by Mr Peter Derante, *Surgeon in* Waterford. No. 370. *p.* 15.

came there, I found his Surgeon along with him, who told me, That the Man would do very well, becauſe he was in no Pain at all; however, I deſired him to take off the Dreſſings, and let me look on it. Which being done, I found it was black and inſenſible from his Fingers to his Shoulder, and therefore adviſed the Extirpation of it immediately, but his Surgeon oppoſed it; however, I ſcarified it in ſeveral Places, and very deep, and then applied a warm Dreſſing. Next Day the Ship put to Sea, and the poor Creature was ſent to *Waterford*, and committed to my Care. As ſoon as I could get my *Apparatus* ready, I cut off his Arm as high as poſſible; then I cauterized the Stump, which was perfectly mortified as high as the *Acromion*. Next day I perceived the Mortification ſpreading toward the lower Angle of the *Scapula*, then I rubbed the Edges of the Mortification with armed Probes dipped in a Solution of *Argent. viv.* in *Aq. Fort.* which compleatly anſwered my Intention; for from that time the Mortification ſpread no further; next Dreſſing I ſcarified and cauterized all the mortified Part, and dreſſed it *ſ. a.* I continued this Method for 17 or 18 Days, and then the Sloughs began to ſeparate and caſt off daily; ſome time afterwards the *Scapula* began to part from the *Os Humeri* and *Clavicula*, and at length came out whole; I was then put to it what to do about the ſtump of the *Os Humeri*, which ſtill adhered to the *Pectoralis* and *Latiſſimus Dorſi*; but in a little time it alſo ſeparated and came away, without any Hemorrhage ſucceeding, which I expected. I was afterwards obliged to cut off part of the *Clavicula*, before I could cicatrize the Wound, which was ſoon afterwards accompliſhed.

A preternatural Tumour on the Loins of an Infant, attended with cloven Spine; by W. Rutty, *M. D. F. R. S.* No. 366. *p.* 98.

III. Mr *Ruyſch*, in an Obſervation on the *Spina biſida*, takes notice that other Writers have deſcribed it to be cloven into two equal Parts longitudinally, as Butchers ſplit the Back-bone of an Ox or Sheep; whereas out of ten Subjects, which he had an opportunity to examine, not one proved to be in that manner, the body of the *Vertebræ* being entire, and the *acute proceſſes* only divided. Pretty near this Deſcription, is the Spine to be treated of. The Back-bone is of a female Infant 6 Days old; whoſe Mother, when 7 Weeks gone with Child, upon a Fright occaſioned by her Huſband's falling from a Horſe, and very much bruiſing his Loins, gave the *Embryo* this Injury: but notwithſtanding ſhe went out her time, and the Child was full grown. There appeared upon the region of the Loins, in the ſame place where the Father received his hurt, a Tumour about the bigneſs of a ſmall Turnep, with a broad Baſis, around which the Skin was diſcoloured, as by an *Ecchymoſis*, but it grew immediately from thence pellucid, like a Veſicle raiſed by *Cantharides*, and continued ſo throughout, except juſt at it's Apex, where was a ſubſtance like a *Fungus*. This Bladder was filled with a Liquor, which in ſcent and colour reſembled the true Urine: inſomuch that, upon ſtrictly examining

Fig. 120.

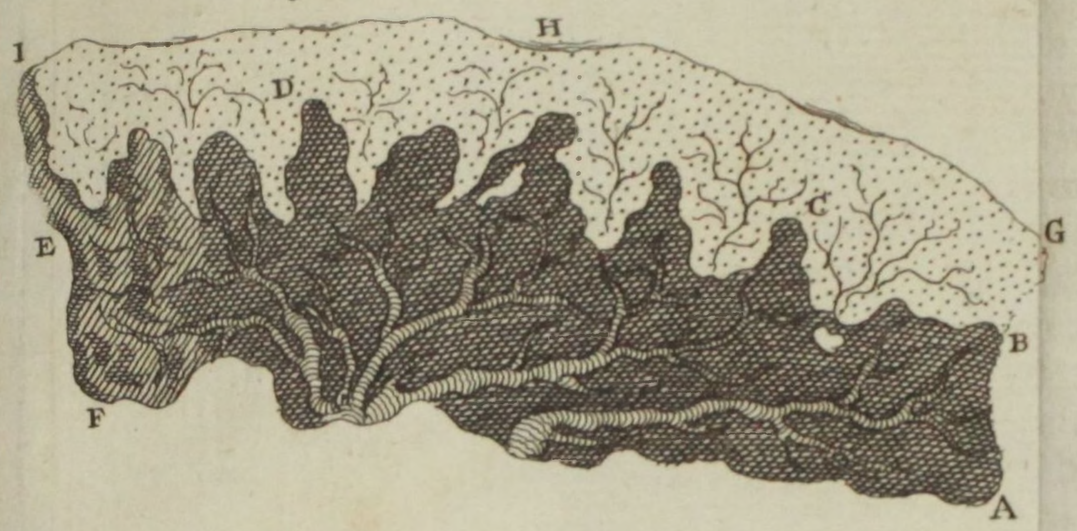


Fig. 121

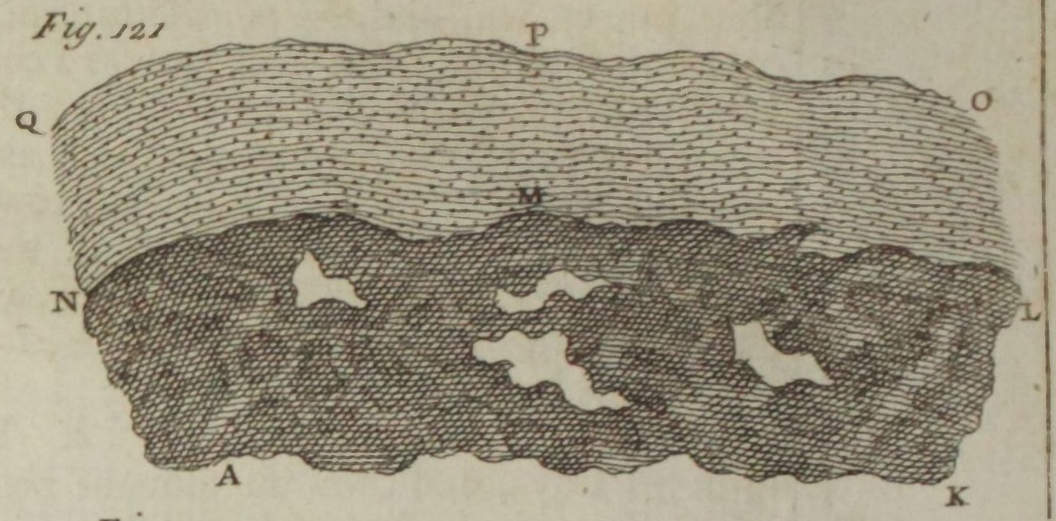


Fig. 122

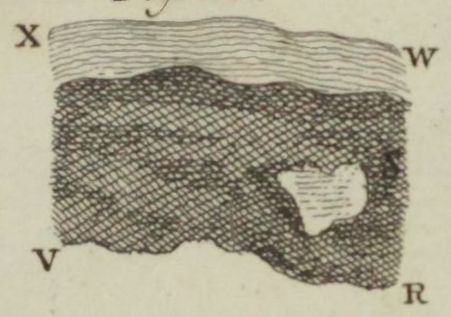


Fig. 124.

Fig. 123

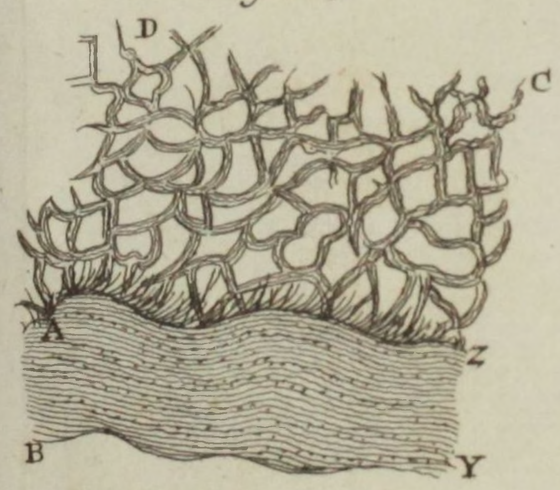


Fig. 125

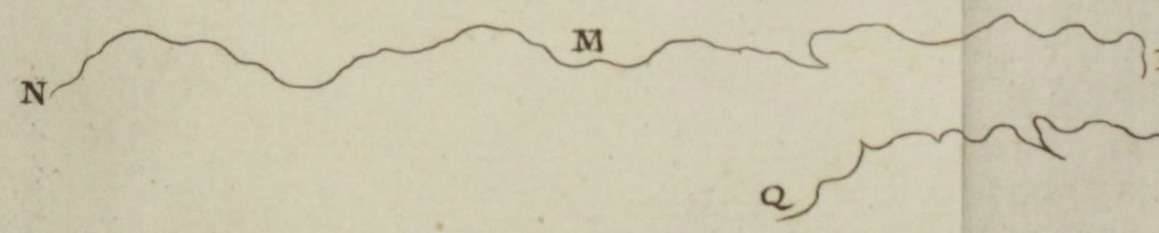
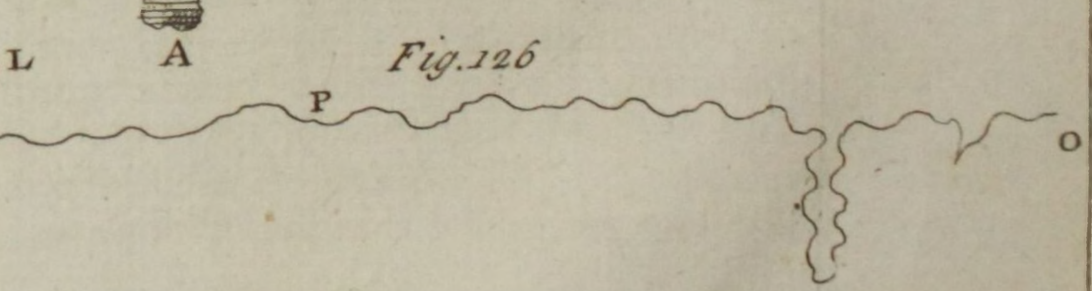


Fig. 126



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examining the Linnen ſtained by what iſſued from hence, with that from the *Pudenda*, we could perceive no ſenſible difference, and concluded there was a Communication between the left Kidney and the Orifice, into which the Surgeon's Probe paſſed obliquely upwards, about an Inch. Whether the ſame Similitude may hold betwixt the Urine and this Liquor, in all Caſes of the like Nature, I have not had opportunities to obſerve: but as Mr *Ruyſch* has taken no notice of it, in ſuch a number of Subjects, that have been before him, I am apt to think, that it does not; being eaſily perſuaded, that if it did, it would not ſo often have eſcaped his inquiſitive Reſearches. The Kidneys, contrary to Expectation, were perfect, and did not any way communicate with the outward Orifice. But upon clearing away the fungous Subſtance, which took up all the *Sulcus* or hollow of the *Spine*, we found where the Perforation tended, a long Probe eaſily paſſing up the Channel, which contains the *Medulla Spinalis*. Throughout this *Fungus* were diſperſed a great many endings of ſmall Nerves, from whence diſtilled this, as it were, urinous Liquor, which occaſioned the Tumour: The reſt of the *Medulla* was more compact, and filled the Cavity of the *Spine*, tho' in ſome Subjects it has been waſted to ſuch a Degree, that by blowing into the Orifice you may inflate the *Dura Mater*. The coat of the Tumour conſiſted at it's Baſis of the *Cuticula*, *Cutis*, and *Membrana adipoſa*: the two firſt of which forthwith terminating, the *Cuticula* only was continued, immediately under which appeared the *Muſcles* and *Fungus* abovementioned. In this it differs from thoſe of Mr *Ruyſch*, which received their Coats from the Membranes that cover the *Medulla*: as likewiſe from thoſe taken notice of by *Tulpius*, which borrowed theirs from the *Peritonæum*, as he ſays, tho' by his own Deſcription, it is more likely they proceeded from the ſame Membranes. Theſe Tumours conſtantly attend the *Spina bifida*; inſomuch that when any of them preſent themſelves on the Loins or Back, of a new born Infant, we have good grounds to pronounce *This* to be the Cauſe; but we may be poſitive in it, if the Child cannot move it's lower Limbs, the want of which Motion is an infallible Indication, that the *Medulla Spinalis* reaches no farther than the Swelling, whereby the Nerves are not diſtributed to thoſe Parts. They appear differently in different Subjects. In ſome the whole Tumour is *opake*, which proceeds from ſmall Filaments of Nerves propagated in great Numbers throughout it's coat, and not from the Thickneſs of the Skin, as *Ruyſch* will have it. In others it is *pellucid*, and then the *Medulla* terminates at once at the Aperture of the Spine, and does not ſhoot out into any Ramifications. This before us is a Compoſit of both Species, the greater part of which was pellucid, the leſs, *viz.* the Apex, *opake*. The Back-bone itſelf, is not cleft, but has it's *Vertebræ*, with their *other Proceſſes* entire, and is only defective in it's *Spines* or *acute ones*. But that portion of the *Vertebræ*, which ſhould make an acute

Angle, from whence their *Spinal Processes* naturally arise, in order to form the *Specus*, or Passage for the Marrow, instead of that, gapes and lies almost in a strait Line on each Side; whereby the *Medulla* is defrauded of it's usual Guard from external Injuries. This Defect begins at the third *Vertebra* of the Loins, and is continued to the End of the *Os Sacrum*: Which last is very extraordinary, it scarcely ever happening to this Bone; the Reason of which I take to be the more than ordinary Compactness of the *Vertebræ*, whereby it is less liable to be injured by any Impression. For we observe, that in Adults they grow so close together, as to unite and form one large and solid Bone.

As the Case before us is a *Vitium conformationis* owing to the Mother's Imagination, so the same sometimes is occasioned by Matter lodging upon the Spine, and eroding the *Vertebræ* by it's Acrimony: But then you find a *carious Bone*; whereas in these *preternatural* Cases, there remain no such Footsteps. This was observed in the Body of the late Lord *Peterborough*, as related by Mr *Cowper*; upon the Opening of whose Body he found a large Tumour, from whence flowed a brownish coloured Matter; and under it, the upper and fore Part of the ninth, and the lower Part of the eighth *Vertebræ* of the *Thorax* were consumed and gone, the *Medulla Spinalis* being covered with it's Membranes only. This gave Rise to those Symptoms in that morbid Case, so nearly resembling the above recited in this preternatural one. It is manifest from what has been said, that these Cases are incurable, and must in a little time kill the Patient. But it is almost immediate Death to open the Tumour; which every Surgeon will naturally do, that has not seen or read concerning it; the Fluid seeming to require a Discharge.

A Case in Surgery, which is commonly mistaken for a Fracture of the Patella; *by Mr* Deverel, *Surgeon at* Bristol. N° 365. p. 44.

IV. *Richard Burt*, living near *Bristol* was thrown from his Horse, and in the Fall received such a Hurt in one of his Knees as made him incapable of remounting: He felt somewhat crack in that Knee (as he expressed it) before it touched the Ground. Upon examining the Part, I found (as I then thought) the Ends of the broken Bone drawn above 4 Fingers distance from each other: But upon a stricter Examination of the Parts, I found the *Patella* (which was drawn upwards by the Extensors of the Leg) retained it's natural Figure, and that the Hardness which was felt below was the End of the torn Ligament that ties it to the *Tibia*. The Ends of the Ligament were brought as near as possible, and kept so about 3 Weeks without any very remarkable Accident intervening. He then began to walk, which was a little too soon, causing thereby some Pains, and loosening the Cicatrix, which made it the longer before it was perfectly firm; however he walks now without any perceptible Lameness. I have met with two others in the same Case; the one a Person of Distinction, who has not met with the good Fortune of walking so well as she used, tho' not for want of all the Care and Circumspection

ſpection imaginable ; for it is hardly to be expected that one in ten, to whom this Accident happens, ſhould ever go right, it being next to an Impoſſibility that the Ends of the torn Ligament ſhould be ſo placed, and retained, as not exalcty to lie one over the other.

Pareé in the 22d Chapter of his 15th Book affirms, that he never ſaw one of thoſe who have had this Bone broken, but that halted during the reſt of their Lives : I am very apt to believe what this excellent Author affirms about the halting, and am ſorry I muſt diſſent from his Notions of the Caſe, and the Cauſe of the Lameneſs. *Hildanus* in his *Obſervationes Chirurgicæ*, *Cent.* 5. *Obſerv.* 88. *p. m.* 485, has given us a Hiſtory of a tranſverſe Fracture of this Bone, which, after all the Symptoms were removed, was cured. *Sed claudicatio ac ſumma imbecillitas totius cruris ſecuta eſt, ita ut non niſi maxima cum difficultate ambulare poſſit.* He afterwards mentioning the Cauſe of the Lameneſs, makes a Quæry, if what *Pareé* (to whom this Obſervation is dedicated) ſays in his *Exc. lib. de Oſſibus*, *lib.* 4. *cap.* 2. can be the Cauſe of the Lameneſs ; his Words are, *Etſi vero opinionem hancce rationi conſentaneam eſſe in dubium revocare minime conabor, unus tamen reſtat ſcrupulus, viz. an, fractâ patellâ, extuberantia calli talis eſſe poſſit, ut cavitatem hancce (quae inter femur & os tibiae magna eſt) adeo ad impleat ut motum actionemque genu impedire poſſit ? Videmus enim ut plurimum in reliquis oſſium fracturis, (niſi contritio oſſis & perioſtei fuerit maxima) naturam tam decenter & eleganter connectere oſſa, ut raro relinquatur veſtigium fracturae. Perioſteum enim, quam diu integrum eſt, materiam calli retinet, quo minus in extuberantiam excreſcere poſſit, niſi, &c. Deinde in hoc noſtro Ægro callum non fuiſſe cauſam claudicationis ex ſequentibus apparebit : quapropter diſtinctione hic opus eſt.* After this he goes on to ſhew us how many ways this Bone may be fractured, but doth not obſerve that he ever ſaw it any other way broken, (unleſs in a Gun-ſhot-Wound) than tranverſly ; if he had, I am perſuaded, that this curious Obſervator would never omitted it in his Obſervations. *Ruyſch* in his *Centuria Obſervationum Anatomico-Chirurgicarum* 4to, *Obſ.* 3. writes as follows: *Patellam propter duritiem ſuam haud frangi poſſe nonnulli perverſe aſſerunt. Nos vero eandem non ſolum à caſu graviori in genu frangi experti ſumus, verum etiam ſine caſu ; cujus rei Hiſtoriam recenſere animus eſt. Ante tres praeter propter annos, viſitavi cum Magiſtro Petro Adriani filio, virum ſatis robuſtum, qui à ponte deſcendens in terram fere ceciderat ; uno pede lubrico, reſiſtens tamen quantum potuit, in terram non fuerat prolapſus ; ſed ab illa reſiſtentia vehementiſſima tranſverſim fracta ejus patella, & adeo quidem evidenter, ut inter utrumque locari potuerit manus, una enim ſupra altera infra genu ſentiebatur.* This Obſervation is ſo like in all it's Circumſtances to that which I related above, eſpecially in that the Fracture was made without a Fall, that I am very apt to believe it is the ſame ; and imagine he might be deceived by miſtaking the hard End of the Ligament for the broken Bone. And when theſe Sort of Accidents, which are now called Fractures

of the *Patella*, come to be nicely examined, they will perhaps be found to be generally of the ſame Nature.

Of the difference in the Height of a human Body, between Morning and Night, by the Rev. Mr Waſſe. No. 383. p. 87.

V. 1. Having obſerved ſeveral Soldiers diſcharged for being a little under the Standard, and having experienced the difference of a Man's Height in the Morning and at Night, I mentioned it to an Officer, and thereby kept ſome Perſons from being turned out of the Service. Since that Time I have meaſured a great many ſendentary People, and Day-Labourers, of all Ages and Shapes, and find the Difference to be near an Inch. I tried myſelf, when ſitting, and found it in the like manner; particularly *Auguſt* 21, 1723. Weather warm, no Wind, at 11 in the Morning I ſat down, and fixed an iron Pin ſo as to touch it, and that but barely. After that, I fatigued myſelf for ½ an Hour with a Garden-Roller; and the Conſequence was, that at 12 H. 30 Min. I could not reach the Nail ſitting, by about $\frac{5}{10}$ of an Inch, or the Breadth of one of the Rods of *Hunt*'s Sliding-Rule. At 2 the ſame Day I wanted near $\frac{6}{10}$ of an Inch. On the 21ſt at 6 H. 30 Min. in the Morning, I touched the Nail fully; and after the above-mentioned Exerciſe for only ¼ of an Hour, at 7 H. 14 Min. I fell ſhort almoſt as much as before. On the 27th, having ſat up late with ſome Friends, I was ſaint, and felt myſelf heavy upon the Ground, and without any Spring, and at 9 that Morning I did not reach the Nail, tho' I had uſed no Exerciſe. I rid out, but could not reach it that Day. On the 28th I rid about 4 Miles; and whereas at 6 that Morning I reached the Nail, I had loſt $\frac{6}{10}$ of an Inch by 8. *Septemb.* 19, I came from *Oxford* a little tired, and next Morning at 8 I wanted ½ an Inch. If I ſtudy cloſely, tho' I never ſtir from my Writing-deſk, yet in 5 or 6 Honrs I loſe near an Inch. All the difference I find between Labourers and ſedentary People is, that the former are longer in loſing their Morning Height, and ſink rather leſs in the Whole than the latter. I cannot perceive, that when the Height is loſt, it can be regained by any Reſt that Day, or by the Uſe of the cold Bath. I have not informed myſelf ſo well about Horſes. My Mare comes 7 this Graſs, is ſtrong, ſhort backed, and well legged. I meaſured her before and after riding 20 Miles, *April* 30, and could not perceive the leaſt difference in her Height. The Alteration in the human Stature, I imagine, proceeds from the Yieldings of the Cartilages between the *Vertebræ*, to the Weight of the Body in an erect Poſture.

This curious Obſervation has been confirmed by ſeveral Members of the Royal Society, and others who have purpoſely tried the Experiment.

Remarks on the foregoing Obſervation; by Mr W. Becket, *F.R.S.* No. 383. p. 89.

