it no more of an *Acidum*, or of an *Urinosum*, this will not yet agree with other Alkalis, unless you give it a supply of an *Urinosum*.

Salia frigida if pure, are all homogeneous, let them be made of what Vegetables, or Animals soever: from whence I infer, that nature only makes use of these two principal parts: which since I came to understand it, has excused me from many a troublesome work or operation, and would also much lessen the processes of many, and lighten their labours, did they but know the true property of those bodies they work upon.

Since now I suppose my self, to have layd this firm Foundation, I will only hint at two or three well known materials, out of which heat, and Lightning may be brought, in which no *Oleum* can be demonstrated to have been contained. This I needed not to have done, because, you have made more Experiments your selves of this nature: I only do it with regard to the *Oleisti*, who
would

would fain introduce some new thing, even against experience; & who would yet farther confound, the confused World, through their opiniated Philosophical Arguments, whereas they had more need be lead out of mistakes. I shall begin with *Aurum Fulminans*; to prepare this, is so well known, that I need not describe the way. The Gold cannot be dissolved without a *frigidum*, but when it is once dissolved by it, it must be precipitated by the same again, e. g. with spirit of Urine; by this means, you get a powder, that gives a great report, a very clear light, and burns. If you cannot see the Lightning, for it is very transient, you may put out the Candle, and you will easily discern it. Here is nothing but an *Acidum* and *Urinosum* joined by an Earth; from whence this Thundring noise proceeds, of which in some Manuscripts, that I have yet by me, I have more copiously treated. Perhaps it may be said, that if I precipitated the matter, with salt of Tartar, it would be one and the same thing: why dos this make it heat as well, as if it were precipitated with an *Urinosum* or *frigidum*. I answer in few words: that there is already in the solution, as much of the *Urinosum* as is necessary, so that a farther affusion of an *Urinosum*, will not well agree. Therefore it happens, that when the Gold is precipitated by this Alkali, so call'd, the *Urinosum* may be so suppressed, as not to make an explosion (the reason of which is also well known to me,) now in case the precipitate should be dried, and imbibed sometimes with a spirit of urine, it will then recover its fulminating power again. So that we see, where heat and flame is, there must be two contrary Principles.

In the next place, If I take a good spirit of Nitre, and drop upon it *guttatim*, spirit of Wine, until it ceases to make an ebullition, the *Urinosum* is then in a ballance with the *Acidum*. Only put this salt in a heated crucible, and it will go off with an explosion; only you have here no report, but heat and light: but if you joyn it with an Earth (as *Aurum Fulminans* is,) you shall then have a re-

port. This spirit of Nitre, and calcin'd coral will doe, if they are inspissated, or brought to be dry. Iftwere necessary, I could instance in that burning mixture *ex Oleo Vitrioli, spiritu urinae, & Jove*: in all these we have a *Calidum & frigidum*, which is brought into motion by warmth, and may give you heat, Thunder, and Lightning as you please to manage it. Salt of Tartar, Sulphur, and Nitre, make a fulminating powder, he will err here, that will ascribe the effect to Sulphur, as if it produced it, by vertue of its oyl, it is very plain, that it proceeds from the two contrary salts. The *Acidum* alone produces heat, but no flame, unless the *frigidum* be added. Just as a red hot Iron, may burn, or scorch a thing, that it cannot bring to flame, unless the *frigidum* should meet it. Oyl of Vitriol burns wood, which it could not do, unless it met its contrary there. I will pass by the terrible heat, excited in the solution of *Jupiter & Mars*, altho' many such might be appealed to, which are well known to the experienced. I shall only mention the wood coal; take it & let it be thoroughly kindled, and then go out of it self: kindle it thoroughly once more, and let it quench, or go out in a crucible or some place where the cold Air, may not too much annoy it: this may be done ten, or twenty times successively, and it will continue to give heat, and light: if this came from oyl, sure it must needs be a very fixt oyl, and tis impossible it shou'd perform such a work: but a *Sal duplicatum*, which by vertue of its terrestreity, is call'd an Alkali, is to be found here.

But least I detain you too long, I shall conclude with my desires, you will not ill resent this my Address, but at your leasure hours, set down your determination in a Page, whether I have treated things contrary to truth and experience, whatever it be, I shall willingly embrace it, and be glad to be better informed, &c.

F I N I S.

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