2. I have obſerved farther, that in young Perſons the Alteration has been more conſiderable than in thoſe that have been aged. The Trials equally ſucceeding in a ſitting as in a ſtanding Poſture, will naturally lead us to believe, that it muſt neceſſarily be from the Trunk of the Body, or ſome of it's Parts, that this remarkable Alteration

teration is brought about. Now every body knows, that the Standard of a Perſon's Stature has been always looked upon to be determined by the whole *Compages* of the Bones, adjuſted by the Divine Architect according to the ſtricteſt Rules of Geometry. But there is ſomething ſo wonderful in the Structure and Diſpoſition of the Spine, that nothing but ſuch a peculiar Contrivance could ſo curiouſly have fitted it for the reſpective Uſes and Purpoſes it was ordained for. The Thickneſs and Shortneſs of the Bones, with the intervening Cartilages, aſſiſted by the bony Proceſſes, diſpoſe it to a Motion peculiar to itſelf: Whereas, had the Bones been of any conſiderable Length, upon bending the Body, the Articulations muſt have made a large Angle upon their inmoſt Edges, and the ſpinal Marrow have been continually liable to be injured; or had the Cartilages been entirely wanting, it would have been as uſeleſs as if it were but one Bone, whereby we being rendred incapable of bending the Trunk of the Body, it muſt have always remained in an erect Poſture. But by the preſent Diſpoſition of it's Parts, it is not only abſolutely ſecured againſt any ſuch Inconveniencies, but, altho' ſo ſmall a Pillar is capable of ſupporting, without hazard, ſuch prodigious Weights, as we are not wanting in our Accounts of. Another Particular, which beſpeaks the utmoſt Wiſdom and Deſign in the Contrivance of this Part, is, the remarkable Difference there is in the Thickneſs of the Cartilages, placed betwixt the Bones of the Spine; the *Vertebræ* of the Breaſt requiring but little Motion, the Cartilages are there but thin, in compariſon of thoſe of the Loins, which being very thick, the loweſt more eſpecially, the Motion is there vaſtly greater; and the Cartilages being abundantly thicker before than behind, this is the Reaſon that we bend our Bodies ſo much more forward than backward. And by this admirable Method of diſpoſing of the thicker Parts of the Cartilages forward, it is, that in all violent Exerciſes, the Parts contained in the Belly and Breaſt are in a great meaſure ſecured from any Damages to which they might have been liable, becauſe by the Pliableneſs and Elaſticity of theſe Cartilages, they break the violent Shocks the *Viſcera* muſt otherwiſe have neceſſarily ſuſtained upon ſuch Occaſions. From what I have here remarked, in relation to theſe peculiar Properties of the Cartilages placed between the Bones of the Spine, we may reaſonably ſuppoſe them to be certain compreſſible, dilatable, elaſtic Bodies, which like other Bodies, endued with the ſame Qualities, will naturally yield to any incumbent Weight, ſufficient to force the Particles of Matter of which they conſiſt, into a more ſtrict and cloſe Union, and that when this compreſſive Power is removed, they will of themſelves recover that State they enjoyed before they were obliged to give way to that Preſſure. Now I am here particularly to obſerve, that the loweſt of all the Cartilages of the Loins is the thickeſt, and ſo conſequently that it contains a greater Quantity of Matter than any of the reſt; by which

Means it becomes more diſpoſed to have it's Thickneſs diminiſhed, and that all of them gradually become thinner, even to the top of the Spine. Now all ſuperiour Bodies, if they come to an immediate Contact, preſſing upon their inferiour, it muſt neceſſarily follow, that the whole Weight of the Body, except the lower Limbs, muſt preſs upon and be ſuſtained by the loweſt *Vertebræ* and their Cartilages; but theſe Cartilages, as has been obſerved, being much thicker in this Part than the other, and the incumbent Weight bearing harder upon them, they muſt be unavoidably compreſſed more than the other; and ſo, conſequently, when this Weight is removed, their Expanſion, from their natural Elaſticity, will be greater alſo. This being the natural State and Diſpoſition of theſe Parts, during the whole ſpace of Time we are uſually employed about our neceſſary Avocations till we diſpoſe ourſelves to Reſt, the Cartilages of the Spine will, by their compreſſible and yielding Properties, become more cloſe and compact from the perpendicular Preſſure they ſuſtain, and ſo conſequently the Spine, the only Support of the Trunk of the Body, will become ſhorter. But when this ſuperiour Weight ſhall be entirely removed, by placing the Body in a horizontal Poſture, as it always is when we are in Bed, the compreſſed Cartilages will, by their natural elaſtic Power, begin gradually to enlarge themſelves, till they recover the ſame expanded State they enjoyed before they were forced to give way and yield to the incumbent Preſſure; and ſo conſequently it will produce a conſiderable Alteration in a Perſon's Stature, agreeable to the determined Times mentioned in the preceding Letter. For if we only conſider that the before-mentioned compreſſive Power will leſſen the Thickneſs of all the Cartilages, in proportion to the quantity of Matter they contain; and that there are uſually reckoned about 24 in Number, it will be no difficult Matter for us to apprehend, that their natural Expanſion being recovered by our cuſtomary Repoſe, the Aggregate of the whole of the Expanſions may amount to about an Inch. Now if the Alteration be ſo conſiderable as this, occaſioned only by the bare incumbent Weight of the ſuperiour Parts of the Body, without any additional Force applied to compreſs the Cartilages yet cloſer, how much more may we reaſonably imagine it would be, were the Experiment tried on ſuch Perſons, whoſe uſual Employment it is to carry heavy Burdens. I have only this one Particular farther to obſerve upon this Head, which is, that this Alteration is not to be expected to be the ſame in aged Perſons as in thoſe that are younger, becauſe the Cartilages, as we advance in Years, gradually grow harder, and till many of them arrive to the ſolidity of a Bone; that is, by degrees they loſe their Spring or expanſive Power, and at length continue in a compreſſed State of Reſt. And this is without doubt one principal Cauſe, why old People not only ſeem to have loſt ſomewhat of their Height, but are actually ſhorter.

VI. 1. Haud

VI. 1. Haud ita pridem, circa magnum illud & necessarium organum, quod diaphragma vocitamus, vehementi sum motu correptus; adeo quidem ut adstantes non parum turbarentur. Cum motus remitteret, & morbi illius nomen exquirerem, Medicus, qui aderat, cordis esse palpitationem respondit. Ergo vero Medicum falli censebam, licet enim, durante motu, pulsum arteriae saepius manu explorarem, nullam pulsus accelerationem percepi. Vehemens ille motus, per intervalla recrudescens, tres circiter dies duravit; quo tempore stomachus mihi & intestina in officio motuque cessabant, mortemque pro foribus esse certissime credebam. Ego vero obstructionem in diaphragmate haerere judicabam, non minorem nummo imperiali.

A Palpitation of the Diaphragm; by Mr Ant. a Lewenhoek, *F. R. S.* No 377. *p.* 341.

2. Ut autem de hac Diaphragmatis affectione omnem mihi dubitationem eximerem, Diaphragma ovis anniculae ad me deferendum curavi; partem illius Diaphragmatis in minuta frustula consectam, ope microscopii, qua potui diligentia consideravi; comperique Diaphragma ex parte compositum esse ex tenuissimis fibrillis; quae sine microscopio conspectae latum circiter capillum inter se distant. Cum deinde diversa Diaphragmatis frusta diversis microscopiis applicuissem, & visu diligenter examinassem; pro certo statui fibrillas illas ex partibus exoriri carnosis, quae Diaphragmati circa costas intexuntur. Easdem fibrillas Diaphragmati vice tendinum inservire judicabam. Tendines isti, sic mihi dicti, non sunt per totum Diaphragma aeque sibi vicini: Quin alii aliis, quamvis sibi vicinis, sunt aliquanto crassiores. Cum autem & fibrillas modo dictas, & membranam inter fibrillas exporrectam, rite consideraſſem; animadverti Diaphragma, quantum ad maximam sui partem, ex fibrillis istis, & membrana fibrillis interjecta, compositum esse: Si tamen vasorum sanguineorum & copiosi adipis, quae Diaphragmati magna copia insident, rationem modo non habeamus. Membrana vero, inter tendines (ita mihi dictos) interjecta, tot rugulis exiguisve plicis scatebat, ut pene obstupescerem: istas autem rugas sive plicas ad hunc usum naturaliter destinatas esse credebam, ut Diaphragma per aëris inspirationem extensum rursus contraherent; eaque ratione opem suam conferrent ad aërem, qui Pulmones per inspirationem impleverat, inde expellendum. Ut Diaphragmatis contexturam oculis spectandum exponerem; exiguam Diaphragmatis ovilli modo dicti portionem delineari, designari curavi. Ubi B G, C F; & D E, tres sunt tendines, ea magnitudine expressi, quam microscopium oculis exhibebat: qui tendines, ut jam ante monui, magnitudine non parum inter se differunt. Inter illos vero tendines membranam interjectam videmus; ex quibus tendinibus, & interjecta membrana, Diaphragma maximam partem compositum esse modo dicebam. Ut autem de vera iconis hujus magnitudine judicare possitis, delineatorem, ut veram frustuli delineati magnitudinem digito indicaret, rogavi; qui mox spatium inter Y Z in icone 130 commonstravit. Adhaec membranam modo dictam permultis iisque exiguissimis foraminibus pertusam esse observavi: quae ab

Of the Structure of the Diaphragm; by the same. No. 379. *p.* 400.

Fig. 127.

Fig. 130.

ab abdomine patebant in pectus, & a pectore viciſſim in abdomen. Cum autem fieri non poſſe hactenus judicaverim, ut humor quiſpiam ex pectore delabatur in abdomen, vel ex abdomine ſubvehatur in pectus; nunc ſatius mihi videtur, judicium ſuper ea re meum ſuſpendere. Quin ſic mecum diſſero; forte etiam pulmonibus noſtris vaſcula inſunt incomprehenſibilis exilitatis. Quippe ſi cogitemus, quantum humoris ex pulmonibus noſtris per exſpirationem educatur in aërem, prae exigua humoris copia quam inſpirando ex aëre inferimus in pulmones; facile in ſententiam illam propendebimus. Sed & hoc non ſemel obſervavi, quod fibrillas illas, quas tendines appello, vaſa quaedam perrepant itinere tranſverſo. In alio ejuſdem Diaphragmatis fruſtulo, quod microſcopio applicatum ſervabam, clare intueri licebat ſtructuram exortumque membranularum; quas inter fibrillas, ſive tendines ſic mihi dictos, interjacere dixi. Membranulas illas permagno plicarum numero, inſtructas videmus: quae omnia exhibentur ad L K. Fibrillae vero, deſignantur per L M N O P Q. Verum fibrillae iſtae ſunt hic majores, quam uſpiam mihi occurrerint. Praeterea membranam illam, ex qua Diaphragma maximam partem conſtare dixi, quamvis tam tenuem, a ſe divelli, & exiguam avulſae partis portionem ope microſcopii exprimendam curavi. Quod eo conſilio feci, ut laceros tendines atque membranulas, quantum ars imitari naturam poterat, oculis ſubjicerem. Ergo hic per R S T V particula indicatur tendinis extenſi: ubi & exiliſſimae exhibentur fibrillae, ex quibus praedicta tendinis portio contexta eſt. Per V T & W X portio deſignatur tendinis quieſcentis. Iſtud vero neque explicari, neque ſatis comprehendi poteſt, quam incredibilis fibrillarum, vaſculorum, & particularum numerus hic inter ſe conglomeretur; & ad tenuiſſimae membranae, Diaphragmatis inquam, formationem concurrat. Sic autem ſtatuo, quoties validius inſpiramus, omnes illas plicas ſive ſinuoſas corrugationes in Diaphragmate evaneſcere atque complanari: quoties autem exſpiramus, Diaphragma rurſus in plicas rugaſve contrahi, quod & ſuperius notavi. Dum igitur tantam adipis copiam in Diaphragmate gigni, & congregari videmus; praetereaque cogitamus ſubſtantiam Diaphragmatis per adipem illum ſic utrimque poſſe craſſeſcere, ut in tumorem extuberet; facile intelligemus Diaphragmatis expanſionem atque contractionem ea ratione poſſe impedire atque pigreſcere, atque hinc ſpirandi difficultatem conſequi: ob quam rationem homines obeſos prae aliis anhelos eſſe judicamus. Modico autem adipe Diaphragma perfundi oblinique neceſſarium ſtatuimus: cum enim id ſingulis horis nongenties expandi & nongenties contrahi neceſſe ſit; motus illos per adipem magnopere adjuvari cenſemus. Ceterum frequentiori indagatione explorare conatus ſum, qua ratione carneae Diaphragmatis partes, quas coſtis vicinas eſſe dixi, tranſiiſſent in membranam; ſive qua ratione membrana Diaphragmatis ex illis eſſet exorta. Verum licet indagationem illam crebro frequentarem, ipſe mihi ſatisfacere non potui. Jam & illa dubitatio me ſubierat,

Fig. 128.

Fig. 129.

ſubierat, an non tendines, vaſculis ſint inſtructi: Et licet microſcopio meo vix tantum tribuere auderem; tamen tertio poſt die indagationem iteravi, & tendines tranſverſe diſſecui: quando & illuc indagationem meam dirigebam, ut etiam in membrana Diaphragmatis, quam rugoſam eſſe dixi, ſanguinea vaſa ſecundum longitudinem tendinum protendi, imo octonos denoſque invicem adjacere viderem. Inde ad membranam, quae tendines quaſi circumveſtit, oculos converti; in eaque tam ingentem obſervavi numerum exiliſſimorum vaſculorum, ut admiratione defixus haererem. Complura iſtorum vaſculorum velut areolis incluſa jacebant; quae tendinum tranſverſe perſectorum vaſcula eſſe cenſebam. Ut autem eorum omnium, quae modo narravi, teſtem haberem ocularem; microſcopium iſtud, cui dictas Diaphragmatis particulas applicaveram, Chirurgo meo tradidi; qui dicta mea cum iis quae videbat adamuſſim convenire reſpondit.

Hac tamen obſervatione non contentus, comparavi Diaphragma bovillum; ex quo circa partes illius carneas, quas coſtis adjacere dixi, fruſtum circiter palmarium excidi: comperique Diaphragma bovillum circiter quadruplo craſſius eſſe ovillo; & hanc craſſitudinem maxima ex parte illius adipi acceptam eſſe referendam. Ex inde ex illa Diaphragmatis portione lamellam quam potui tenuiſſimam abſcidi; quoties enim paulo craſſiorem exſcindebam, perſecabam adipem, qui verſus medium Diaphragmatis portenditur; puta ubi Diaphragma ſatis eſt craſſum, neque adipis expers. Diaphragma vero utrimque, id eſt, ſuperius atque inferius, quatuor diſtinctis conſtat membranis, earumque tendinibus; qui tendines membranis veluti incluſi deliteſcunt. Iſtorum autem tendinum ingens multitudo non poterat mihi non admirationem parere: neque ſatis credibile videbatur in corpore, cujus ſtructura functioneſque tam parum ſunt cognitae, in Diaphragmate inquam, tales tamque multiplices partes includi. Ut Diaphragmatis bovilli ſtructuram oculis exponerem, partem illius ad A B C D *Fig.* 131. exprimendam curavi, ubi primo quatuor exhibentur partes diſtinctorum tendinum, qui magno numero invicem adjacent, & ſupra in Diaphragmate ovillo etiam ſunt exhibiti. Verum per integrum bovis Diaphragma iſtiuſmodi diffunduntur exiguiſſimi tendines, quos ego quidem ſic appello. Et hos quidem tendines, una cum membranis, neceſſe eſt in rite conſtituto corpore ſine ulla intermiſſione alternatim extendi atque contrahi.

Tenuiſſimas illas fibrillas, uti & membranarum rugulas plicaſve, per crebram indagationem etiam ex voto meo deprehendi in Diaphragmate ovillo; nec ipſe tantum ſaepius cum voluptate conſideravi, ſed & aliis conſiderandas exhibui. Caeterum tendines illos, & tenuiſſimas particulas tranſverſe perſecui; inquirere volens num forte ſint perviae, & cavitatibus praeditae. Quando incredibilis exilitatis vaſcula tanto numero in oculos meos incurrerunt; ut, qui ipſe non viderit, vix mihi ſit habiturus fidem. Tum & ingentem percepi numerum exiguiſſimorum vaſculorum, quae tranſverſo Diaphragma

itinere permeabant; & quantum ego quidem sentiebam, ad hoc officium à natura destinantur, ut adipem per omnes Diaphragmatis partes circumferant, & ipsi Diaphragmati continuum alimentum subministrent. Superius modo dixi adipem in Diaphragmate inclusum latere; & utrimque super adipem 4 exporrigi membranas, inter se omnino distinctas. Addo membranas istas tam arcte sibi conjunctas esse, ut simplex esse membrana videatur. Jam vero alteri microscopio, quod paulo minus quam microscopia modo dicta magnitudinem objectorum augebat, frustum Diaphragmatis mediocris crassitudinis admoveram. Quod eo spectabat, ut demonstrarem, qua ratione membranae partes Diaphragmatis adiposas, sive ipsum Diaphragmatis adipem, utrimque circumdent; adeo ut adeps in membranis illis includi videatur. Per
Fig. 132. E F G H, item per I K L M, duae istae quadruplices designantur membranae; in G H vero, & I K, adeps saepe jam dictus includitur. Cum deinde tenuissimam Diaphragmatis portionem, quae prae manibus erat, in orbes conscindere conarer, Diaphragma in duas partes sive lamellas secessit; unde suspicatus sum Diaphragma sic à natura comparatum esse, ut adeps eo facilius per Diaphragmatis substantiam distribuatur. In icone 132, ubi membranae transverse sectae exhibentur, quaedam exiguae apparent corrugationes, quas in iis plerumque percepi. Postea comperi membranulas, in quibus adeps coe[illegible]do producitur, exilissimis vasculis annexas esse; quae tamen vascula per contiguarum partium exsiccationem in Diaphragmate jam dicto erant disrupta. Hanc ego membranularum & vasculorum connexionem ex eo capite necessariam existimo; ne Diaphragma, quoties extenditur, omnino complanetur, sed in cavitatem pene globosam sese expandat.

Forte complures Diaphragma sentient esse membranam apprimè crassam; cum tamen sit membrana perexilis. Ut igitur hunc illis errorem eximam; frustulum Diaphragmatis bovilli, sicut se nudis oculis offert, delineandum curavi: Istud tamen verum est, Diaphragma pro
Fig. 133. tenuitate sua esse oppido robustum, quod multitudini exilissimorum tendinum, de quibus saepius egi tribuendum esse statuo. Per N O P Q, frustulum designatur Diaphragmatis bovilli: ubi per fibrillam N O unum latus, sive dimidia crassitudo, Diaphragmatis bovilli indicatur; per P Q altera crassitudinis illius medietas exprimitur. Reliquum Diaphragmatis, nempe quidquid inter O P & N Q interclusum est, adipe sive partibus adiposis est obsitum: nisi quod inter N Q nonnihil carnis interjaceat, pertinens ad carnem costis adjacentem. Medicos igitur errare cogito, qui palpitationem, quàm in pectoris regione quandoque percipimus, cordis palpitationem appellant. Certe ego tales palpitationes ex mala Diaphragmatis affectione oriri censeo; sive affectionem illam producat alimenti defectus, sive vasorum quorundam efficiat obstipatio, quae Diaphragma magno numero pervagantur. Talis enim obstipatio in ante dictis tendinibus facile convulsivos motus excitare potest; & hanc morbi mei ipsissimam fuisse caussam existimo.

Fig. 127

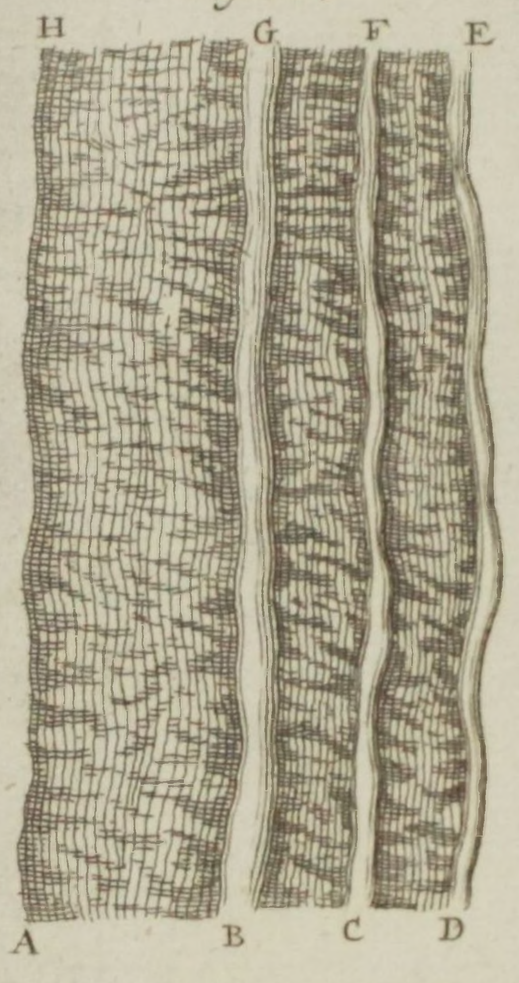

Fig 128

Fig. 129

Fig. 130

Fig. 131

Fig. 132

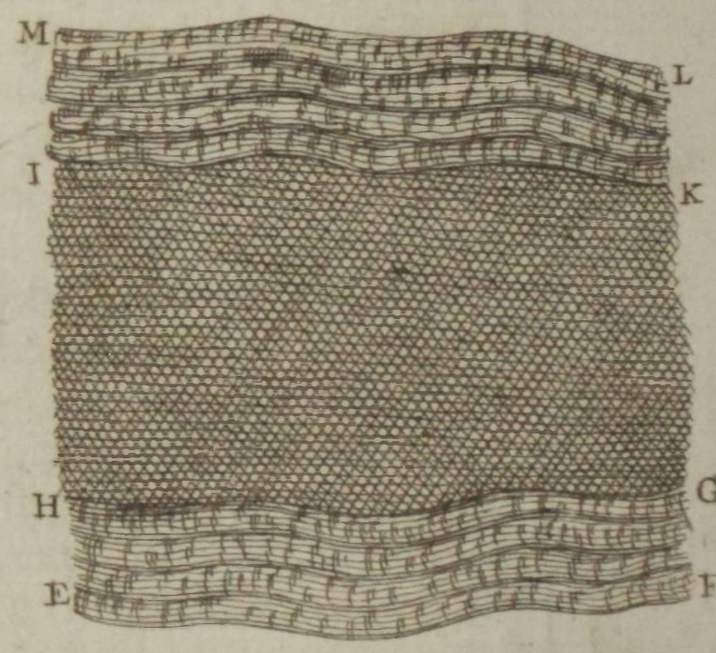

Fig 133

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3. Multis ab hinc annis pro certo habui quod Diaphragma instrumentum sit adeo magnum, ut totum abdomen continue moveat, quo motu cibi in ventriculo & intestinis adeo conteruntur, ut in materiam tam fluidam redigantur, quae apta est, ut intret parvula illa vascula sanguinea, quae multa in intestinorum cavitatibus sita sunt: non autem per oscula illorum vasculorum, ut quidam hominibus persuadere conati sunt, sed me judice per tenues tunicas illorum parvissimorum vasculorum sanguineorum. Si jam ponamus arteriam in corpore bene constituto, intra horae unius spatium ter millies & sexcenties pulsare, quatuorque pulsus fieri in una respiratione, computabimus 900 respirationes spatio unius horae, ac toties fiet pressio ventriculi & intestinorum, quam voco subactionem in ventriculo & intestinis contentorum.

Continued by the same. N° 380. *p.* 439.

Duos abhinc menses varias lentas palpitationes per Diaphragma sensi: quare cogitabam de tuba quadam vitrea, à me inventa, ad spiritum cujusdam liquoris in pectus ducendum, ut experimentum facerem, num insolitus ille diaphragmatis motus, quem cordis palpitationem vocant, sedari posset. Implevi ergo meam tubam ad altitudinem trium transversorum digitorum spiritu vini, in quo jam diu haec aromata fuerant infusa, nempe nuces moschatae, macis, & parum caryophillorum, sed cinnamomi multum, ut & croci, & inspiravi aërem transeuntem per hunc spiritum vini, & quidem non modestè, sed fortiter aërem in pulmonem impuli, quo Diaphragma quod fortis membrana est, valde extendebam experiendi gratia num palpitationem, vel inordinatum diaphragmatis motum, hoc facto componere possem, quod illo tempore bene successit: Sed postea quidem evenit, ut experimentum hoc, quamvis aërem tam fortiter in pectus inducerem, ut pressus aër cum tussi ex guttere erumperet, expectationem meam eluserit.

VII. In § VI, the Author informs us of wonderful Appearances within the very Center of human Bones; for in 8 several Preparations he has, of Leg and Thigh Bones, and others, of Men and Infants, he has observed plain *Chrysalis's* of Insects, and very perfect; of different Sorts, lodged in the Cavities of the Marrow: How they come there, he can no more account for, than for whole Bundles of Worms twisted together, which he has found in the great Artery just by the Heart; or for 6 fat, thick, *Erucæ* in a Sheep's Brain; and many of the like nature, that have happened in the way of his Observation, which are in the *Czar's* Repository.

An Account of a Book, entituled, Adversariorum Anatomico Medico Chirurgicorum Decas tertia. *Auctore* Fred. Ruysch, *M. D. Anat. & Bot. Prof.* Amstel. *R.S.S.* No. 379, p. 428.

In § IX, he treats of human Bones, in which Search he has long laboured: He observes the *Epiphyses* upon the Ends of the Bones are chiefly fastened to them by the *Periosteum*; which being taken off, they easily fall asunder. 'Tis a Mistake, that we vulgarly think this is done by means of an intermediate Cartilage: The Truth is, both the *Epiphyses* and Ends of the Bones, at first, are cartilaginous; but in time become bony, and then are only joined by the *Periosteum*. The

Oſſification always begins in the middle of Bones. Sometimes he has found human Bones ſo void of Cavities, that he has made Knife-handles of them: It is has been thought that cartilaginous Parts were exſanguious; but falſly, as he demonſtrates by ſeveral Preparations thereof.

CHAP. VIII.

MONSTERS.

A monſtrous double Birth in Lorrain; *communicated by Mr.* Fevry. N° 377. *p.* 346.

ON the laſt of *December*, 1722, I went to *Domp Remy la Pucelle*, to ſee there *Sebaſtiana Camus*, aged 44 Years, delivered on the 24th of the ſaid Month, about 8 o'Clock in the Evening, of two Children or Twins, joined together, as appears by the Draughts, *viz.* There is one Head, one Neck, one Breaſt, one *Abdomen*, and two Hands on one Side; and there are as many Parts on the other; the whole being well proportioned and plump, joining together by the Belly, which is common to both, ſo that one of the Heads is in the Place where the other's Feet ſhould be, and the other Head is in it's natural Place; they have but 2 Legs for both of them, which ſeem to ariſe from the tranſverſe *Apophyſes* of the *Vertebræ* of the Loins on one Side; and from the oppoſite Region of the Loins, comes out a Leg ending with a Joint which bends forwards, and at the Extremity forms a ſmall Stump, like a Finger, articulated by *Ginglymus*. There is but one Fundament for both, by which they void their Excrements; they have but one Navel-ſtring, and the Parts proper to the Female Sex are alſo ſingle: They eat and drink with their Mouths ſeverally, and while the Breaſt is given to one, the other cries for it: They ſleep and are awake, ſometimes both at the ſame time, ſometimes ſeparately. Each of theſe Children has been baptized: One of them is ſomewhat plumper than the other, which is more puny, and not ſo freſh-coloured. The Head of the one, which is a little bigger than that of the other, came firſt to the Birth, the two Arms lying on the Breaſt followed next; the Legs lay on the Sides of the Breaſt of the ſecond; the oppoſite Leg, which is ſingle, was extricated afterwards; laſt of all, the Arms of the ſecond Child, being ranged on the Side of it's Head, made it eaſy for the reſt to come out. The Bodies of both theſe Children make no more in Bulk than that of one ordinarily does. It is obſervable, that the Mother can aſſign nothing that had had any Relation to this Event, during the Time of her Pregnancy.

Fig. 134, 135.

By another Account communicated to the Royal Society, we are informed, that theſe Children lived two Months after the Birth.

Fig. 134, and 135 were drawn in their Life-time, and the reſt were taken after their Death, by Order of his Royal Highneſs the Duke of *Lorrain.*

Fig. 134, repreſents the fore View of the Twins; 135, their Back-part; 136 and 137, the Skeleton; 138, the Breaſts and abdominal Muſcles, after the external Teguments were removed; 139, Part of the *Viſcera* of the *Abdomen*; 140, the Urinary and Genital Parts.

CHAP. IX.

Period of human Life.

I. AT *Uttoxeter*, in the Moorlands of *Staffordſhire*, 1722, in 14 Days were buried three Women; the 1ſt 103; the 2d 126, and the 3d of 87; and the ſame Year two Siſters and a Brother in and of that Pariſh; the Brother 92, the youngeſt Siſter 95, the eldeſt Siſter 98. *Examples of long Life; by* Simon Degg, *M. D. F. R. S.* No. 400. *p.* 364.

And in the ſame Pariſh this preſent Year 1726, were buried in 22 Days, the following aged People.

Aug. 7.	One Woman aged 94, and one Man aged - - -	81
Aug. 4.	One Man, aged - - - - - -	68
Aug. 19	One Man, aged - - - - -	87
Aug. 22.	One Man, aged - - - -	82
Aug. 25.	One Man, aged - - - -	83
	Men	4
	Women	2

In 1726, at *Gravely* in *Hertfordſhire*, 31 Miles from *London*, almoſt every ſixth Soul is upwards of Sixty. Inhabitants 187, aged above Sixty, 29.

II. Suos habent characteres varii aetatis gradus. A fluiditate aſcendit homo ſenſim per ſoliditatis varias mutationes, donec cum rigiditate & fibrarum veluti immobilitate amittat vitam. Nec contemnendi eſt usûs haec in medicinâ conſideratio. *The Anatomy of a decrepid old Man, aged* 109; *by* John James Scheuchzer, *M. D. F. R. S.* No. 376. *p.* 313.

Accidit ante menſes aliquot, ut ob decrepitam ſuam aetatem & raram, in Noſocomium fuerit receptus *Johannes Leonhardus Vopper*, Rhoetus, Sharanienſis ex coetu Glantino Foederis ſuperioris. Is juxta tenorem teſtimoniorum lucem primum vidit, 1. *Maii* 1614. A. 1634. Metalli foſſor in venâ ſepultus, per horas 33. ſub terrâ jacuit: Mortuo, quam vivo, ſimilior inde protractus, propter Abdominis validam, quam paſſus eſt, preſſionem, inde ab illo tempore incontinentiâ urinae laboraverat. A. 1637, iter fecerat per *Hungariam*,

riam, *Turciam*, *Terram Sanctam*, reversus *Venetias*. Post A. 1639, militem egit sub Capitaneo *Casparo de Monte*, in servitiis *Caroli* Ducis *Lotharingiæ*, in statu *Mediolanensi*, & A. 1663, in *Lusitaniâ*, A. 1682, interfuit obsidioni *Viennensi*, & in ultimo bello obsidioni *Landaviæ* & Cladi *Hockstettensi*. Ita vitam, per varios casus & mille rerum deserimina, protraxit senex noster ad Annos 109, Menses 3.

In cadavere observavimus, cursoriè veluti, (non equidem licuit per temporis angustiam sectioni diu immorari) sequentia.

In abdominis cavo erat, parvâ quidem copiâ, serum sanguinolentum extravasatum. Intestina tenuia fuere omnia inflammata, rubro colore tincta, & Duodenum prae primis integrum admodum dilatatum, internâ sui parte fracidum prorsus & gangraenosum; Omentum prorsus emaciatum, ut vix agnosci potuerit: Pancreas contractum: Hepar sanum: Vesicula fellis bile repleta: Ductus Choledochi eâdem turgidi, & tota vicinia Intestinorum & Mesenterii virore infecta, ut alicubi extravasata videretur bilis, cujus egressum in Duodenum invenire haud potuimus. Prope Pylorum, in Ventriculi superiore parte, aderat expansio veluti flatulenta, nuce juglande major. Renes sani, ut & Lien, cujus exterior membrana, jucundo admodum spectaculo, obsessa erat hinc inde maculis nivei candoris, magis minusque latis, quae primo intuitu referebant pustulas Variolarum maturas, sed cartilagineae prorsus erant duritiei, & ultra superficiem reliquae membranae aliquantum elevatae. Observo heic, antequam progrediar ulterius, non duntaxat rigescere fibras, & contrahi supremâ aetate, sed tantum non insensiles fieri; nemo quippe juvenilis vel consistentis aetatis pateretur inflammationem Intestinorum, qualis haec fuit, absque acutissimo dolore, de quo tamen aeger post senile delirium, quod aliquamdiu est perpessus, ad se ultimis vitae diebus rediens, nihil est conquestus. Cartilaginea illa Lienis crusta manifesto est indicio, posse ita rigescere membranas, ut tandem indurentur.

Thoracis apertio non parum facessebat laboris. Fuerunt quippe non solum Sterni illae costosae prominentiae, aliàs cartilagineae, heic planè osseae, sed & cum ipsis Costis tantum non continuae, indicio manifesto, Cartilagines fieri successu temporis osseas, quemadmodum membranae & arteriae fiunt cartilagineae, & ex cartilagineis non semel osseas narrant Historiae. Pulmones viridantibus passim maculis obsessi, in utroque Thoracis latere, posticâ sui parte affixi erant Costis: Pericardium amplum & multo sero refertum, cujus & aliqua portio in cavo fluitabat Thorace. Cor ipsum vidimus satis amplum, imprimis Auriculas dilatatas praeter modum, & tum hasce, tum Ventriculos sanguine concreto refertos, unde patet substitisse tandem sanguinis motum, propter defectum contractionis elasticae in tubulis arteriosis, & cordis machinam sanguini ad concretionem disposito expellendo non amplius fuisse sufficientem, imo propter nimiam resistentiam obrutam. Praestabat Tendinem illum, quo Cordi inseruntur arteriae, vel osseum plane, vel cartilagineum saltem: Osseus sane, quod novimus,

Fig. 134.

Fig. 135.

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mus, fit in Cervis adultioribus, unde Os de Corde Cervi. Et fanè aliquid tale offendimus, nimirum Valvulas ſemilunares, prae primis Aortae, cartilagineas penè, praecipuè mediâ ſui parte. Aortam ipſam deſcendentem obſervavimus valdè amplam, diametri duplo majoris, quam eſt Gula, Pariſini circiter pollicis. Gulae inſtratae paſſim erant Glandulae lentiformes induratae. Amplitudo illa Aortae indicat tardiorem ultimis fortè vitae annis progreſſivum motum ſanguinis, unde arteriae, quae propiores ſunt Cordi, fuere ſenſim dilatatae, ſicuti ſaepe obſervamus dilatari adeo, ubi nimia eſt molis reſiſtentia, ut in Aneuriſma abeat egrediens è Corde Arteria magna.

Pergimus ad Caput, ubi praedura Cranii ſubſtantia rurſum ſolitò majorem poſcebat laborem: Suturae, imprimis Sagittalis & Lambdoidea, erant fermè obliteratae, nec prorſus penetrabant utramque Tabulam, ut nulla fuerit per illas è cavitate illâ magnâ Capitis perſpiratio, & ſuccus ille Oſſium nutritius, inter fiſſuras Suturarum extravaſatus, factus quoque fuerit oſſeus. Foramina quidem tria quatuorve ſatis ampla, in ſupremo vertice, ad latas utrumque Sinus Sagittalis, pollicis fermè diſtantiâ ab invicem viſuntur, internam Laminam ad externam uſque penetrantia, abſque quod ullum illorum utramque perforet Tabulam. Dura Meninx triplo ferè craſſior fuit, quam eſt ordinariè, coriacea penè: Pia ſeparabatur facile, nimio utpotè irrigata ſero, a Cerebri ſubſtantiâ: Ventriculi omnes ſero erant referti, quod ſat magnâ copiâ quoque fluitabat in Cerebri baſi, imprimis ad Spinalis Medullae egreſſum. Plexus Choroides Glandulis piſalibus, lymphâ coagulatâ refertis, erat obſeſſus: Septum pellucidum egregiè poterat conſpici: Caeterum Cerebri ipſa ſubſtantia, imprimis interioris, flaccidior ſolito.

Innotuit mihi, inde ex quo obiit decrepitus noſter, retuliſſe eum perſonis fide dignis, quod pater ejus, ſeculum jam ſupergreſſus, tres genuerit liberos, & ex majoribus pauci infra ſeculi aetatem obierint. Hoc certum eſt, noſtro natam filiam *Mariam Magdalenam* ex uxore *Urſulâ Herzeliâ* de *Naniken* pagi *Tigurini*, quae S. Baptiſmatis charactere ſignata fuit *Dieſſenhovæ*, 18 Aug. 1707.

CHAP. X.

PHARMACY, CHYMISTRY.

I. TRADITUM eſt in ſcriptis de Camphora editis, poſſe etiam praeter ordinariam, quam copioſam ſatis habere poſſumus, aliam ex radice Cinnamomi, Zedoaria Ceylonica, Roremarino Camphorato. *Of Camphire; by Mr* Charles Neuman, Chym. Prof.

Reg. *Berolin.* F. R. S. N° 389. *p.* 321.

Camphorato, Abrotano aliisque vegetabilibus aromaticis parari, quod certo respectu negari nequit, & hac ipsa observatione mea confirmatur; nihilo tamen minus confiteri me oportet ante omnia, me nusquam locorum, quae peregrinando adivi, talem ex aliis & jam dictis vegetabilibus paratam, licet diligenter perquisitam, ne in minima quidem quantitate vidisse Camphoram, quae in solida & vere sicca consistentia cum orientali conveniret; sed quicquid hujusmodi mihi monstratum est Amstelodami, fuit illud oleum, quod in India ex radice Cinnamomi destillatum dicitur & Camphoram non minus quam Cinnamomum redolet, quamvis dubius adhuc haereo, genuinum ne illud destillatum fuerit, an oleum Cinnamomi ordinarium copiosa Camphora impraegnatum? Si quidem multa experientia comprobatum habeo, solere vulgo & imprimis in loco jam dicto, varias merces, potissimum ad rem medicam pertinentes, fuco inducto effingi, & per miscelam adulterari: sed quoquo modo se res cum isto oleo habeat, posito etiam, nihil fuci subfuisse, & ostendi posse Camphoram, etiam in solida consistentia, ex radice, & ex Zedoaria Ceylonica, aliisque orientalibus vegetabilibus elicitam, nemo tamen, quoad scio, solidum quid Camphorae aemulum ex vegetabilibus Europaeis unquam produxit; licet de Roremarino multi multa dixerint, & de aliis quoque plantis nostratibus conjectura praesumserint; imo licet etiam *D. Hofmannus* Professor *Hallensis* & *Boyle* nobilis Anglus memoriae prodiderint, quod ille simile quid ex floribus Rosarum & Ligno Aloes *, hic vero ex oleo Anisi impetraverit †, penitus tamen ego sum persuasus, quicquid Camphorae simile ex his tribus productum fuerit, molle quid & unctuosum, vel ad summum butyraceae consistentiae, minime vero siccum, crystallinum, fragile, & Camphorae duritie aemulum fuisse, id quod etiam ex ipsorum descriptionibus quivis facile potest colligere. Taceo, quod in vulgus notum est, oleum Anisi in frigore butyri instar condensari, minime vero in Camphoram eo ipso abire. Praeter haec, quae in scriptis commemorata legimus, fuerunt aliqui & in his quidam Pharmacopoeus, caeteroquin rerum suarum satagens, qui ore tenus mihi affirmarunt, posse se ex variis plantis indigenis Camphoram parare, cujus modi tamen itidem ne tantillum quidem unquam videre licuit; interim assentior illis & lubens credo, potuisse hos eâdem facilitate, qua ego meam, impetrare Camphoram.

Placuit igitur ad Inclytam Reg. Societatem referre, acquisivisse me ex nostrati Thymo vulgari, verum, densum, crystalliformem & in omnibus qualitatibus conspirantem, nec nisi odore differentem Camphoram, quae cuncta experimenta huc usque cognita, & pro justo examine ex cogitata possibilia, aeque ac Orientalis sustinet, atque ita cum hoc in omnibus, solo odore excepto, convenit.

* *Vid.* Ejus Dissertat. de Camphora & Observat. Physico-Chym. † *Vid.* Ejus Tr. de Firmitate & Fluiditate.

Destillaveram

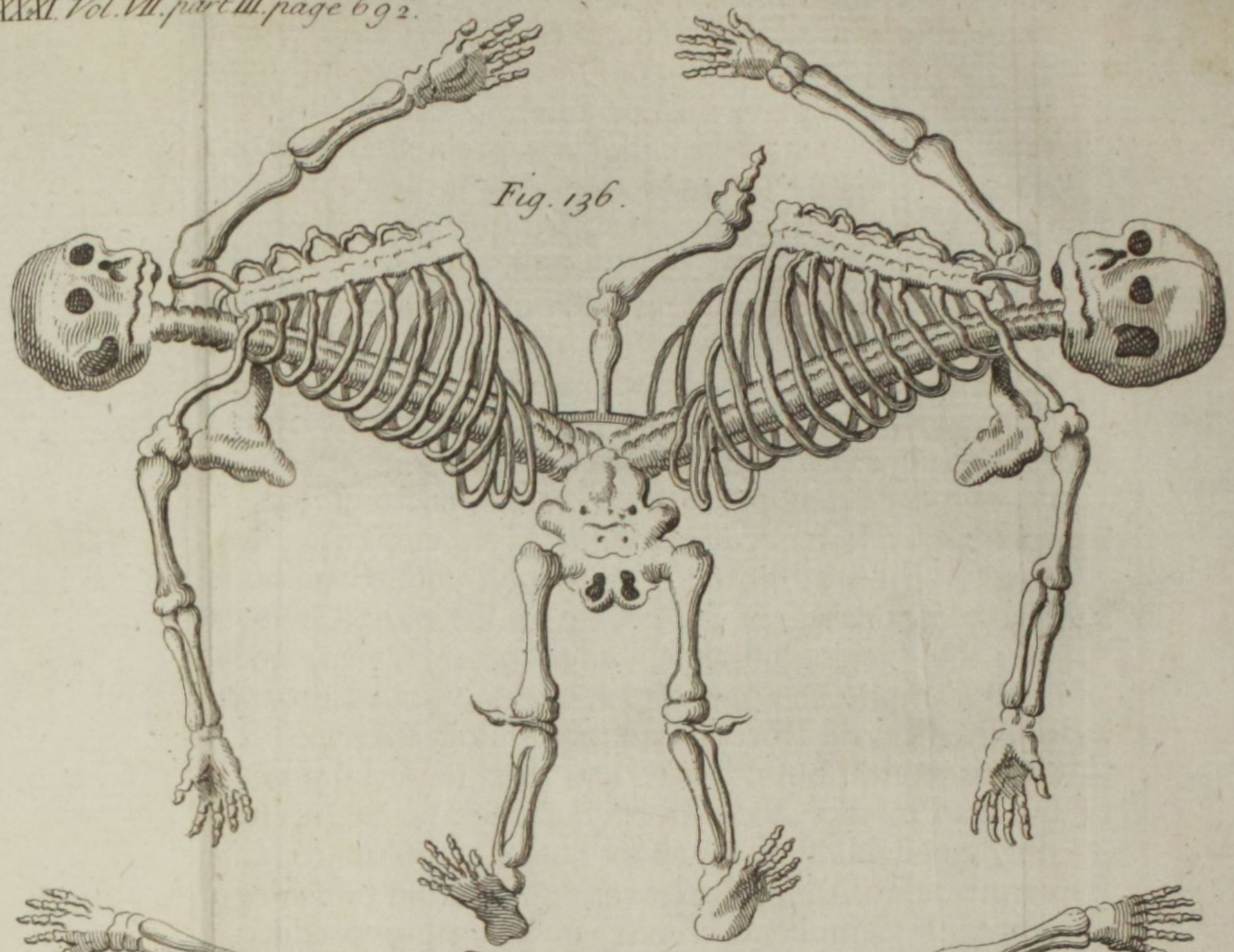

Fig. 136.

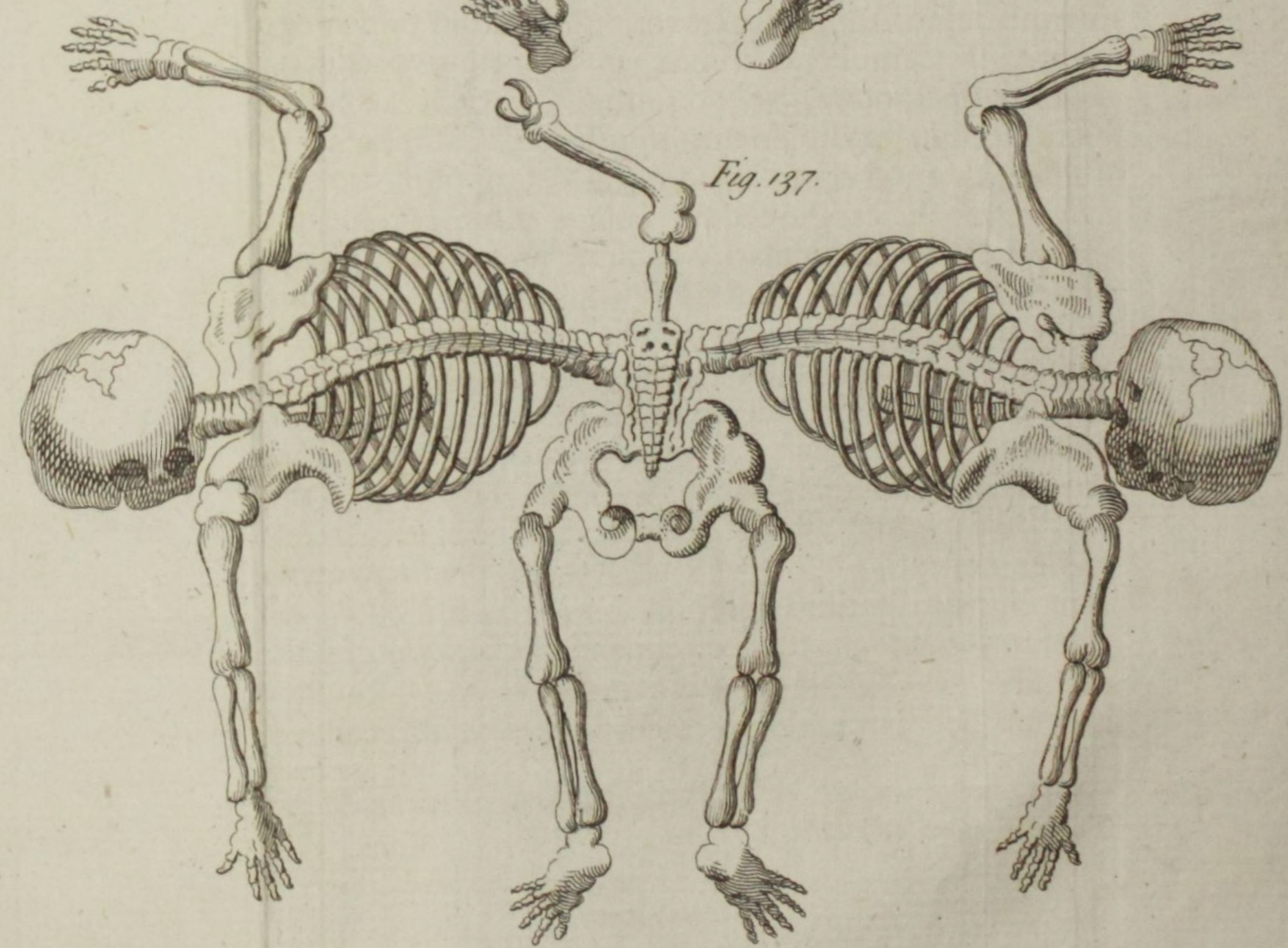

Fig. 137.

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Fig. 138.

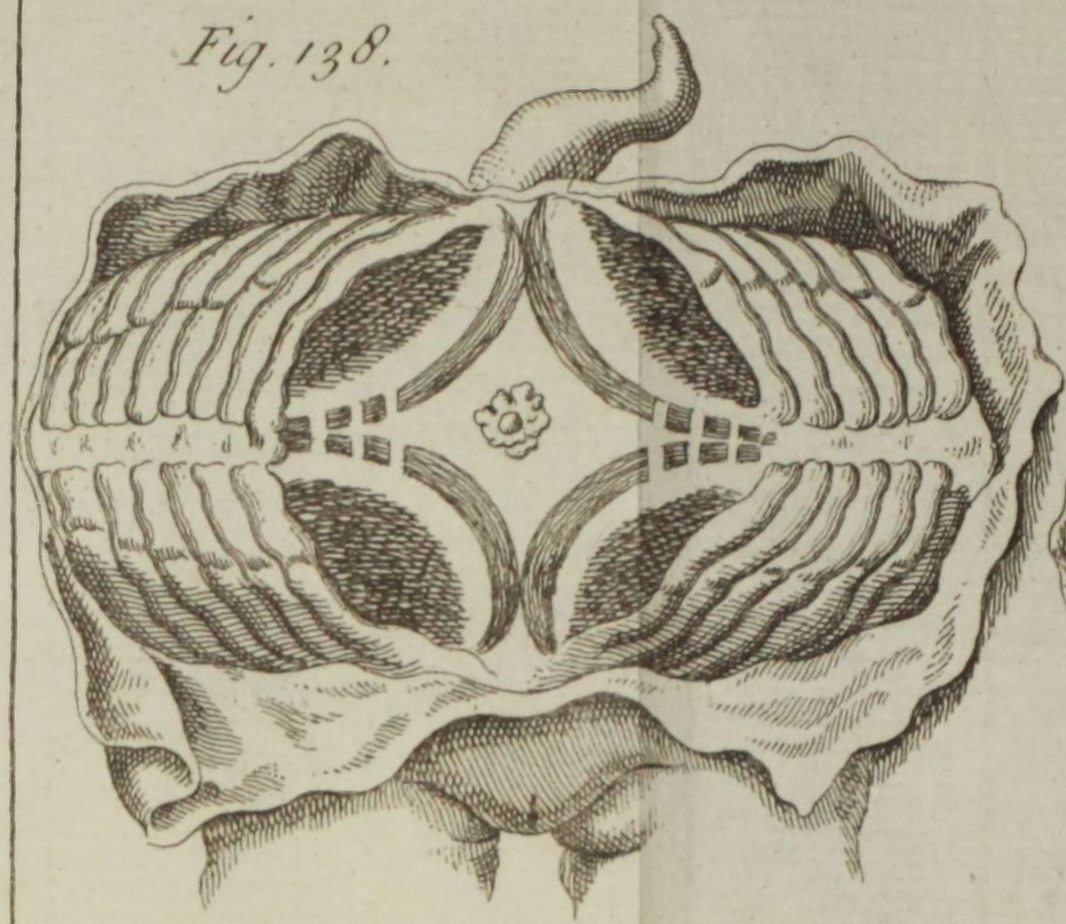


Fig. 139.

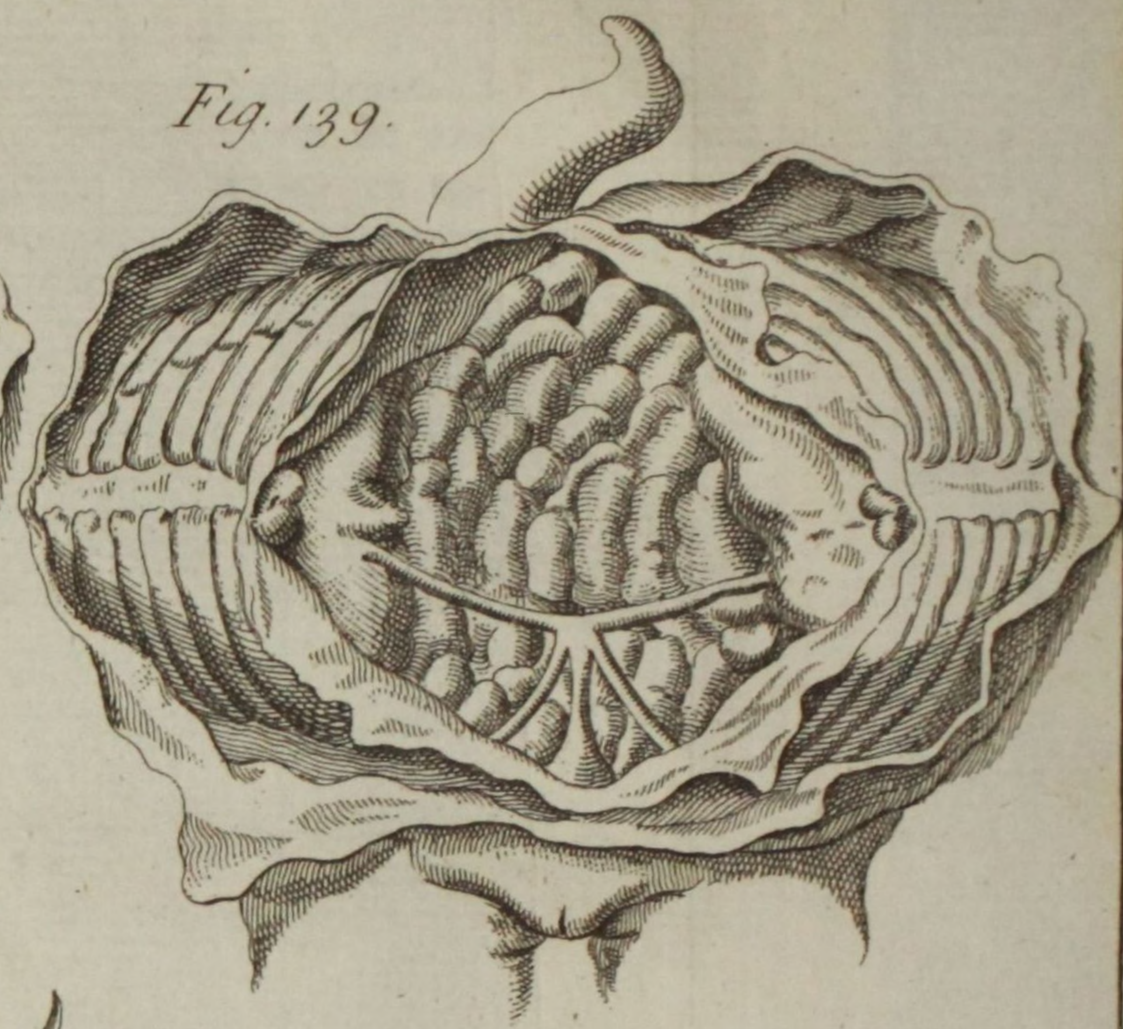
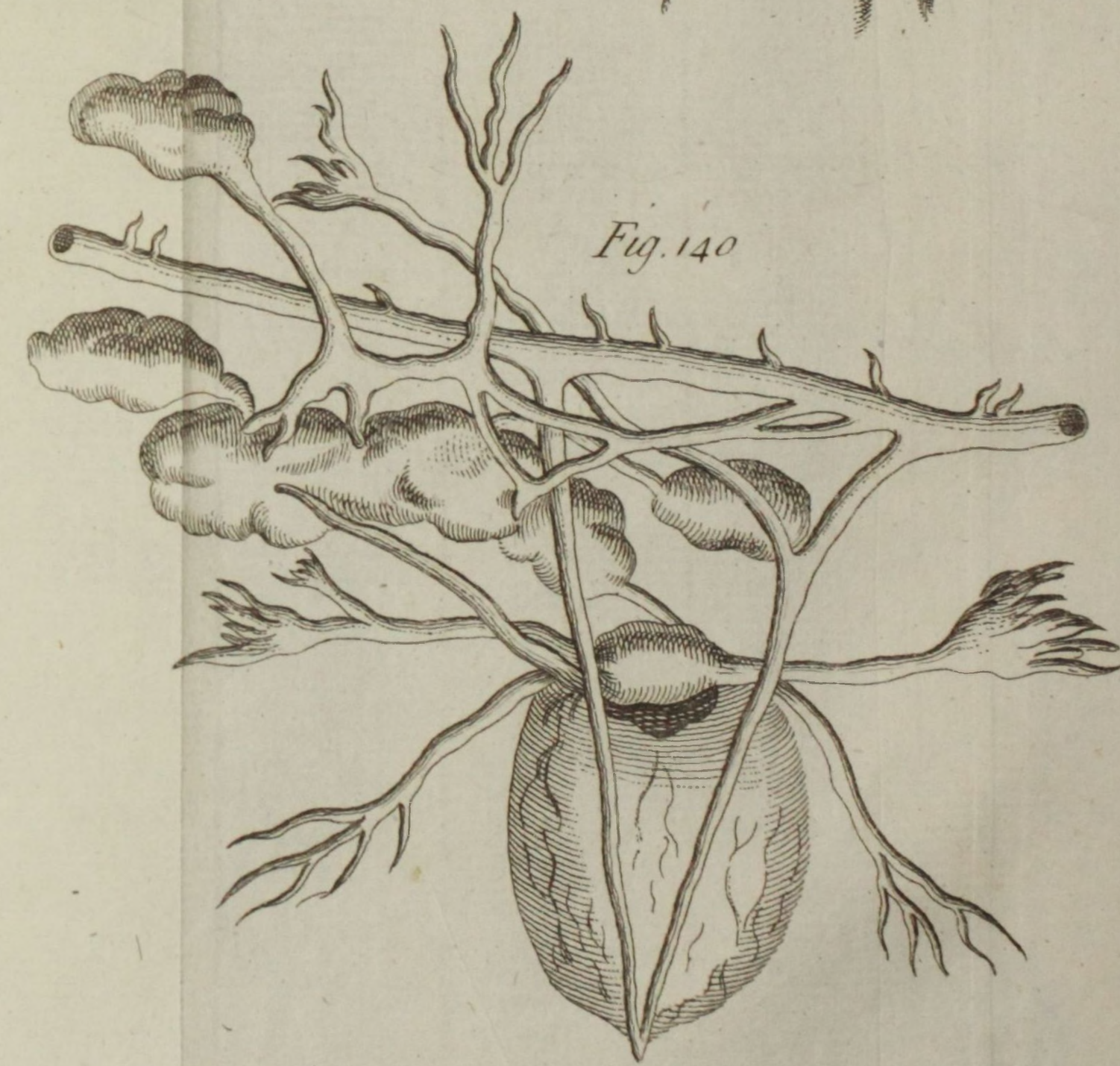


Fig. 140



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Deſtillaveram *Anno* 1719, ex dicta herba olei copiam bene multam, inſtitutaque hujus ab aqua ſeparatione cum goſſypio, cernebam tam ad orificium vitri, quam in goſſypio oleo imbuto parvos figuratos cryſtallulos haerentes, qui ipſam deſtillationem alias ſatis celerem, magis magiſque remorabantur, adeo, ut neceſſarium eſſet goſſypium, contra morem, aliquoties renovare. Mirabar quid rei novae & extraordinariae contigerit, variaſque cogitationes agitabam, parum tamen vel nihil certi ea de re unde evenerit, & quid eſſet, poteram colligere ; lagenam igitur oleo plenam, bene munitam, reponebam. Interim ſemel excitatae & conceptae de rei novitate cogitationes inquietum me tenebant: quare ſciendi cupiditate ductus, poſt paucos dies, reſumo lagenam olei, viſurus, an denuo cryſtallini quid ad orificium vitri haereat, & quantulumcunque demum id fuerit, per experimenta tamen parvula probaturus, cujus indolis illud ſit, ſed circa orificium nihil ejuſmodi reperiebam circa fundum vitri vero, quod me tanto magis attentum, ne dicam attonitum habuit, conſediſſe vidi cryſtallos in ſi ſatis magna quantitate, diverſae magnitudinis, partim avellanas exaequantes, pleraſque cubiformes, ſaccharo cando ſimiles. Nondum ſuſpicabar Camphoram, ſed potius ſal volatile, quod pro copia herbae ſucceſſive ſimul tranſcenderit, & in parte aquoſa ſolutum, poſtquam haec fundum petiiſſet, purumque oleum ſupernataret, tandem ita coaluerit. Effundo igitur oleum, ut ſal, quod eſſe putabam, impetrarem, & judicii mei certior fierem. Sed denuo in admirationem rapiebar, quod ne guttulam quidem aquae in fundo invenirem, ubi conſultius nihil erat quam magma ſalinum à fundo liberare, & ab oleo ſeparatum ſervare. Quo me igitur ex dubio extricarem, vel potius, ut de ſale, quod judicando praeſumſeram, certior eſſem, tentabam experimentum quo cuncta ſalia, cujuſcunque indolis & nominis fuerint, probantur. Magnam ſcilicet quantitatem aquae deſtillatae infundebam ſuper materiam cryſtallinam, ſat diu ſimul agitabam, hinc per aliquot horas quieti dabam, ſolutionem cryſtallini per omnes horae quadrantes cupide, ſed fruſtra expectans, neque enim ſolutionem, neque ullam mutationem ejus animadvertebam, praeter quod minimae particulae in ſuperficiem elevarentur, majores vero quantumvis bene interagitatae fundum ſemper repeterent, & aqua particulis oleoſis cryſtallinae materiae adhaerentibus, ſed agitatione liberatis, impraegnata eſſet. Transfundo aquam, & nova adfuſa, denuo tentabam cryſtallorum pro indole ſalium ſolutionem, poſtquam hi ab adhaerente oleo, quod forſan ſolutionem ejus in aqua impediret, liberati eſſent, ſed pertinaciter ſolutioni renitebantur, quam neque adhuc dum, ſaepius licet tentatam, admiſerunt. Dehinc, praeoccupatione de ſalino concremento plane abjecta, conjecturare cepi, quod plane quid aliud, ſcilicet mixtum oleoſum, vel quaſi reſinoſum volatile ex oleo condenſatum eſſe debeat. Hoc mecum perpendens, ſub examen revoco varia, alias vere exiſtentia, mihique nota ſubjecta, ſi quod eorum cum novo hoc comparari queat. & mox ob ſimilitudinem cogitabam Camphoram. Sine

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mora igitur nova quaedam, per quae me magis certum de re fore ſperabam, adornavi, & ecce rei certus eram, ſi quidem omnia quae modo feci experimenta, non alia quam quae communis Camphora ſuppeditat, Phaenomena exhibuerunt, unde tandem, utpote veritatis convictum, nullo plane dubio relicto, concludere me oportuit, corpus hoc cryſtalliforme aliud nihil quam veram eſſe Camphoram, quae ab Orientali non niſi in eo differat, quod haec Thymum, illa vero aliud vegetabile redoleat, quod, quia Camphoram copioſam ſuppeditat, huc uſque nullo alio quam arboris Camphoriferae nomine indigitatum fuit.

Ex his omnibus ſequentia mihi concepi dogmata, quae ulteriori cujuſvis indagationi, cum libertate ſentiendi, proponam.

I. Nomen hoc Camphora, vel Caphura, non ſpeciale, ſeu proprium eſt, quod uni ſoli ex India venienti Camphorae ſemper competat, ſed pro generali, ſeu appellativo potius haberi debet (uti *v. g.* nomen ſalis, olei, aquae, ſpiritus, &c.) ita ut pro diſtinctione ſpeciei Camphorae nomen illius vegetabilis addatur, ex quo parata eſt, ſicuti mea Camphora jure meritoque Camphora Thymi dicenda venit.

II. Sub hoc nomine Camphorae concepta ceſſat omnis controverſia inter autores hactenus agitata de ſpecie, ad quam Camphora pertineat, ſi quidem neque reſinis, neque ſalibus volatilibus, neque oleis & ſuccis accenſenda eſt, multo minus ad gummi vel bitumina referenda, quod cum his omnibus per omnia non conveniat, ſed jam in hac, jam in alia qualitate, jam plus, jam minus praecipui, vel tamen plane diverſi quid habeat.

1. Reſina dici nequit, quia, quod etiam jam *Hofmannus* adnotavit. (a) *Omnes reſinae poſt combuſtionem, cineres, vel aliud terrei aliquid relinquunt, Camphora è contra plane nihil, ſed tota deflagrat & in auras avolat.* (b) *Nullae reſinae in vaſe clauſo penitus & in totum elevantur ab igne, ſeu ſublimantur, quod tamen cum Camphora ſuccedit.* (c) *Reſinae, ubi deſtillantur, phlegma praebent, & oleum, partim etiam ſpiritum ſic dictum, Camphora vero horum nihil.* (d) *Nulla plane reſina eſt, quae ad inſtar Camphorae in ſpiritu nitri ſolvi queat* (e) *Nec ulla datur, quae aeque cito & in tanta copia in ſpiritu vini colliqueſcat, neque* (f) *Talis, quae in aqua calida Camphorae inſter avolet.* 2. Multo minus Camphora ſal volatile dici poteſt, quia in aqua non ſolvitur, nec cum aqua intime, quin videri poſſit, miſcetur, quam tamen ſolutionem inviſibilem cuncta ſalia admittere debent neceſſario, uti ſupra jam commemoratum eſt. 3. Quamvis autem Camphora oleoſum mixtum, vel ex oleo condenſatum corpus ſit, ideo tamen ſimpliciter oleum vocari nequit, aeque ac alia mixta ſolida oleo pragnantia, ſiquidem olei nomen liquidis praecipue, vel ad ſummum tenuiter unguinoſis, minime vero ſolidis & ſiccis ſubjectis tribuitur & convenit ; neque ullum oleum in ſicca ſubſtantia, ceu Camphora, ſublimari poteſt. 4. Succi nomen Camphorae non convenit, quia ſucci proprie dicti mixtionem. (a) *Vel gummoſam, quae in aqua facile totaliter liqueſcit,* (b) *Vel gummi-reſinoſam, quae partim in aquoſo, partim in oleoſo, inflammabili, ſpirituoſo,*

ſpirituoſo & ſimili ſolvitur, (c) *Vel reſinoſam obtinuerunt, qui poſteriores reſinae propriae dicuntur, de quibus jam ſub numero* I. *dictum eſt, quarum proprietatum nulla Camphorae convenit. Nam ſi omnia ea, quae ex arboribus aliiſque vegetabilibus partim ſponte proveniunt, vel à natura & ſolae, partim etiam per artem parantur, quamvis in tota planta ejuſque ſucco & partibus aliis diſperſa & commixta fuerint, ſuccos vocare quis vellet, quantam non confuſionem ineptam & conceptu impoſſibilem pareret in deſcribendis rerum eſſentiis? Sic enim omnis aquae, ſucci, gummi, olei, balſami, reſinae ſimiliumque diverſitas plane periret, verbaque haec diſtinctiva nullius plane uſus forent.* 5. Camphoram etiam gummi vel bitumen non eſſe, ex prioribus jam ſatis apparet, quicquid enim gummi vocatur, penitus in aqua colliqueſcit, ſicuti bitumina maximam partem in ea ſolvuntur, ambo vero ſublimationi refragantur, quam Camphora tamen admittit. Cum igitur nihil in orbe terrarum cognitum ſit, quod cum Camphora comparari poſſit, aequum etiam eſt, ut ſuo quoque nomine ſingulari & ſpecifico inſigniatur, per quod, ſi res quaedam dicatur Camphora, ſtatim intelligatur, eam neque oleum, neque gummi, ſal volatile, reſinam, ſpiritum, neque bitumen, ſed plane aliam & à dictis his diverſam eſſe materiam, mixtum nempe ex ingredientibus, Camphoram veram conſtituentibus, concinnatum, indolis ſpecialiſſimae. Unde quaeſtio, an ſal, vel gummi, reſina, vel ſuccus ſit, aequae inconveniens & ſupervacanea judicabitur, ac ſi quis quaerere velit, an ſal ſit oleum, vel an gummi ſit Camphora.

III. Ex prioribus deduco, quod omnis Camphora certum ſuum ſpecificum odorem, & quidem oleum illius plantae, ex qua parata eſt, conſtanter retineat, quodque odor iſte ſine deſtructione totius Camphorae ſeparari ab ea nequeat.

IV. Conſequitur, quod experimentum noſtrum de Camphora Thymi orientalem Camphorae fabricationem ſatis ſuperque confirmet, nempe quod deſtillando paretur, & acquiratur, in quo negotio vix alia intercedit diverſitas, quam quod ex ſic dicta arbore Camphorifera ibidem in magna copia & ita longe plus Camphorae quam olei haberi queat, cum è contrario vegetabilia *Europaeorum* plurimum olei, parum vero Camphorae largiantur.

V. Certo credere poſſimus, alias quoque plantas *Europaeas*, copioſo oleo eſſentiali pregnantes, aeque ac Thymum, Camphoram daturas eſſe, quamvis nullam adhuc viderim, neque pro ea elaboranda juſtam occaſionem nactus fuerim, vel otio abundarim.

VI. Tandem ſi qui fuerint, qui plane ſingularem vel peculiarem Camphorae indolem diſtincte nequeunt concipere, & ex quibus denique conſtet, ſcire velint, in horum gratiam pro mea quidem qualicunque experientia, amice mentem meam ita declarabo; quod Camphora ſit ſiccum quid, album, pellucidum & fragile, valde acute olens, non ſolum in igne, ſed etiam in aëre ſubcalido prorſus volatile corpus, quod ratione mixtionis, ex copia principii inflammabilis

rarefacti, pauca aquositate, & summe attenuata vel subtilissima terra, intime inter se unitis constat. 1. Constat Camphora rarefacto Phogisto, quia non solum cito & tenuiter, imo etiam in aqua & nive ardet, sed etiam cum aliis de eodem principio copiose participantibus celerrime unitur, ex quibus spiritus vini commemoratione, nitri vero spiritus meditatione dignissimus est, siquidem de posteriore paucissima sunt cognita. 2. Aquosi aliquid continet Camphora, cum alias principium inflammabile, licet copiosius, flammam exhibere non posset. 3. Terram subtilem nemo negabit, quia extra hanc siccum corpus crystallinum non sisteret. 4. Aeque minus in dubium vocabitur, terram hanc subtilissimam, & cum coeteris intime, perque minimas, quas vel cogitando concipere possumus, partes unitam esse, si perpendimus, quod Camphora in solo aëre, aliquantulum tamen subcalido in tota mixtura sua, plane nihil post se relinquendo, avolet.

Definitio haec per ea ipsa, quae hactenus de Camphora Thymi diximus, confirmatur, considerando, quod ea solummodo ex subtili oleo essentiali ortum duxerit, in quo oleo itidem non alia, quam superius dicta tria constituentia, phlogiston, aqua & terra demonstrari possunt, quamvis sub notabili hoc discrimine, quod 1. Camphorae mixtura multo subtilior quam olei, quinimo (si ita loqui liceat) quinta essentia, & extractum olei sit. 2. Camphora parum saltem aquei principii in sui mixturam recepit, oleum vero intuitu hujus longe plus. 3. Terra Camphorae summe attenuata, & adeo subtilis est, ut sponte simul cum coeteris constitutivis avolet in auras, cum contra terra olei multo est crassior, id quod etiam, ut alia taceam, in rectificatione vel exhalatione olei videre est, ubi primo resinae vel bituminis instar, tandem etiam crassiori specie apparet.

Quod supereſt, dissimulare non possum, haec aliaque experimenta de Camphora facta dubium me habere, an etiam ullo alio quam destillationis modo Camphora acquiratur. Prae coeteris, de veritate suspecta mihi videntur, quae de collectione Camphorae in Insula *Borneo* asseruntur ; dicunt vero quod ibi locorum sponte Camphora instar gummi, vel resinae, ex arbore exsudet, atque ita ab incolis colligatur, multo pretiosior quam Japonica, quaeque prae raritate tam cara habeatur, ut incolae illius insulae nihil ejus concedant exteris. Sed quoquo modo res cum hac traditione sese habeat, justas tamen de ea dubitandi causas habeo, & in his potissimum Camphorae volatilitatem, naturae ejus penitius insitam ; namque si ex arboribus exsudaret, non adeo diu sub sole fervidiore, quo terrae illius climatis incalescunt, persisteret, sed sat cito in aere libere exhalando fugeret, idque tanto facilius, quia cum exsudaret, multo liquidior esse deberet, nec consistentiam Camphorae duriorem habere posset, quae vero liquiditas ad tanto celeriorem exhalationem disponeret, si quidem per se Camphora in molli vel liquida consistentia retineri plane non potest cum accepto calore, & ubi colliquescit, mox avolat, qua de causa etiam cum resina comparari nequit. Quod vero Camphora nativa,

ad inſtar diſtillatae, in oleo ſuo diſtillato quaſi ſoluta ex arbore profluat, & dein ad arboris corticem Cryſtallorum in modum concreſcat, tanto minus ut credam aducor, cum pauca vel nulla potius exempla comperta ſint, quod natura olea diſtillata eſſentialia, aliaque arte facta, inſtrumentis debitis quippe deſtituta, produxerit. Et parum abeſt, quin credam totam traditionem de tali collectione Camphorae non niſi ex auditu commemorari, & viros coeteroquin eruditos *Ten Rheine*, *Breynium*, *Hermannum* coeteroſque, alium ex alio tranſcripſiſſe, nullum vero, quantum credere par eſt, rem oculis in arbore ipſa conſpexiſſe, quae quidem fallacia in Hiſtoria naturali prima non foret. Hinc deinque concludo, eſſe omnino hanc ſpeciem Camphorae tam raram, ut eam oculis cernere nemini liceat, nec forſan unquam contingere queat.

2. In tractu praecedente, inter alia Scriptor haec aſſerit. " Acquiſivi ex noſtrati Thymo Vulgari verum, denſum, cryſtalliformem, " & in omnibus qualitatibus conſpirantem, nec niſi odore differentem Camphoram, quae cuncta experimenta huc uſque cognita, & " pro juſto examine excogitata poſſibilia, aeque ac orientalis ſuſtinet, " atque ita cum hoc in omnibus, ſolo odore excepto, convenit. " . . . . Quibus verbis paulo poſt ſubjungit, " ſe hanc Camphoram ex " Oleo Thymi deſtillato obtinuiſſe." . . . Haec ille : de quibus non inutile erit pauca obſervare.

Of the ſame, by Mr John Brown, *Chymiſt, F. R. S.* No. 390, pag. 361.

Primo mihi animum ſubit, Quoddam apud nos eſſe eodem modo è noſtrati Thymo deſtillatum, quod hactenus improprio Salis Thymi Volatilis nomine dictum fuit : non tamen video quomodo Camphora Thymi verius dici poteſt. Equidem non in dubium voco quod ex propria experientia aſſeruit Vir Doctus de eo, quicquid demum ſit, quod è Thymo extraxit, quodque appellat Camphoram : Liceat tamen mihi, pace viri eruditi, paucis, notare differentias, quas ipſe obſervavi inter Camphoram proprie dictam, & illud quod è Thymo apud nos deſtillatum habemus.

Praeparatio noſtra eſt hujus modi : Oleum Thymi coagulatum ſeu condenſatum, pellucidum, cryſtalli formâ indutum, variae magnitudinis, variaeque figurae, poſt primam ſeparationem ſaccharo cando albo, mox vero rubro, ſimile ; valde Thymum ſpirans, pungentis vel etiam cauſtici ſaporis, non fragile ut Camphora. Hoc in quibuſdam experimentis à vulgari Camphorâ, qualis in officinis venditur, non multum differre fateor. Eâdem ſpecifica gravitate videntur eſſe. Neutrum horum in aquâ ſolvi poteſt. In Spiritu Vini ambo facile ſolvuntur. In aliis vero Phaenomena adeo ſunt diverſa ut mea ſententia nomen Camphorae utrique competere non poſſit. (1.) Camphorâ in Spiritu Vini ſolutâ & poſt in aquam projectâ, ſubito coagulum album ſupernatat, quod reverâ apparet eſſe Camphora, odore, ſapore, & ſubſtantia. Quod ſi eadem in oleo noſtro coagulato experiri velis, videbis in aquae ſuperficie guttas parvas olei liquidi innatare, que ſenſim in cryſtallos planos (cryſtallis Lunae non

multum

multum abſimiles) formantur, etiamque ſaporem & odorem Thymi retinent. Diverſitas adhuc magis è ſequenti experimento comparuit. Utramque mixituram ſupradictam tota nocte in aëre frigido expoſui: Mane coagulum, quod prius Camphorae in Spiritu Vini ſolutae innataſſe dixi, prorſus evanuerat, aquâ Camphorae odorem adhuc retinente; (forte propter ſpiritum vini admixtum:) in altero vero, nempe Oleo Thymi coagulato, cryſtalli aquam ſupernatantes, in eodem ſtatu, quo antea fuerant, remanebant, nec quidquam erant diminuti. (2.) Camphoram ſolidam per vim ſpiritus nitri in liquorem pellucidum mutatum iri, quis in re chymicâ vel minime verſatus non novit? At oleum noſtrum coagulatum, ſi eidem menſtruo adjiciatur, priſtinam quidem formam cryſtallinam penitus amittit, & ſubſtantiae reſinoſae ſeu gummoſae formam induit, neque, quantumvis vaſculum, in quo continetur, validâ manu & ſaepe concutias, unquam in fluidum evadet. Preterea ſi liquorem illum pellucidum, in quem Camphora redacta erat, in aquam poſtea effundas, redintegratur Camphora: contra, oleo noſtro coagulato eadem ſubſtantia reſinoſa, ſeu gummoſa, adhuc manet, & ſapor Thymi adhaeret cum notabili amaritudine adjecta. (3.) Oleum Vitrioli (ut docuit Boyleus) Camphoram in totum diſſolvit: in Oleum vero Thymi coagulatum, quod ſupra deſcripſimus, nullam aliam mutationem inducit, niſi quod vi manûs concutientis cryſtalli in minores partes dividantur; & hoc modo cryſtalli olei, ſi microſcopio obſerventur, fragmentis Camphorae ſe magis aſſimilant. Inſuper Camphora Oleo Vitrioli ſoluta ſe ab hoc menſtruo recuperat, ſi poſtea in aquam fundatur: noſtrum vero eandem formam cryſtallorum, quam in Oleo Vitrioli habuit, etiamſi in aquam effundas, una cum ſapore & odore Thymi, adhuc retinet. (4.) Scribit D. *Neuman Camphoram conſtare rarefacto Phlogiſto* at minime quidem noſtrum: nam ſi igni admoveatur, extemplò colliqueſcit, & oleum liquidum fit. Fatendum quidem eſt, ſi goſſipium immergas, idque deinde igni admoveas, flammam ſtatim concipit: ſed hoc goſſipio deberi clarum eſt, idemque oleis omnibus commune. (5.) Ignis in duo iſta corpora diverſos effectus habet. Nam qualiſcunque ignis gradus idoneus eſt ad ſublimandam Camphoram ſine ulla liquefactione, idem corpus hoc è thymo deſtillatum & condenſatum prorſus liquefaciet, & liqueſactum tenebit cum nulla vel minimâ ſublimatione. Hactenus de differentiis. Quibus, non abs re fuerit teſtimonia quaedam de oleis coagulatis, ſeu ſalibus ex oleis natis, huc pertinentia, ſubjungere. D. *Slare*, in Philoſophicis Actis, ab hinc pluſquam triginta annis editis, oleum noſtrum hiſce verbis deſcribit, Ex ſatis magnae copiae Thymi deſtillatione, ſeparatum eſt ſal volatile indolis ſingularis, (quod Peritiſſimus noſter Chymicus D. *Moult* primum mihi exhibuit) hoc eſt pellucidum, vel cryſtallinum, quoad gravitatem ſuam ſpecificam paulo aqua ponderoſius, idemque & ſal & oleum in uno corpore coagulatum eſſe videtur: in aqua non ſolvitur, ſed calefactum facile avolat.

Idem

Idem Vir Doctus se Oleum Cinnamomi viginti annos asservasse dicit, & intra sex annos postremos, singulis annis quoddam salis praecipitatum fuisse, & hoc sine ullo additamento aut arte ad salis formam inducendam. Sed quoad hujus salis naturam, an simile fuerit ei, quod ex Thymo destillatum ostendit D. *Moult*, silet.

Helmontius equidem de sale ex eodem oleo, arte facto sic locutus est. " At quando oleum Cinnamomi suo sali Alkali miscetur, absque " omni aqua, trium mensium artificiosa occultaque circulatione, to- " tum in salem volatilem commutatum est ; " etiamque in alio loco modum, quo oleum Cedri salis naturam assumat, vi menstrui sui Alkahest, docet, additque haec verba, " sese permiscebit aquae.

Cl. *Boerhavius* (si modo Chemiae institutiones ejus nomine nuper editae, genuinae sunt) sic scribit, " Diu asservata olea pretiosissima " aromatum orientalium, vasis bene clausis, mutantur in salem, seu " saponem ; sed experimentum non facile imitari possumus, nam " docente *Hombergio*, demum fit per multos annos, & dicuntur tunc " aquae misceri."

In alio loco cum D. *Neuman* consentire videtur *Boerhavius*. " Camphora est nil nisi oleum per destillationem concretum in gle- " bam pellucidam ; nam non est progenies solius arboris Campho- " rae, sed omnes plantae aromaticae Camphoram sui generis produ- " cere possunt ; " & paulo post " Oleum quod in insula Ceilon & " alibi ex semine Cardamomi fit, fere totum in Camphoram muta- " tur, quod idem verum est de pluribus oleis ibi natis." At vero ante 6 vel 4 dies olea varia in India destillata, qualia sunt oleum ex cortice Caryophyll. & Calam. aromat. & radicibus Cassumun. & similia perlustravi ; atqui nullam in his materiam condensatam sive coagulatam reperire potui, quamvis plusquam 10 annis hic recondita fuissent. Nèque dicere possum cum D. *Geoffroy* jun. (*Memoires de l'Academie Royale* 1721) me unquam observasse crystallos ex Ol. Terebinth. vel Majoranae, parietibus vasium, in quibus asservata fuerant, adhaerentes, similes crystallis Camphorae ; quamvis vasa multos annos his usibus applicata diligenter inspexi.

Quod ad hoc sal, seu oleum coagulatum Thymi attinet, idem aliis in hac urbe, in re chymica versatis notum est ; nam hujus parvam quantitatem (nisi quod colore sit candidiore) nostro similem vidi : at in nullis aliis oleis aliquid hujus generis me vidisse memini, nisi forte mihi persuadere liceat, inesse hoc tempore in suis principiis, (si ita dicam) in oleo Macis, à nobis ab hinc jam quindecim mensibus destillato, cujus olei eliciendi haec est narratio.

Satis magnam quantitatem Macis pro una operatione recepi, totoque die destillavi ; at minore olei quantitate elicita, quam expectabam, altero die, & etiam tertio, pro re nata, destillationem reiterare institui : Quantum memini, quarto die, posteaquam oleum aquam supernatans separaveram, visus est mihi alius liquor, cum aqua non permistus, vasis separatorii fundum petiisse ; hoc etiam educto, invenì

esse

esse oleum Macis, aqua ponderosius : ita ut ex eadem planta, eademque operatione, oleum dispari gravitate extraxerim. In superiore parte hujus olei, aliquid crystallinae formae hodie fluctuare videtur, attamen cujus generis sit substantia, sive Camphora, sive non, tempus docebit.

P. S. Postquam differentias inter nostrum oleum Thymi coagulatum & Camphoram orientalem supra descripseram, *Johannes Maud*, Chymicus, ostendit mihi oleum Majoranae coagulatum, quod nuper, & inopinato in vase, (in quo oleum Majoranae quinque annos asservatum fuerat) invenit.

Hoc oleum coagulatum Majoranae etiam eadem experimenta, cum oleo nostro Thymi coagulato, subire volui, quod & factum est, & multum inter se convenire reperiebam, ita ut hoc nihilo magis, quam nostrum, nomen Camphorae mereri, satis sciam.

Of fixed Alkaline Salts; by Mr Charles Neuman, Chym. Prof. Reg. Berolin. *F. R. S.* N° 392. *p.* 3.

II. 1. Mixta jam consideranda ut plurimum *Salia Alkalina*, *Salia fixa*, vel *Salia lixiviosa* appellantur. 1. *Salia lixiviosa* audiunt, quia per elixationem acquiruntur. 2. *Salia* vero *fixa* dicuntur, quoniam maxima ignis vi nec volatilia redduntur, neque in sublime feruntur vel abiguntur. 3. Quicquid per *Alcali* denominationem intelligitur, non adeo ignota etiam res est, nempe oppositum acidi, vel quod idem est, *antacidum*. Origo autem nominis hujus ab arabico *Alcali* derivatur; *Kali* significat Sal, & *Al* praefigitur, quemadmodum in Gallica lingua articulus definitus *le*, *la* ; itaque *Al Kali* conjunctim *le Sel* denotat. Notum insuper est, quod & herba quaedam reperiatur, *Kali* dicta, in locis maritimis crescens, multoque sale scatens, à *Lobelio* etiam *Soda* nuncupata, quae si comburitur & elixatur, ingentem salis copiam praebere solet, quod olim simpliciter *Sal* adjecto Arabico nomine *Alcali* appellatum fuit. Cumque hoc ipsum sal combustioni etiam aliarum herbarum & vegetabilium forte ansam dederit, & sales inde prolecti ejusdem fere indolis & naturae reperti fuerit, credibile admodum est, veteres, modo dicti salis originale nomen ideo retinuisse, & hoc illudve aeque *Alcali* appellasse, & tantum tractu temporis, ad meliorem distinctionem, hoc vel illud cognomen adjectum forsitan fuisse, ita praeter *purè Salia Alkalia*, corpora etiam *terrestria Alkalia* innotuere ; prioribus, pro nostro nunc scopo nobis inservientibus, ad distinctionem terrestrium, latinam denominationem *Salis* adjecerunt, & hocce in aqua solubile mixtum *Sal Alcali*, vel in genere *Salia Alcalia* appellarunt, ne forte sola vox *Alcali* aequivoca evadat, vel ad significationem ambiguam, inter *Salinum* vel *terrestre Alcali*, occasionem praeberet.

In genere autem de appellatione monendum, non satis exprimendi efficacem esse denominationem, sive solum *Salia Alcalina*, sive *Salia fixa* solum vocentur, quoniam utrumque nomen sensum iterum suggerere potest aequivocum: etenim primo habemus *& Salia Alcalia volatilia*, & secundo *Salia fixa*, quae non *pure Alcalina*, sed *Salia* dicta *Neutra* constituunt: Quamobrem securius erit, praeparata ista nunc consideranda

consideranda ambobus simul insignire nominibus, puta *Salia Alcalina fixa* eadem appellare.

Caeterum nobis sufficit scire, quod voce *Alcali* oppositum *Acidi*, per nomen *fixum* vero aliquid, quod constans in igne sit, & per maximam ignis torturam, ita per se, non penitus destrui vel auferri possit, intelligatur, & quod in toto orbe, a multis retro seculis, in hodiernum usque diem usui cesserit, salia ejusmodi, ad distinguendum voces in chymia, ita nuncupare & ab aliis salibus distinguere. Parum denique refert chymico practico, num voces ejusmodi Arabicae, vel Chaldaicae, vel alii omnino linguae originem debeant, modo versus alios artis peritos loquendo vel scribendo mentem suam explanare poterit.

Originarium Alcali hodie quidem adhuc conficitur, sed non ex unica herba *Kali* vel *Soda* tantum, sed ex aliis simul ad maris littora crescentibus, nec sale destitutis herbis. Cum vero maximam partem salis hujus Soda vel *Kali* forsitan porrigat, ideo sub nomine Sodae, & cum copiosissime in Hispania alitur & praeparatur, sub cognomine *Sodae Hispanicae* exportatur, venditur & consumitur.

Quemadmodum vero *Kali* hocce non parum de sale marino participat, cum quo, uti dictum, & aliae herbae permiscentur, totaque incineratio & subsequens praeparatio non adeo circumspectè, sed solummodo ab hominibus plebeiis ejusmodi locorum accolis peragitur; itaque ultro apparet, quemadmodum & re ipsa constet, *Alkali* hocce vel Sodam minime purum chymicum, sed aliis salibus & impuritatibus, ut & abundanti terra conspurcatum Sal Alkali exhibere: Quare & nostris hisce temporibus nec chymiae, neque medicinae, sed solummodo mechanicis artificibus & opificibus, maxime vitriariis, saponum confectoribus & tinctoribus inservit. Si quis vero, hisce non obstantibus, illo ad chymicos labores uti vellet, tunc depuratione necessaria & separatione earum, ad Sal Alcali purum haud pertinentium, impurarum & peregrinarum sive admixtarum, sive casu introductarum rerum omnino indiget. Haecce omnia, occasione originis vocis Alkali, paucis praemittere volui, ad proprium scopum nunc reversurus.

The Properties of pure fixed Alkaline Salts.

Sal Alkali-fixum purum primo quatuor proprietates Alkali, cujusdam in genere possideat necesse est, quibus & salia Alcalino-Volatilia stipata sunt. 1. Ut cum acidis quibusvis effervescat. 2. Ut cum acidis hisce in Sal medium abeat. 3. Ut omnes cum acidis factas solutiones praecipitet. 4. Ut coeruleum syrupi violarum colorem in viridem transmutet. Sal Alcali-fixum contra in subsequentibus proprietatibus à volatilibus Alcalicis salibus quam maxime discrepat, nempe quod 1. Solutionem Mercurii sublimati non in album, quod salis Alcali volatilis indoles est, sed in fuscum, citrinum colorem praecipitet. 2. Cum cupro adjecto nec vestigium coloris coerulei excitet. 3. Cum Spiritu Nitri fumum haud producat. 4. Aquae admixtum, non frigoris, sed potius caloris sensum illi conciliet. 5. Ab aëre admisso haud siccum relinquatur, sed humidum evadat, vel denique liquescat. 6. In igne non avolet, sed permaneat, candescente

 suaviter

ſuaviter igne fere nihil, ingenti vero & fuſorio, parum admodum de pondere ſuo amittat. 7. Non ſolum in igne fixum perſeveret, ſed etiam cito ſe fundi patiatur, & denique. 8. In Cryſtallos haud abeat quemadmodum ſalia nonnulla volatilia. Praeterea Sal Alkali fixum purum, etiam ſubſequentes qualitates peculiares poſſidere, & in tentaminibus monſtrare debet. 1. Ut in forma ſoluta, cum alio, circa quod occupati ſumus, puriſſimo ſale Alcali-fixo, abſque ulla alteratione, turbatione vel praecipitatione, amicabiliter coëat neceſſe eſt. 2. Ut Sulphur in humida via, aeque ac ſicca, omnino ſolvat oportet. 3. Cum Acido vitriolico puro permixtum, & in ſal medium cryſtallinum coactum, in igne nihil ponderis ſui amittere, nec ullo modo fluere debet. 4. Denique purum & genuinum ejuſmodi Sal Alcali-fixum, praeter reliquas omnes antea recenſitas 15 proprietates, cum pinguibus etiam vel expreſſis oleis ſaponem conſtituere neceſſum habet. Quod ſi vero in unico ſolum harum ſingularium commemoratarum proprietatum peccet, tunc ſtatim ſignum penitus infallibile eſt Sal Alkali-fixum non purum fuiſſe.

What Subjects are required to produce fixed Alkaline Salts.

Quantum mihi innotuit, natura cum integro ſuo penu, nullum nobis ſatis purum ſeparatum, & cum recenſitis proprietatibus dotatum, Sal Alcali fixum porrigit, ſed exiſtit, ſi demonſtrabile aliquod reperitur, (qualecunque in toto orbe Sal Alcali nativum invenire & explicare poſſum) unice & ſolum in illo, cum ſale Acido jam permixto, communi vel marino ſale. Circa hoc vero conſiderari oportet, quod Sal Alcali fixum ejuſmodi, 1. Quia illud nunquam nulloque modo in ſtatu ſuo pure Alcalino, ſed ubique, ſive cum acido ſalis communis, vel etiam, quemadmodum in fontibus nonnullis ſotericis, cum Acido Vitriolico conſpurcatum reperitur; ſi denique illud demonſtrare cupio, (poſito me hoc demonſtraturum) variis nihilominus artificiis ab admixtis ejuſmodi rebus liberari prius debet; ita ut talia, artificioſis laboribus educta corpora, (certo reſpectu) haud ſimpliciter pro pure nativis, circa quae ars minime verſatur, declarare poſſim. 2. Quod hocce in Sale communi reperiundum Alcalinum ens, cum denique illud artificiis variis ſeparaverim, & demonſtraverim, nihilominus cum antea recenſitis ſedecim proprietatibus perfecte haud congruens purum, ſed à ſale Alcali-fixo vegetabili ordinario valde diſcrepans Alcali exiſtat. Ex quibus generaliter denique concludo, purum Sal Alcali-fixum naturam minime nobis porrigere, conſequenter omnia Salia Alcalina pura tota Artis Producta eſſe.

Regnum Vegetabilium, vel hiſce adnumeratas res naturales, ſi non in totum, maximam tamen partem, pro ſubjecto & materia agnoſcunt, ex quibus in maxima copia produci & elaborari queunt; Nam licet hinc inde parum quicquam demonſtrativi, in Regno etiam Animali exhiberi quandoque poſſit, attamen, excepto illo, in urina & faecibus à dicto ſale communi dependente, in tam parva quantitate exiſtit, ut attentionem haud mereatur. Rationem, quare tam parum, vel nihil

nihil Alcalino-fixi exhibeat, ſuo loco, pro viribus, paucis ſubjungam.

Mirum interea videtur & paradoxum, quando de origine & exiſtentia Salis Alcali dicimus produci illud ex re quadam, quae nec granum Salis Alcalino-fixi continuit ; quemadmodum ex omnibus iſtiuſmodi rebus, ex quibus multae librae imo centenarii Salis Alcali fixi eliciuntur, ante operationem in igne, vel ante incinerationem vel combuſtionem, nec granum hujuſmodi, in tentaminibus ſingulis probati Salis Alcalini ad ſenſum educi poteſt ; ſed ſi ſalini aliquid detegitur, ad acidam potius, quam Alcalinam naturam verget.

Praecipuum & maxime neceſſarium inſtrumentum ad productionem Salis Alcalino-fixi eſt IGNIS, utpote in quo praerogativa artis prae natura in tantum conſiſtit, dum hunc pro lubitu & placito excitare, minuere & augere, variaque corpora cum ipſo reſolvere & componere valet, quomodo & quando ipſa cupit : & cum hoc, nempe quod Salia Alcalino-fixa mediante igne producantur, quidam Chymici verbales forte audiverint, hi derepente nudum inſtrumentum pro materia Salis Alcalini, vel pro principio conſtitutivo ipſo venditarunt, & univerſam Salis Alcalino-fixi formationem particulis ignis adſcripſerunt, cum tamen quotidiana experientia plane diverſum, & quod ignis undique tantum ut inſtrumentum ad ejus formationem cooperetur, viſibiliter convincat & demonſtrat, prout & ipſe inſequentibus de hac re ulterius mentem meam ſum explicaturus.

Subjectum, ex quo Sal Alcali fixum produci debet, proprie duo neceſſaria requiſita vel ingredientia contineat, neceſſe habet, quae ad conſtitutionem hujus ſalis abſolute requirantur, nimirum ut, 1. In ſe ſit inflammabile, & oleoſis vel bituminoſis partibus, & 2. Sale quoque acido dotatum. Quod ſi ergo has abſolute & neceſſario requiſitas proprietates in uno ſubjecto conjunctas reperio, tum ſatis quoque ſufficiens eſt, ut Sal Alcali-fixum largiri queat, unde omnia fere vegetabilia, vel eorum partes incorruptae, aptiſſima exiſtunt ; uno vero utrorumque deficiente, parum quoque vel nihil Salis Alkali fixi inde emerget. Hoc ergo fundamento omnis Salis Alkalino-fixi in mundo productio innititur, & pro diverſitate proportionis horum memoratorum duorum neceſſariorum ingredientium, etiam ex hoc vel illo ſubjecto modo plus, modo minus, modo debilius, modo fortius, vel alio modo diverſum Sal Alcalino-fixum acquiritur. Sola ſiquidem oleoſi ingredientis copia omne punctum non abſolvit, dum & imprimis ſal acidum ut adſit, neceſſe eſt. Quod ſi ergo Sal Alcalino fixum producturus, de quodam vegetabili, ſive ſit herba, radix, lignum, cortex, vel quicquid ejus ſit, antea tantum per alios labores, per quos ſolummodo contentam in eo olei & ſalis acidi proportionem concludere poſſum, ſufficienter inſtructus ſum, tum in anteceſſum quoque judicare potero, an multum vel parum Salis Alcali-fixi daturum ſit : Quod ſi enim parum vel nihil olei poſſidet, parvam quoque Salis Alcali proportionem ſubminiſtrabit, & ſi parum vel nihil ſalis

acidi contineat, vel acidum volatilius exiſtat, multo minus adhuc ſuppeditabit ; unde poſterior haec circumſtantia, plerumque in cauſa & culpa eſt, quod non raro ex magno cujuſdam ligni acervo, vel aliis vegetabilium partibus, parum ſalis Alcali erui poſſit ; & ſicut indubitatum exiſtit, quod omne ſanum vegetabile partes inflammabiles contineat, ita contra multa ex iis, vel parum ſalis, vel etiam volatile & ſub incineratione plerumque diffugiens, ſal acidum continent. Dari quoque poſſunt plantae, ligna, radices & ſimilia, ſalis & olei ditiſſima, quae vero, dum incinerari debent, propter nimiam aëris intercluſionem, tantummodo vaporant, & in carbones, non vero in cineres exuruntur ; qua circumſtantia omne ſere ſal acidum, quamvis ejus non parvam quantitatem contineant, praecipue ſi vegetabile adhuc viride, & inſufficienter exſiccatum ſit) ſenſim ſenſimque exhalat, perparum reſtat, & omne quod remanet, cinerem in pauca, & Sal Alcali-fixum in longe minori adhuc quantitate ſuppeditat. Res haec demonſtrari poteſt, *ex. gr.* in Pinu, vel quovis ligno, quo communiter ad urendum utimur : Si ejus aliquot centenarii recipiantur, iique leniter aperto aëre comburantur, ſufficientem cinerem, & ex his notabilem quoque ſalis partem nanciſcemur : Si vero ejuſdem ligni totidem centenarii in parvos acervos conſtruantur, carbonariorum more, vel alio quoque modo, ligno apertus aër adimatur, ejuſque modo tantum ei permittatur, ut vaporare poſſit, breviter carbones conſueti exinde conficiuntur & quidem ea ratione, ne ulli carbones inflammantes, qui in igne aperto aëre, fumantem flammam edunt, reſtent ; ejus modi puros carbones, ſi tum aperto aëre incineres, eoſque in comparatione quantitatis priorum cinerum ponderes, demum Sal Alcali exinde modo conſueto, elixiviando ſepares, & itidem ponderes, haec poſterior methodus immenſum quanto minus cinerum & ſalis in reſpectu prioris, quod ab initio ſtatim aëre aperto incineratum fuit, ſuppeditabit. Nulla alia ex ratione, haec ponderis diverſitas ex ejuſdem quantitatis ligno oritur, quam quod in confectione carbonum pleraque pars ſalis acidi, vel communiter ita appellati ſpiritus lignorum, in aërem aufugerit, quae tamen neceſſariò ad conſtitutionem Salis Alcalino-fixi, tanquam primarium ingrediens, requiritur.

Conſideratu dignum eſt, quod pro acquiſitione cineris vegetabilis abſolute admiſſio aperti vel liberi aëris requiratur, quippe ſine quo nulla ratione cineres acquirantur, unde carbones, occluſo aëre, etiam fortiſſimo & per aliquot annos conſtanter durante igne, ſemper carbones permanent, & nunquam in cineres rediguntur. Nec minus notatu & obſervatu dignum eſt, quod inter carbones & ex eodem ligno confectos cineres, tanta occurrat differentia. 1. Sic ex carbone, quantacunque etiam aquae copia, ne hilum quidem ſalis Alcalini elixiviari vel ſeparari poteſt. 2. Nullum ne quidem fortiſſimum & potentiſſimum acidum ullum effectum in carbone exerit. 3. Nullus carbo cum vitro ſeſe miſcet, quae ſingula tamen cineres praeſtant.

Sed

Sed ut ad formationem Salis Alcalini, ſeu neceſſaria ad id conſtituentia revertamur, veritas & probatio meae Theſeos ex pluribus adhuc momentis & circumſtantiis ulterius ſatis patet. 1. Recipiatur ejuſmodi putridum, carioſum & quaſi emortuum lignum, quod alias dum in decenti vigore adhuc exiſtit, largam ſatis lixivioſi ſalis quantitatem edere ſolet; comburatur, elixivietur, & procedatur in omnibus eadem ratione, ac ſi ſanum lignum fuiſſet, & tunc tandem reſpiciatur, & computus ducatur, quam parum vel nihil Salis Alcali-fixi exinde proveniet. Ratio eſt manifeſta, quia neceſſario ad ejus formationem requiſitae, tam oleoſae, quam praeprimis quoque acidae ſalinae partes antea in aërem exhalarunt & evanuerunt. 2. Aſſumatur planta recens, quae manifeſto ſufficiente ſalis acidi quantitate à natura dotata eſt, ſeparetur exinde ſal acidum, ſeu ita dictum ſal eſſentiale, quo facto herba exſiccetur, (ſeparato nimirum ante dicto ſale acido) comburatur & elixivietur cum omni cautela, tunc ad oculum patebit, quam parum vel nihil Salis Alcalino-fixi ſuppeditatura ſit. 3. Eadem autem herba, eademque quantitate aſſumpta, abſque tamen ſalis acidi vel eſſentialis ſeparatione, tantum ſiccata, combuſta, & modo conſueto ita elixiviata, viſibiliter & aperte per auctiorem Salis Alcali-fixi quantitatem, in comparatione prioris operationis, veritatem demonſtrabit. 4. Vel accipiatur ante extractum ſal eſſentiale acidum, calcinetur debita cum cautione, tum eadem certitudo emerget, & ex eo quoque, quia ejuſmodi ſalia eſſentialia non pure ſalia acida, ſed etiam aperte oleoſis & ad formationem Alcali altera ex parte neceſſariis partibus dotata ſunt, verum ſal Alcali fixum apparatur. 5. Quod ſi porro eadem recentis ejuſmodi herbae quantitas, quae ordinario bonam ſatis Salis Alcalini portionem dare ſolet, aſſumatur, factaque ponderatione tota quantitas in duas partes accurate dividatur, ejuſque pars dimidia ſiccetur, comburatur, & modo conſueto Sal Alcali-fixum porro exinde elixivietur, ponderetur & conſervetur; altera vero pars dimidia ad putrefaciendum reponatur, & decenter tractetur, quo penitus penituſque putreſcat, tum deſtilletur, ita acquiremus, prout non incognitum eſt, ſpiritum urinoſum, ſal volatile & oleum empyreumaticum; ſed reſpiciatur poſtea, quantum Sal Alkali-fixi ex reſiduo jam extrahi poſſit, ſi quidem certo, licet ſumma cum cautione elixivietur, perparum & ſaepe plane nihil emerget; ratio iterum non obſcura eſt, quia requiſita ad fixum Sal Alkali, ſal acidum & oleum, durante putrefactione metamorphoſin paſſa, & partim in ſal volatile, vel ſpiritum urinoſum converſa, partim etiam, & quidem pleraque ex parte, in oleum in ſubſtantia & forma olei per deſtillationem inde ſeparata fuerunt. 6. Quod ſi ad manus ſit purus citri ſuccus, qui aperte ſal acidum, aut paucas vero oleoſas, vel de principio inflammabili participantes partes ſimul continet, ejuſque magna ſatis portio, ad 20, 30, vel plures congios aſſumatur, aquoſum evaporetur, inſpiſſetur, comburatur & elixivietur, tum exinde quoque formatio Salis Alcali-fixi manifeſta reddetur. 7. Quam

optime autem ſenſibus noſtris haec patebunt in tartaro, vel ejus cryſtallis quoque, quippe qui, prout unicuique notum eſt, nihil aliud, quam ſal acidum permultis oleoſis partibus imbutum, continet; quod ſi ergo haec duo hic conjuncta requiſita primaria, nempe ſal acidum & oleum, mediante neceſſario ad hoc inſtrumento, ignis ſcilicet, uſtulentur & comburantur, tum ex reſiduo nullum amplius apertum ſal acidum, è contra vero de novo utique productum Sal Alcali, & quidem copioſe acquiritur; & ſic cum omnibus ſubjectis demonſtrari poteſt.

Quod vero oleoſa quoque ſubſtantia non parum de ſuo contribuat, inter alias diverſas demonſtrationes, etiam ex unica hac cuique facile in ſenſus cadente circumſtantia colligi poteſt; quod ſi *ex. gr.* quatuor librae ſiccati abſinthii incinerentur, & ex lixivio Sal fixum colligatur, accipimus praeter propter ℥ij ſß Salis Alcali-fixi. Jam vero recipiantur itidem 4 librae ejuſdem abſinthii, contundantur, & conſcindantur eae, & pars ipſius oleoſa bituminoſa, ſeu reſinoſa, per ſpiritum vini rectificatiſſimum, quamdiu ſcilicet ſpiritus tingitur, extrahatur; tum plurimum quidem, non tamen omne & univerſum in eo contentum inflammabile educes, omne tamen ſalinum in ipſo interim remanet; quod reſtat poſtea, exſiccetur, comburatur, ſal exinde elixivietur & ponderetur, tum loco ante dictarum 2 ½ unciarum jam unica tantummodo ſalis uncia prodibit; ex quo ergo iterum apertiſſime neceſſarium, ſub priori combuſtione relictum, & ad majorem Salis Alcalini fixi portionem contribuens, in poſteriori vero antiproba, mediante extractione ſpirituoſa ſejunctum, & jam proinde abſens, ingrediens bituminoſum ſeu oleoſum demonſtratur. Pro ulteriori demonſtratione, haec jam memorata, ab extractione ſpirituoſa reſidua, remanentia per aquam excoquatur, herba tum reſtans exſiccetur, comburatur, elixivietur, ejuſque ſal colligatur, tum ejus tantummodo 19, vel 20 grana acquirentur; ratio eſt, quia ex his 4 herbae libris jam omne fere oleoſum & ſal acidum, quae ad compoſitionem & formationem Salis Alcalino-fixi requiruntur, extractum fuit.

How Alkaline Salts are produced, and of what they conſiſt.

Cum ergo clare ſatis pateat, quod ad formationem Salis Alcalino-fixi acidum & principium quoddam inflammabile abſolute requirantur, prout comprobavi, pro primo facile exinde quoque colligi poteſt, quod aliquid ex his 2 tam neceſſariis ingredientibus ſimul in eo reſtare debeat, prout & revera reſtat. Ignis, qua inſtrumentum, quod ad confectionem Salis Alcali adhibendum eſt, nihil aliud peragit, quam quod, 1. Omnem ſuperfluam aquam, 2. Omne itidem ſuperfluum ſal acidum in forma ſpiritus, 3. Volatile demum & ſuperfluum oleum ſeparet. Quemadmodum igitur omnia ſalia, ſive acida, ſive alcalina ſint, ſeu quoquo modo appellentur, nec minus omnia inflammabilia *terram pro baſi vel fundamento* agnoſcunt, quae terra imprimis oculis ſeſe ſiſtit, ſi ejuſmodi mixta magis magiſque à connexis cum ea volatilibus partibus liberantur, & contra ad magis magiſque fixum ſtatum reducuntur: ita hoc quoque hic in generatione vel compoſitione

positione Salis Alcalino fixi videre licet ; dum enim ignis sensim sensimque aliquid de volatiliori inflammabili & sale acido cum aqua propulit, uno eodemque tempore, residuum magis fixum tam sal acidum, quam bituminosum magis magisque concentratur, quando sensim sensimque necessaria ad constitutionem salis acidi aqua perit, quae mediante calore ignis, ex sale acido liberatur, & exhalare cogitur ; eodem, inquam, tempore separatur, altera ex parte, terra, quae in sale acido fuit ; quo diutius ignis continuatur, vel subjectum incineratur, eo plus aquae subtilis, subtilis acidi & inflammabilis abigitur, & tanto plus altera ex parte terrae acquiritur, vel tanto facilius degenerat sal acidum cum pauca phlogisti portione, in terram : Unde *maximum volumen salis fixi ex pura terra consistit :* verum quia haec terra originem suam ex sale acido educit, &, ut ita loquar, naturae acidae est, impossibile est, quod etiam sub prima incineratione vel calcinatione omne sal acidum ex ipsa liberari possit ; sed ultimum potius maxime concentratum &, in comparatione prioris multo volatilioris, jam maxime fixum, ut & magis fixum substantiae inflammabilis in quavis particula hujus terrae impactum restat & inhaeret. Salinum hoc causa existit, quare omnis haec terra dispositionem *solubilitatis* cum aqua retinet, & paucum illud, quod ex inflammabili ortum deducit, causa hic quoque est *causticitatis*, secundum proportionem & modum immixtionis sui.

Ex eodem quoque fundamento, quia scilicet haec terra acidae naturae & familiae est, prodit quoque constans quasi desiderium, sal acidum rursus assumendi, quod ipsorum *affinitas & intima commixtio cum omnibus acidis*, quin imo nuperrime à me demonstratus magnetismus, quo Salia Alcalino-fixa acidum quoque ex aëre attrahunt, tanto magis confirmat. Hoc quoque concentratum & restans paucum sal acidum, ut & haec ad salinam mixtionem prona & jam ab omni aqua liberata terra, aperte unica existit causa, quod haec mixta id rursus quasi concupiscant, quod per calorem ignis amiserant, nempe aquam : inde oritur celeris illa & subitanea extractio humiditatis & *solutio per deliquium*, quin & *incalescentia* illa, quod si fortiter combusta fuere, & tum prima vice humiditatem sentiunt quin etiam ipsa *incensio*, si minerale quid simul adhibitum fuit, quale quid in *sale Tartari caustico cum Regulo Antimonii Martiali* praeparato, ut & *pyrophyris* videre licet. Quod si vero Salibus Alcalicis paucum hoc sal acidum & inflammabile plane adimitur, tum *nuda* tantum restat *terra*, quae nec in aqua amplius solvi potest, nec humiditatem nec acidum ex aëre attrahit, nec incalescentiam producit, & in omnibus quasi emortua apparet ; quamquam Chymicus, dummodo ipsi lubeat, eam rursus, revivificare, & ad dispositionem solutionis & mixtionis cum aqua, imo ad plerasque priores qualitates reducere valet.

Omne quicquid de formatione Salis Alcalino-fixi superius attuli, unico exemplo aliquatenus jam supra memorato plenarie demonstrare possum, vel quivis illud in propriam sui convictionem imitari poterit ;

Recipiatur ſal eſſentiale Acetoſellae, quod viſu, guſtu, tactu, vel quoquo modo ante examinatum, [quamvis nemo quoque iſtud negaturus ſit] apertum ſal acidum, non tamen purum, ſed particulis oleoſis mixtum, ſiſtit. Quod ſi ergo hujus, *e. g.* uncia 1 aſſumatur, ea cum aqua uniatur, tota ſeſe penitus in aqua ſolvit, prout etiam ex ſolutione aquoſa in cryſtallos antea concrevit, & ne minimum quidem indiſſolutum vel cum aqua permixtum reſtat, ita ut nec oleum, nec terra, nec Sal Alcali, nec aliud quicquam peregrinum, ſed nihil aliud, quam purâ ſalis acidi ſolutio videri poſſit. Jam recipiatur porro ℥i. ejuſdem ſicci tamen & cryſtallini ſalis, imponatur ea vaſculo retorto vitreo, & debita cum cautela, igne per gradus adhibito, deſtilletur, tunc ſenſim ſenſimque omne iſtud, quod antea in ſuo ordine circa confectionem Salis Alcali recenſui, jam hinc mediante ignis inſtrumento, quod nihil aliud quam vaſculi retorti & contenti in eo ſalis incaleſcentiam cauſatur, eveniet & producetur. 1. In vas recipiens ſuperflua, quae tamen in ſicco ſale antea latitarunt, aqua & oleum cum ſubtiliſſimo & volatiliſſimo ſale acido prodibunt. 2. E contra non parum terrae inde rurſus ſeparabitur, & reſiduum, cui aliquid ſalis concentrati & olei quaſi fixioris ſeſe innexuit, in perfectum Sal Alcali-fixum degenerabit. Invenientur circiter 3 drachmae aquae pauco ſale acido volatili imbutae, qui liquor alias, ſpiritus acidus Acetoſellae vocari poteſt, ſcrupulum forte unum olei empyreumatici ponderabis, & in vaſculo retorto, ita dictum reſtans caput mortuum conficiet circiter ʒiv & 20 & aliquot grana, ex quo plus quam ʒiii veri ſicci Salis Alcali fixi elicies; ita ut pauca tantum grana exhalarint & diſperſa ſint, quae de tota uncia, ſi ex omnibus computum traxeris, forte deficiant. Hic ergo omnia prodeunt & eveniunt, quae dixi; verum praeter Sal Alcali &, quae primo abiit, aquam & ſubtile acidum, oleum quoque adeſt, ut terra plane emortua, quae duo poſteriora jam nullo modo cum aqua miſceri amplius volunt, quamvis antea, cum adhuc totum ſal acidum oleoſum conſtitueret, omnia in eodem ſolverentur. Poteſt quoque Sal Alcalino-fixum deſtrui, parva illa acidi & inflammabilis portio ipſi adimi, indeque quantitas terrae augeri, & ſic unico hoc experimento omnium harum rerum certitudo erui.

Conſiſtit itaque Sal Alkali fixum ex terra quadam ſolubili, in quam, mediante igne, aliquid de fixiſſimo ſale acido ſeſe inſinuavit, ſimul quoque aliquid de magis fixo, vel ad terreſtreitatem magis inclinante bituminoſo, ſeu inflammabili principio, uſtulando quaſi innexum eſt, ita ut novum mixtum ſalinum, quod Chymici *Sal Alcali-fixum* vocant, conſtituat. D. *Homberg*, hac in re, quamvis revera vir egregie habilis fuerit, tamen errorem paſſus eſt, dum ſal acidum tantum cognovit, quod ſeſe terreſtribus particulis innecteret, & ſic Sal Alcali-fixum conſtitueret, de inflammabili vero nullam mentionem injecit. Senior D. *Geoffroi* & D. *Lemery*, in tantum quidem ſub ſuis laboribus obſervarunt, quod aliud quippam adhuc praeter ſupra dictum

dictum ſal acidum & terram, nempe aliquid de principio inflammabili ad conſtitutionem Salis Alcali neceſſario requiratur ; ſed boni iſti viri rurſus in eo defecerunt, dum hoc inſtrumento, ſeu igni, aſſignare voluerunt, cum tamen in iſto ad Sal Alcali fixum adhibito ſubjecto vegetabili, reale ac ſubſtantiale ingrediens oleoſum vel bituminoſum uniuſcujuſque oculis obverſetur. Porrigatur quaeſo his ejuſmodi ſubjectum in manus, in quo antea nullae actuales partes inflammabiles demonſtrari vel conjecturari poſſunt, ſed in quo tantum ſal acidum & partes terreſtres probari queunt ; hoc ſubjectum ipſi poterunt in vaſe retorto, per 20 & plures annos, cum multis centenariis extrorſum vaſi retorto adhibitis, particularum ignis & materiarum luminis [*Parties de feu & matieres de la lumiere*] vel qua ratione ipſi volunt tractare, ea tamen cum expreſſa praecautione, ne cineres ipſos harum adhibitarum inſtrumentalium materiarum ignis addant, dum certo certius ſit ipſos ne unicum quidem granum Salis Alcalino-fixi exinde philoſophando educturos, licet etiam totum *Carteſium* ſimul igni conſecrarint : jam vero ſi ex ipſorum opinione ignis ingrediens, vel conſtituens materiale ipſius exiſteret, neceſſum foret, ut abſolute etiam ex ejuſmodi rebus, in quibus in ſe nullae eſſentiales partes inflammabiles praeſto & immixtae eſſent, illud conficere poſſint : Quod ſi in actum deducere non poterunt prout revera non poterunt, ſed ſemper materia in & ex ſe ipſo inflammabilis aſſumenda venit, quare non ipſas actu realiter praeſentes adhibitas, plane certas & demonſtrativas res, tanquam cauſam reſpiciam, vel quare memet huic & illi philoſopho vel Chymico cerebrino, qui forte per totam ſuam vitam nullum carbonem manibus tractavit, & chymica ſubjecta & hiſtorias non ex ipſorum intima qualitate, & realiter conſtituentibus materialibus partibus diverſarum in iis contentarum materiarum, ſed tantummodo ab extera, mediante circulo, linea, & microſcopio, vel etiam quae cum iis dimenſurare & perſpicere non poteſt, ſecundum propriam chimericam in cerebro tantummodo propoſitam, & in Chymico laboratorio nunquam comprobatam, nec unquam comprobandam imaginationem probabile judicat, ſubjiciam, ipſiuſque deliramenta adorem?

Quod autem ignitio, vel ignis, qua inſtrumentum tantum, ad productionem Salis Alcali fixi requiratur, inter caetera ex Tartaro quoque patet quippe qui utraque primaria praeſidia poſſidet. Poſſidet, ut notum eſt, partes oleoſo-bituminoſas, continet etiam apertum ſal acidum, & utrumque in abundantia ; quod ſi autem ex hoc Sal Alkali abſque igne artificioſe deberet produci, tum nihil amplius adhibendum foret, quam volumen, vel terra quaedam, in quam parum acidi & inflammabilis ſeſe innecteret, & innidularetur ; proinde pro hoc ſcopo oculos Cancri, vel aliud corpus terreum, quod ad minimum cum nullo alio acido imbutum eſſet, adhibere poſſent. Solve igitur in Tartari ſolutione, tantum ante dicti terrei corporis, quantum ſolvi poteſt, evapora aquam & exſicca, tum equidem ex propria mea hypotheſi, qua dixi, quod ſal acidum & in-

flammabile in terra concentrata abſolvant Sal Alcali fixum ex copioſiore terra & pauciore ſale acido & inflammabili fixiore conſiſtat, poſſibilitatem & mixtum quoddam, quod in pluribus circumſtantiis ut Alcali fixum ſeſe gerit, oculis ſiſtes; verum examinetur ulterius ſecundum omnes à me allatas probationes veri & perfecti Salis Alcalino-fixi, tum mox hic, mox alibi patebit, multa adhuc illi deeſſe, & quomodo totum mixtum, ſolutio tantum oculorum cancrorum in acido Tartari, adeoque ſuperfluum acidum & oleum, breviter ipſe Tartarus crudus adhuc ſimul in illo immerſus & irretitus ſit, per conſequens nullo modo verum & perfectum Sal Alcali fixum conſtituat, nulla alia ex ratione, quam quia nullus ignis adhibitus fuit, non ac ſi ex igne plures adhuc particulae ignis ad hoc neceſſariae eſſent, ſiquidem, prout dixi, hic adhuc ſuperfluae inflammabiles partes in oleo Tartari praeſentes ſunt, ſed propterea quia ſuperfluum oleum & acidum exinde ſeparari debuiſſent, unde etiam in hoc experimento, formatio Salis Alcali ad oculum patet, ſimulac modo plus acidi & Alcali per adhibitum calorem ſenſim ſenſimque expulſum, & operationi per neceſſarium inſtrumentum colophon impoſitus fuit. Induſtrius olim *Kunckelius* jam tum temporis animadvertit, quod ex Tartaro & Calce viva, ſi utraque cum aqua coquendo elixivientur, poſſibilis demonſtratio Salis-Alcalini, abſque adhibita ſicca ignitione demonſtrari poſſit; cum vero cum praecedentibus circiter conveniat, & eadem ratione quaedam partes olei empyreumatici Tartari adhuc aliquatenus reſtent, ſuperfluum exiſtimo iſtud in meae hypotheſeos probationem adducere, prout & alias non paucas adhuc cum variis acidis impraegnatas terras, vel plenarias terrarum ſolutiones, tanquam falſa Salia Alcalino-fixa adducere poſſem, niſi prolixitati parcerem.

Of the moſt uſual fixed Alkaline Salts, and how they are to be obtained.

Satis ſuperque notum eſt, quod ex omnibus vegetabilibus, vel potius eorum cineribus Sal Alcali parari poſſit, nec non quod ex permultis herbis & permultis aliis partibus à non exiguo temporis ſpatio ejuſmodi lixivioſa Salia confecta fuerint, & denique quod eodem modo omnia conficiantur, nihilo minus quaedam adhuc de hac materia, tam in genere de Salibus fixis herbarum, quam etiam in ſpecie de reſiduis adhuc in Chymia uſualibus Salibus Alcalino-fixis, ſeu potius eorum praeparatione, quantum fieri poteſt, brevibus adducam.

Modus procedendi ab aliis in 9, ab aliis vero in 6 puncta diſtribuitur; qui in 9 puncta ipſum diſpertiuntur, appellant operationes vel labores, qui pro hoc ſcopo cum ſubjecto vegetabili perficiuntur, prout ex ordine ſequuntur, deſiccationem, combuſtionem, extractionem, ſeparationem, inſpiſſationem, calcinationem, ſolutionem, filtrationem, & .inſpiſſationem. Qui vero 6 puncta tantum requirunt, appellant hos labores, deſiccationem, combuſtionem, extractionem, ſeparationem, inſpiſſationem, & depurationem. Ego ad 4 eas reduco, nimirum *inciner ationem*, *elixiviationem*, *inſpiſſationem* & *depurationem*, dum ſcilicet unus labor alterum ſemper praeſupponit; quod

qnod ſi enim *de incineratione* loquor, quod nempe vegetabile primo in cineres exuri debeat, tum hoc jam praeſupponit deſiccationem, vel quod antea, ſi non ex toto, ſaltem aliqua ex parte exſiccari debeat. Si de ſecundo puncto *elixiviatione* ſcilicet loquor, vel ipſae anus norunt, quod nullum lixivium abſque aqua vel extractione fieri poſſit; norunt quoque, quod haec *extractio*, ſi lixivium appellari debet, à cineribus ſeparanda ſit, ut proinde elixiviatio extractionem & ſeparationem utique praeſupponat; & ſic etiam ſub operationibus *depurationis*, neceſſariae ad eam calcinationes, ſolutiones, filtrationes & inſpiſſationes intelligendae veniunt.

Totus proceſſus producendi Salia Alcalia fixa ex herbis, ſequentibus abſolvitur momentis, quae breviter percurremus: Recipitur herba ejuſmodi, eaque leniter ſiccatur; partem aliquam ſiccatae herbae de alio igne incende, in ignem ſenſim ſenſimque reliquum herbarum conſtanter projice, ita ut leni tantum carbonum igne, minime vero aperta flamma, exuratur & in cineres redigatur, cui rei non parum favet, ſi hic carbonum ignis circa ultimum in magis magiſque anguſtum ſemper acervum colligatur. Quod ſi tandem penitus exuſtio peracta eſt, refrigeſcat, cinis cribretur, ut reſtantes forte non plane incineratae particulae ſeparentur, cinis aqua frigida plenarie elixivietur, lixivium filtretur, filtratum vel in figulino, vel vitreo vaſe leniter evaporetur, denique ad ſiccitatem inſpiſſetur. Medico uſui ſi adaptari debent, & ſi Medicus externam plane non neceſſariam, imo potius noxiam magis quam utilem, pulchritudinem & candorem reſpicere non vult, tum prima haec inſpiſſatio ſufficere poterit; quod ſi vero depurari, imo ex parte plane cryſtalliſari debent, tum calcinantur parum, & denuo in magna ſatis portione aquae ſolvuntur, filtrantur, rurſuſque leniter evaporantur eouſque, donec in ſuperficie parva cuticula apparere incipiat; tum enim in fundum detruncatae cucurbitae, vel aliud ampli orificii vitrum infundatur, & impoſita leviter charta à cinere vel aliis ſordibus praecaveatur, & in locum temperate calidum reponatur, tum ſenſim ſenſimque magna pars in pulchras & egregias cryſtallos jucundo ſaepe ſpectaculo vertetur, praecipue ſi lixivium, adhuc ante apparitionem cuticulae, ab igne auferatur, & in locum leniſſime calidum ad cryſtalliſandum reponatur, & abſque ulla motitatione ſatis temporis ipſi concedatur. Poſtquam igitur in cryſtallos concrevit, reſtans lixivium ab iis decantetur, pars humiditatis rurſus leni igne exhaletur, rurſus in ante dictum temperatum locum reponatur, ut reſiduum, quantum fieri poteſt, cryſtalliſet, quae tamen cryſtalli plerumque pulchritudine ad priores non accedunt, ſed multo minores, imo plane aliter formatae eſſe ſolent. Quod tum vero ſupereſt liquidum, decantetur, & tandem plenarie inſpiſſetur; cryſtalli autem ſemper pauca aqua deſtillata communi celeriter abluantur, & tum ſuper pura charta bibula ab adhaerente humiditate leniter ſiccentur. Si vero non cryſtallos, ſed tantum depuratum album Sal

Alcali desideres, ante dicto diuturno labore supersedere, & tantum post primam calcinationem, solutionem & filtrationem, ad siccitatem leniter inspissare, & tum in obturato firmiter vitro ab aëre bene praemunire poteris. Haec igitur est generalis methodus, qua salia lixiviosa herbarum, florum, stipitum, &c. purissime & optime praeparari possunt, ubi tria adhuc monenda erunt. 1. Simulac una tantum, vel altera levis circumstantia in ante dicto processu immutatur, sive sit in exurendo, in elixiviando, evaporando, calcinando, sive quicquid ejus rei sit, quod statim & infallibiliter modo hic modo alibi immutatum sal acquisiturus sis. 2. Quod in ejusmodi depuratis & crystallisatis Salibus Lixiviosis nulla, quae in subjecto antea fuit, specifica virtus & proprietas demonstrari queat. 3. Quod omnia usitata & praecipue crystallisata Salia herbarum nunquam pura Salia Alcalino-fixa sint, vel qua talia ad alios Chymicos labores, in quibus purum Sal Alcali fixum requiritur, adhiberi debeant.

Tachenius & cum eo alii contendunt, herbas recentes plus salis largiri quam siccatas, *Rivinus* autem id pernegat, & ait, se id omni adhibita diligentia observasse, & de eadem herba probam sumsisse; sed nullum discrimen in iis potuisse reperire. Meo quidem judicio uterque certo modo verum dixit: Nam si ejusmodi vegetabile tractes, quod nullum subtile vel volatile sal acidum continet, tum ex siccato idem pondus salis ac ex recenti acquires: vel etiam si herbam recentem, aperto igne flammae, siccatam contra leni tantum candefactionis igne incineres, itidem semper idem fere aut saltem parum differens pondus, quamvis non ejusdem indolis, Salis Alcalini emerget, adeoque hac ratione *Rivini* quoque opinio veritati consona est.

Sed si ejusmodi vegetabile sub manus sit, quod vel tenerum, subtile, vel etiam cum aliis partibus obiter tantum commixtum sal acidum continet, quod sub incineratione facillime abscedit, exhalat, evaporat & aufugit: tum utique recens aut saltem non adeo plene exsiccatum multo plus Salis largietur, quam aliud, licet tamen unam vel alterum adhuc enchiresin requirat, & hac ratione *Tachenius* applausum meretur. Dantur vegetabilia, quae omni licet industria & praecautione sub incineratione adhibita, tamen subtile suum & ad fabricam Salis Alcalici necessarium sal acidum dimittunt, ita ut ex magna satis quantitate perparum tamen Salis Alcalici fixi acquiratur. Quod si autem exhalatio salis acidi hoc vel alio modo impediatur, tum ad oculum plus Salis Alcalini fixi prodibit, id quod rursus ea, quae de generatione & formatione horum salium dixi, luculenter confirmat. Hoc quo eo magis patescat, recipiatur tantum *Lignum Guajacum*, quod sub deflagratione sal suum acidum perquam facile dimittit, quod si satis magna ejus quantitas exuratur, incineretur, & ex cineribus omni cum praecautione Sal Alkali colligatur, perquam *exigua* ipsius *quantitas* erit secundum proportionem assumpti ligni; cujus rei rationem modo attuli, quia scilicet subtile acidum, sub deflagratione & effumatione plurima ex parte diffugit;

diffugit; quod ſi autem eadem ligni quantitas in minutiſſima fruſtula concidatur, vel plane raſpetur, & hoc cum magna aquae quantitate excoquatur, decoctum coletur, reſiduo ligno recens aqua affundatur, & excoctio eo uſque continuetur, donec aqua non amplius tingatur, decocta omnia confundantur, evaporentur, & in extractum inſpiſſentur, quod leniter exſiccetur, & tum tam hoc quam reſidua ſeorſim ſiccata raſpatura vel fruſtula leniter candefaciendo exurantur & incinerentur, tum elixivientur, & methodo conſueta Sal Alkali ex iis colligatur, mirum quanto *major* ipſius *quantitas* inde proditura ſit, quod & de non paucis aliis valet.

Praeter allata Salia Alcalino-fixa, herbarum, proſtat etiam Alcali quoddam lignorum minime pretioſum, & ad multas operationes non incommodum, hoc, quamvis jam plene elixiviatum, inſpiſſatum & calcinatum Sal Alcali revera exiſtat, tamen communiter tam Latina, quam Germanica, ut & quibuſdam aliis linguis, *cinis* tantum appellatur, *cineres clavellatos* indigito. Quicquid ſit, ſive olim purus non elixatus cinis ſub hoc nomine venditus, indeque denominatio retenta fuerit, ſive alia cauſa fuerit, originem hujus nominis inquirere operae pretium eſſe vix exiſtimo. Interim cineres clavellati unicuique ſatis noti ſunt, & à quibuſdam ſimpliciter *Sal Alcali* appellantur. Praeparantur-communiter ex cineribus lignorum duriorum, fagi, aceris, betulae, fraxini, quercus & ſimilium, unde & quomodo parentur, & qua ratione optimi cognoſcuntur, videre licet in *Kunckelii Arte Vitriaria*, *Valentini Muſaeo Muſaeorum*, & in Tractatulo, qui *Ars tinctoria experimentalis & fundamentalis* inſignitur. Hi cineres clavellati prout emuntur & venduntur, *non* conſtituunt plane *purum* & ad omnes labores chymicos aptum *Sal Alcali*, qua propter ii antea adhuc ſemel depurandi ſunt, quod non difficulter fieri poteſt, ſiquidem nihil aliud agendum, quam ut dictis cineribus clavellatis *aqua* & quidem *frigida*, ſed ne nimia copia, affundatur, ſolvantur, ſolutio filtretur, leniter evaporetur & inſpiſſetur, tum eadem ratione & bonitate ac quodvis *puriſſimum Sal Alcali* adhiberi poterit. Id quod à decantata ſolutione cinerum clavellatorum reſtat, & in aqua frigida ſolvi negat, *non* eſt amplius *purum Sal Alcali* fixum, ſed praeter partes alcalinas adhuc etiam de *Sale acido*, & quidem *vitriolico*, participat: nam ſi iſtud aqua fervide calente plene diſſolvatur, filtretur, & ſolutio, poſtquam ex parte evaporata fuit, per aliquot horas reponatur, candidas & egregias cryſtallos reperies, quae in omnibus probis & inquiſitionibus ut verum ſal enixum ſeu medium, quod ex alcali fixo & acido Vitriolico componitur, breviter ut *Tartarus vitriolatus* ſeſe gerant; quod autem ab hac ſecunda cinerum clavellatorum cum aqua fervida tractatione ſolvi recuſat, & in filtro remanet, ſunt inutiles plane foeces & ſordes.

Praeterea extat aliud purum Sal Alcalino-fixum, quod ordinario pro optimo habetur, & hactenus tam ad Chymiam, quam ad Medicinam prae omnibus aliis adhibitum fuit; eſt iſtud *Sal Tar-*

tari; qua ratione id paretur, itidem res eſt ſatis ſuperque nota, qui vero illud tenerius & penetrantius requirit, duplici modo hoc adipiſci poterit, *vel calcinando, ſolvendo, filtrando & inſpiſſando, vel etiam calcinando, per deliquium ſolvendo, filtrando & inſpiſſando*; hi duo purificandi modi, ſi non ſaepiuſcule reiterentur, in pleriſque conveniunt, & tum *differunt tantum in ſolvendo & deliqueſcendo:* quod ſi autem una ex parte *calcinatio*, & altera ex parte *deliqueſcentia* ſaepe ſaepiuſque inſtituatur & reiteretur, tum ingens utique & ſat *notabile diſcrimen* oſtendent. 1. Inſtituta & reiterata ſaepe *calcinatione* ſenſim ſenſimque aliquid de reſtante adhuc inflammabili & ſale acido, imo & de ſubtiliſſima terreſtri parte ipſa deſtruitur, imo totum mixtum Sal Alkali conſtituens quaſi invertitur, & in puram in aqua non amplius diſſolubilem *Terram* commutatur: quod ſi ſupra adductorum Autorum opinio vera exiſteret, & *particulae ignis* ad productionem Salis Alkali, *tanquam materiale ingrediens*, concurrerent, hic plane non ad ejuſmodi deſtructionem, ſed potius ad augmentationem Salis Alkali fixi devenire deberet, dum hac ſaepius repetita calcinatione *recentes* ſemper *particulae ignis* admoventur, tantum abeſt, ut eae deficere poſſint; nihilominus unuſquiſque veritatem dictorum experiri, deque hac repetita calcinatione experientiam conſulere poterit. 2. E contra, inſtituta & repetita *ſaepius ſolutio per deliquium* & inſpiſſatio plane contrarium demonſtrat, dum ejus vice, quod per calcinationem ſubtilius aufugit, & magis terreſtre remanet, hic potius ejuſmodi crudiores terreſtres particulae ex Salibus Alcalibus fixis potius ſeparantur, extricantur, *teneriores* contra *& ſubtiliores* in his per deliquium ſolutis ſalibus retinentur, unde ejuſmodi ſalia, hac ſaepe ſaepiuſque repetita per deliquium ſolutione, eo tandem redigi poſſunt, ut *nec in frigore, nec in calore amplius ſiccam conſiſtentiam recuperent, ſed ſemper conſiſtentiam humidam, fluxilem*, forte ut oleum Vitrioli, *conſervent*, & in igne ejuſmodi ſal tenuiora crucibula potius ſolvat, craſſiora autem citius penetret, quam in forma ſicca apparant.

Non inuſitatum etiam Sal Alcali fixum eſt ita appellatum *Nitrum fixum*, ſeu Nitrum alcaliſatum: Quod licet cuique notum, ejuſque praeparatio tanquam vilis & nauci aeſtimari poſſit, meas tamen quoque circa iſtud negotium cogitationes, forte quibuſdam ſcitu adhuc neceſſarias, jam exponam. *Alkaliſatio Nitri* ſequenti innititur fundamento: ſimulac *Nitrum cum quodam bituminoſa vel craſſe terreſtri inflammabili corpore miſcetur & detonatur*, ſtatim una ex parte Nitri reſolutio, & contra altera ex parte generatio, vel nova compoſitio Salis Alcali oritur, ubi bene inſimul notandum, quod non tantum Sal Alkali fixum, ſed & in eodem momento *adhuc Sal Alcali volatile, vel urinoſum* generetur, ſi, inquam, Nitrum cum terreſtri quodam inflammabili corpore commiſcetur, exempli gratia, bitumine, pice, colophonio, fuligine, tartaro, maſtiche, ſulphure communi, carbonibus, gummi ſandarachae & ſimilibus, tum Alkaliſatio ſtatim procedit, ſimulac cum iis detonatur, vel deflagrat; ſed cum *ſubtilio-*

ribus

ribus mixtis *inflammabilibus*, ut ſpiritu vini rectificatiſſimo, & ipſis oleis deſtillatis, non ita procedit; niſi cum poſterioribus ſingularia artificia adhibeantur. Viliſſimum & proinde etiam uſitatiſſimum additamentum ſunt carbones pulveriſati, ut notum eſt; ne autem hunc tibi conceptum in animo formes, ac ſi Sal Alkali ex adhibitis carbonibus ortum duceret, ſiquidem tota carbonum libra tantum aliquot drachmas cinerum, hi cineres vero tantum aliquot grana Salis Alcali fixi largiuntur, id totum fere a Nitro ipſo dependet, unde quoque pro ulteriori adhuc penſitatione adducam ſequentia momenta. Libra una optime depurati Nitri cryſtallini continet praeter propter partem dimidiam aquae, unam quartam ſalis acidi, & unam quartam additamenti Alcalini, quod ad corporificationem acidi nitroſi, & ad figurationem formae cryſtallinae in conficiendo Nitro additur, unde quoque totum Nitrum ſal medium exiſtit; quod ſi autem huic librae Nitri ℥iii vel iv carbonum admiſceas, quae *per ſe* circiter 3 vel 4 gr. *Salis Alkali* fixi ſuppeditant, & cum hac carbonum quantitate ante dictam Nitri libram alcaliſes, accipies, ℥ viii vel 10 imo, ſi recte operatus fueris, fere ℥ xii purificati & boni Salis Alcalini. Jam ergo oritur quaeſtio: *unde tantum pondus?* ſi quidem vix ℥ iv. additamenti alcalini in tota Nitri libra praeſto ſunt. Quiſque rem hanc ulterius conſideret, & ea, quae de origine Salis Alcali fuſe ſatis dixi, in conſilium trahat; forte tum quaeſtionem hanc ſibi ipſimet facile diſſolvere poterit.

Dixi in genere, Nitrum cum omnibus craſſe terreſtribus inflammabilibus ſubjectis alcaliſari poſſe; ſed ne cogites proinde velim, ac ſi etiam in genere unum, & quoad omnia ſemper idem, Sal Alcali fixum inde proditurum ſit. Minime; ſed prout inter inflammabilia additamenta ipſa, modo hoc, modo illud diſcrimen reperitur, ita ſemper utique aliquo modo diverſum, modo magis vel minus ſubtile, craſſius, modo ſumme cauſticum, vel etiam obtuſius, ſemper tamen Nitrum fixum, quamvis non ubique & omni ex parte plane aequale, ſed modo hic, modo alibi differens Alcali, quod vel a proportione, vel, & quidem ut plurimum, a differente indole & natura additamenti, ut & ſingulari ratione ab iſto magis magiſque fixo, vel in aliis fixis materiis concentrato, imflammabili dependet, ex quo *cauſticitas* quoque primario *ortum* ſuum *deducit*, *e. g.* ſi nitro ejuſmodi ſubjectum admiſceo, in quo inflammabile equidem copioſe, ſed *tantum ſuperficie tenus* praeſto, imo *cum multa aqua* adhuc extenſum, & proinde *magis ad volatilitatem diſpoſitum* eſt, ut *in reſinis*, pice, colophonio, & ſimilibus, tum accipio quidem *nitrum fixum*, ſeu alkaliſatum, ſed longe *non adeo cauſticum*, ac ſi ejuſmodi ſubjectum ipſe addo, in quo *phlogiſton magis fixum & terreſtre* factum eſt, quod iterum *ex gr. per additamentum Reguli Antimonii Martialis* facile demonſtrari poteſt; quippe in quo ſolummodo concentratum principium *inflammabile terreae indolis* ex Marte *cauſticitatis vera cauſa* exiſtit, qua occaſione non diffiteor, memet ipſum, in quantum adhuc *originem cauſticitatis* conſidera-

vi & obſervavi, huc uſque *nullum Sal Alcali fixum abſque additione ſubjecti mineralis cauſticum reddere noſſe* & poſſe, ut propterea haec materia ulteriore adhuc diſquiſitione indigeat; imprimis cum & alia occaſione oſtenderim, qua ratione ex eodem plane fundamento *Sal Alcali volatile cauſticum* produci queat.

Ordinarium *Nitrum cauſticum* fixum ex partibus anaticis Reguli Antimonii Martialis & nitri cryſtalliſati pulveriſatis ante & mixtis caementando paratur, prout notum eſt. Quin & Regulus Antimonii, calx viva, ut & plura alia mineralia tartaro crudo ejuſque ſali, imo etiam ipſis depuratis cineribus clavellatis, methodo ſatis nota *enormem cauſticitatem* inferunt, ita ut ordinarium cum calce viva & depuratis cineribus clavellatis, vel ſale tartari paratum, & ordinario quoque appellatum *Sal alcali cauſticum* omnia corpora tenacia animalium, ut pennas, crines, lanam, oſſa, cornua, ungulos, *&c.* in *mucum.* & pinguedines parvo temporis ſpatio in *ſaponem*, ſulphur autem in *rubrum liquorem* diſſolvat. Quod ſi hoc Sal in forma liquida ſolutum exiſtat, tum appellatur *lixivium ſaponariorum*; ſi adhuc ſemel in crucibulo fundatur, & tum in exiguas oblongas portiones, praeter propter ut partes fiſtulae tabaci ſimiles, effundatur, tum *lapis infernalis alcalicus*, *cauterium potentiale*, & quibuſdam *Sal Chirurgorum* appellatur.

Tandem praeter *duas* has a me allegatas magiſque conſuetas *nitrum* alcaliſandi *methodos*, *adhuc tertia* huc illuc uſitata eſt, nimirum, *ſi nitro*, carbonum, vel reguli loco, *tartarus pulveriſatus addatur.* Quanquam hoc praeparatum, ex uſitata conſuetudine *nunquam nitrum fixum*, ſed poſtquam elixiviatum & inſpiſſatum fuit, potius *ſal Tartari extemporaneum* & ſi non elixiviatum vel depuratum fuerit apud aurifabros, docimaſtas, Metallurgos, monetarum tractatores, zonarios, alioſque circa metalla verſantes artifices, *fluxus niger* appelletur: Verum & hoc nitrum fixum non ita promiſcue pro quovis alio ſumendum erit, ſi quidem itidem *pro diverſa* dictorum duorum ingredientium *proportione*, *etiam diverſa ſalia* emergunt. Quod ſi igitur *fluxum* hunc *nigrum* praeparare volo, recipiuntur 1. vel *partes aequales* utriuſque, vel etiam 2. *nitri pars una & tartari partes duae vel tres:* ante dicti mechanici artifices ſolent utrumque ſeorſim pulveriſare, pulveres utroſque miſcere, tum in purum ferreum mortarium injicere & pruna candente incendere, & plerumque hoc ita crude adhibent, abſque ulla elixatione, filtratione & inſpiſſatione, ſeu depuratione. 3. Quod ſi vero prima ſtatim detonatione album plane ſal deſidero, tum *ad tres vel duas nitri partes tantum unica tartari* recipitur. Circa has tres *diverſas proportiones*, ut ante jam notavi, etiam ſequentes *diverſae circumſtantiae* occurrant. 1. *Si* 2 *partes nitri ad* 1 *tartari partem* aſſumantur, tum *non omne nitrum* plane *alcaliſatum* exiſtit, ſed ex parte adhuc nitrum crudum ei inexiſtit. 2. *Si* 2 *vel* 3 *partes tartari cum* 1 *parte nitri* commiſceantur, tum omne nitrum equidem reſolutum & alcaliſatum eſt, ſed e contra *non omnis oleoſa tartari ſubſtantia conſumpta & exuſta* eſt, ſed magna pars adhuc reſtat, unde quoque idcirco *haec proportio* tantum & unice ad *liquefactiones*

factiones & reductiones metallorum prae aliis proportionibus longe commodior, aptior & *utilior* deprehenditur, interim & hoc (si volupe fuerit) instituta de novo calcinatione, itidem à superfluis oleosis partibus liberari, & sic in *perfectum Sal Alcali redigi* potest, quod vero tum Sal Tartari extemporaneum, vel extempore paratum, vocari non potest. 3. Proportio media, ubi *partes analicae* assumuntur, optima quidem videtur, interim negari non potest & eam *adhuc* quandam *nitri crudi partem* secum retinere.

Sub hac modo adducta, & tanto magis *ex* 2 *partibus nitri* composita proportione, durante deflagratione, *realis separatio principiorum vel partium constituentium tartari oboritur*, ubi 4 *notabiles circumstantiae & momenta* occurrunt. 1. Maxima pars oleositatis tartari non modo resolvitur, sed & ita consumitur, ut vice ejus quod alias in destillatione Tartari notabilis *copia olei* in forma fluida separatur & apparet, *hic* sub detonatione cum nitro *nullum* aliud *ipsius vestigium*, quam paucum siccae fuliginis ob oculos veniat. 2. Altera notabilis circumstantia sub hac salis Tartari extemporanei formatione haec est, quod, cum alias durante destillatione vel exustione Tartari, separatio olei, spiritus & phlegmatis una ex parte, & nova formatio salis fixi alcalini altera ex parte, per consequens *omnia tarde* eveniant, & aliquod temporis spatium requirat, *hic omnia simul & semel unico momento* & unica detonatione procedunt. 3. Notum est quod tartarus & nitrum (quodvis seorsim) *si destillentur, spiritum acidum* suppeditent, *hic autem*, ubi haec duo salina mixta conjunctim deflagrant, *ne hilum* quidem *acidi* emergit, *sed* rursus plane aliud, imo *contrarium*, & de novo formatum, *scilicet urinosum* sensibus nostris sese sistit. 4. Cum in communi exustione tartari per se usque additamento, semper *non exigua portio terrae indissolubilis* post perpetratam Salis Alcalici elixiviationem restet, hic in Salis Tartari extemporanei praeparatione *fere nihil indissolubilis terrae* reperiatur, sed omne istud *in purum sal*, & quidem *in momento & incomprehensibili celeritate* convertatur.

Continued by the same. N° 393. *p.* 45.

Whether fixed Alkaline Salts differ one from another, and how.

2. *De Salibus lixiviosis plantarum* primum *in genere notandum* venit. Quod in quantum forsan una vel altera differentia interea sese exserit, ista *plane non à specifica indole & singularibus viribus*, quas una vel altera planta *ante combustionem & incinerationem possedit*, ortum trahat, sed differentia ista primario dependeat *à duabus aliis circumstantiis*; (prout hoc experientissimus Chymicus D. *Stahl* jam animadvertit) nimirum 1. *à diversa structura* vel teneriorum vel crassiorum partium plantae; & 2. *ab operatione*, vel mutatis in ea enchiresibus & parvis manipulationibus. 1. *Ratione structurae* aquiritur, *e. g.* longe aliud Sal Alkali ex subtilibus & teneris foliis, quam ex crassioribus caulibus ejusdem herbae; aliud è petalis florum, vel totis floribus, quam è lignis; aliud è seminibus, quam è radicibus; aliud è succo expresso quam extracto, quod è siccata herba cum multa aqua & forti coctione paratum erat; aliud ex teneris recentibus herbis, quam è valde exsiccatis; & sic

porro. 2. *Ratione operationis*, acquiritur longe aliud Sal Alkali è leni tantum fumante excandescentia & incineratione, quam è forti flammante combustione; aliud ab elixiviatione cum aqua frigida, quam cum aqua calida, imo cum reali excoctione ebullitoria; aliud si parum aquae, quam si multum adhibeas; aliud si parum & semel tantum calcines, quam si fortiter & saepius calcinatio reiteretur; aliud si Sal inspissatum cum multa aqua iterum solvas, quam si per se in deliquium fluere permittas; idque rursus secundum plures etiam alias circumstantias. Sed, *nisi* Salia lixiviosa de *industria*, *forte per repetitas calcinationes*, *vel deliquescentias*, ad nimiam & maxime notabilem differentiam redigantur, in communibus ordinario usitatis laboribus & praeparationibus *horum salium* reperibilis *differentia parvae vel nullius est considerationis*, excepto *si forte minerale* quippiam, *vel de industria*, *vel incuria*, *vel inscitia adhibitum fuit*. Quod si ergo apud ordinaria pure praeparata salia lixiviosa herbarum, diversitas quaedam tamen reperiretur, in hoc tantummodo consisteret, quod unum magis pure alcalinum quam aliud, unum subtilius, aliud crassius, unum magis terrestre quam aliud, unum paulo magis causticum quam aliud, unum cum pluribus ab oleoso ingrediente oriundis partibus, vel etiam copiosiore spiritu acido imbutum, indeque magis crystallinum sit, quam alia salia: de cetero *singula sunt salia lixiviosa*, *singula salia fixa & alcalina*, *sed singula non sunt vere pura*, *cum purissima ex iis adhuc sint impura*, *& ad alias chymicas applicationes adhuc inepta salia alcalina*, dum pleraque apertum quippiam & superfluum acidum, quaedam etiam superfluam terram aliasque accidentales peregrinas immixtiones, si non voluntarias ineptas additiones, tanquam putatitia artificia pro acquirendis speciosis crystallis, secum foveat: Ita ut, si *ordinaria in Pharmacopoliis parata vegetabilium crystallina lixiviosa Salia*, animo revolvo, saepe non satis mirari possim, quare istiusmodi salia in hodierna praxi medica adhuc toto die adhibeantur, cum tamen medico ignotum sit, quale sal aegrotis commendet, *quia ejusmodi crystallisata salia nec pura alcalina*, *nec perfectè saturata salia neutra existunt*, *& per consequens accurate novit nemo*, *quantum alcali*, *& quantum acidi una drachma vel uncia talis pulchre crystallinini salis contineat*, item, *an praesens ibi & ad crystallisationem disponens acidum*, *vegetabile*, *vel minerale acidum sit*. Quod si egomet in praxi medica *Sale Alcalino fixo* opus haberem, tum purum *Sal Tartari* vel etiam depuratos *cineres clavellatos* reciperem; quod *si sal acidum* ex usu foret, tum ex apertis *puris acidis* commodissimum seligerem, & *si sal medium* adhibendum esset, itidem ejusmodi *ex usitatis plene saturatis salibus mediis*, quae me certiorem reddunt, & quod ad praesentem aegritudinem pro commodissimo reputarem, in usum vocarem; tum enim certo scirem, quid ex Pharmacopolio daretur, & quid aegroti sumerent, reliqua autem *incerta* & imperfecte saturata *salia*, *quae nec pura salia acida*, *nec alcalina*, *nec media seu neutra sunt*, *secure negligerem* & suo loco relinquerem.

Istam adhuc admonitionem dare volo, quod si forte adhuc unum vel alterum singularem effectum ab hoc vel illo sale vegetabili lixivioso expectare velis, & quod si possibile est, ut quoddam Sal Alcalino fixum adhuc singulare quippiam in re medica prae alio possidere queat, ut ejusmodi herbam ad minimum quam *lenissime excandescere* sinas, *non violenter incineres*, *multo minus fortiter exuras*, omnium minime vero *nec cineres nec sal calcines*, tum forte specifica quae expectatur virtus, *in paucis* quibusdam restantibus revera *oleosis partibus* (quippe in quibus tantummodo sitam eam esse oportet) aliquo modo conservaretur; cum contra certior sim, quod *si* absque considera-tione & cautione *igne flammae exuratur*, *calcinetur & depuretur*, quod inquam revera *nihil specifici* nec singularis amplius *reperiri aut demonstrari* queat. Quanquam igitur curiositatis gratia, *ex una eademque planta*, *absque ullo peregrino additamento*, unice *mediante igne & aqua*, ut non dicam 40 vel 50, dicam tantummodo permulta genera salium alcalinorum fixorum, quorum aliud ab alio semper aliqua in parte, licet parum tamen aliqua in re, modo externo aspectu, modo etiam interna leviore circumstantia differre debet, praeparare & producere norim; tamen altera quoque ex parte non ignotum mihi est, quod non tantum haec multiplicia ex una eademque planta artificiose producta, sed & *omnia lixiviosa herbarum salia*, imo quod plus est, *omnia salia alcalino-fixa in orbe reperibilia ad eundem aspectum*, *virtutem & efficaciam reduci possint*: ita ut hoc respectu & intellectu non nisi unicum & unius generis Sal Alcali fixum ex omnibus vegetabilibus in orbe statuam, dum vel hoc unicum in varias formas & effectus, vel etiam omnia alia ad eundem aspectum & effectum reducere possum, adeo ut *si salia lixiviosa ex centum vel pluribus herbis parata* ante oculos haberem, *ullum sal*, *multo minus ullum subjectum* ex quo ejusmodi Sal Alkali productum fuerit, *divinare possit nemo*. Quin nemo potis est tantummodo in genere cognoscere, num ex esculento aut innocuo, vel è summe venenoso & maxime nocivo vegetabili confectum sit; an subjectum suaveolens, vel graveolens, plane absque ullo odore vel foetore fuerit; an sapidum vel insipidum; purgans vel adstringens; antiscorbuticum, epilepticum, vel antefebrile, emeticum, vel diureticum, narcoticum, vel sternutatorium, causticum, vel balsamicum; an ligna, vel radices, cortex, vel medulla, flores, vel herbae semina, vel succi, vel quicquid fuerint, ex quibus ejusmodi praesens sal alcalinum paratum sit. Existimo haec sufficere posse pro iis, qui adhuc constanter opinantur, *Salia Alcalina fixa specificam* herbarum aliorumque vegetabilium, ex quibus producuntur, *virtutem secum retinere*, ita ut sal caryophyllorum & cinnamomi stomachicum, sal hyosyami & papaveris narcoticum, sal radicum jalappae purgans, sal radicum tormentillae, vel corticum chinae chinae adstringens vel antifebrile, sal ipecacuanhae & gratiolae emeticum, sal esulae causticum & sal cicutae venenosum & lethiferum esset, convincendis, quin & ad universos resurrectionis fratres ita confundendos, ut resuscitationem

tationem & revivificationem vegetabilium non ita facile concipere debeant, dum demonſtrari ipſis poteſt, omnia ejuſmodi ſalia lixivioſa in toto Regno Vegetabili ad eandem figuram & effectum, imo (ut ante dixi) ex eadem herba ad tam multiplicia ſalia reduci poſſe: unde aperte hic profiteor, *nemini hominum poſſibile eſſe, ex cineribus, vel lixivio ne quidem ſolam externam figuram iſtius vegetabilis, ex quo parata ſunt, rurſus producere, vel in ſale ipſo ex ejuſmodi puris ſalibus repraeſentare*; de induſtria dico *ex ejuſmodi puris ſalibus*; ſiquidem ipſe non una vice vidi, ejuſmodi figuras herbarum *ex teneris aeneis, & ſubtilibus linteis filis* praeter propter *artificioſe concinnatis*, & in lixiviis concentratis impoſitas vel ſuſpenſas fuiſſe, ubi utique omnia ad ejuſmodi fila circumcirca cryſtalliſata fuere, quae deceptor ignaris *tanquam veram reſuſcitationis plantarum repraeſentationem* commonſtravit: verbo, tota quae praetenditur *humana arte reſuſcitatio, in veritate non fundata, ſed tantum chimerica imaginatio eſt, & non niſi in libris viſibilis.* Reperitur etiam *inter puriora & ad chymicos labores aptiora cognita fixa alcalica ſalia* ipſa, in hac vel illa parte *quaedam differentia quae vero* itidem ab exercitato chymico *omnia removeri*, ea penitus *aequalia & ad eandem figuram & effectum reduci poſſunt.* D. *Hoffmannus* in libro 2. Obſer. Phyſ. Chym. ſelect. ſub N° 29. totum caput hac de re conſignavit, *nihil tamen quam differentias ipſas obſervavit & protulit*, quae praeter propter & ſummatim in his conſiſtunt. 1. Si oleum vitrioli nitro fixo affunditur, tum ſub effervescentia verus ſpiritus nitri, vel aqua fortis exhalat. 2. Hoc vero nunquam fit, ſi oleum vitrioli ſali tartari, vel cineribus clavellatis affundatur. 3. Quin & in his utriſque poſterioribus rurſus quaedam obſervatur differentia, dum à ſale tartari (ex affuſione olei vitrioli) ſuperficies nigricantem cuticulam acquirit, liquor ipſe nigricans evadit, & plane alius foetor, quam ſpiritus nitroſi, à nitro fixo deprehenditur. 4. Omnia autem haec à cineribus clavellatis non obſervantur, dum ab iis nec ſpiritus nitri, nec cuticula, nec nigricans color ſeu ſolutio, ſed iterum ſingularis vapor apparet. 5. Fumi hi nitroſi etiam manifeſti fiunt, ſi oleum vitrioli ſali tartari extemporaneo, quod ex 2 partibus nitri & 1 parte tartari paratur, affunditur. 6. Quod vero iterum non licet videre in ejuſmodi ſale tartari extemporaneo, quod cum pauca additione nitri elaboratum fuit. 7. Ex ſale tartari & arena vitrum clarum & pellucidum parari non poteſt. 8. Bene autem ex ſale tartari extemporaneo, ut & ex cineribus clavellatis. 9. Ex ſale tartari, vel cineribus clavellatis in crucibulo fuſis, adjectis carbonibus, reſultat ſpecies hepatis ſulphuris, quale tamen nec nitrum fixum, nec nitrum cauſticum conſtituit. 10. Sal Tartari & Nitrum cauſticum cum Spiritu Vini rectificatiſſimo tincturam largiuntur, quam vero nec nitrum fixum, nec cineres clavellati, nec iſtud ſal tartari extemporaneum, quod ex 2 partibus nitri & 1 parte tartari paratur, depromunt.

Has

Has quidem *differentias Hoffmannus advertit, ſed non adduxit, unde haec eveniant, qua in re differentia haec ſita ſit, an, & quomodo iſta meliorari & corrigi queant, multo minus quomodo haec adeo differentia ab ipſo reperta ſalia Alcalino-fixa penituſque aequalia reddi poſſint*, cum tamen omnia & ſingula naturali ordine procedant, differentia non adeo difficulter percipi & facile corrigi, & unum ſal alteri aequiparari poſſit, adeo ut *primum* ne unicum quidem phaenomenon, ex omnibus ſupra allegatis, uni vel alteri ſali ſingulare exiſtat, & *ſecundo* inter omnia pura fixa alcalica ſalia nullum aliud diſcrimen amplius, niſi circa gradus cauſticitatis adverti debeat. (*a*) Affuſum oleum vitrioli in nullo dictorum ſalium ſingularem, ſed ſemper eundem vaporem & foetorem producere debet. (*b*) Omnia haec ſalia aequaliter in clarum & pellucidum vitrum redigi debent. (*c*) Singula etiam Spiritum Vini rectificatiſſimum pulchro colore tingere debent, & ſic porro. Sic non neceſſum eſt mirari, *quod oleum vitrioli ex nitro fixo*, vel *ex ſale tartari extemporaneo, quod cum 2 partibus nitri* paratum fuit, *ſpiritum nitroſum ejiciat*, dum, ſi hoc apparet, in ejuſmodi ſale Alkali neceſſario *adhuc* quaedam *nitri crudi portio* ineſt, unde exundantes ex eo fumi (qui nihil aliud quam verum ſpiritum nitri conſtituunt) adeo naturales ſunt, ac ſi Glauberiana methodo oleum vitrioli nitro crudo affunditur, cum è contra utique ex *ſale tartari vulgari, ex cineribus clavellatis, aliiſque* ejus generis *alcalinis ſalibus, quibus nitrum non accedit*, imo quibus non ſuperflue accedit, etiam *nullus ſpiritus nitri* liberari, vel fumus nitroſus exſpectari poteſt. Haec res quo tanto certius pateat, recipiatur tantum *idem nitrum fixum, vel idem ſal tartari extemporaneum*, à quo ab affuſione olei vitrioli fumus nitroſus apparet, idque denuo cum uno vel alio ſubjecto inflammabili Regni vegetabilis commiſceatur, *e. g.* nitrum fixum *cum majori* carbonum *quantitate*, & ſal tartari extemporaneum *cum copioſiore tartaro* conjungatur, & deflagret ut ante, vel majoris certitudinis cauſa proportio carbonum, vel tartari adhuc plus augeatur, quo ſuperfluum antea, & adhuc crudum exiſtens nitrum plus inflammabilis terrae reperiat, quacum incendatur & alcaliſetur, *ut* per conſequens *nihil nitri crudi amplius reſtare poſſit*, tum revera ex hoc recollecto ſale, ab affuſione olei vitrioli, *nullus* ſpiritus nitroſus amplius, ſed potius plane alii vapores effumabunt. Quod *oleum vitrioli cum ſale tartari* foetorem ſpiritui nitri plane diſſimilem, nigricantem cuticulam, & obſcuram ſolutionem efficiat, hoc à nulla alia re, niſi à ſuperfluis adhuc *in ſale tartari reſiduis empyreumaticis* partibus unice dependet; quod ſi ſal tartari ab iſtis partibus decenti modo repurgatum eſt, tum itidem nec foetor amplius, nec nigricans ſubſtantia, utpote *quae oleum vitrioli cum omnibus oleoſis contrahit*, apparebunt: unde ex *cineribus clavellatis*, quia iſti, mediante calcinatione, *ab oleo empyreumatico* magis *liberati* ſunt, ut & ex *puro ſale tartari*, ſi ſufficienter calcinatum eſt, ejuſmodi nigredo nunquam apparet, nec demonſtrari poterit, ſed ab affuſione olei vitrioli omnia clara, & albida perma-

nent.

nent. Simili ratione *hoc oleum empyreumaticum in ſale tartari* unica exiſtit cauſa, quare cum arena pellucidum vitrum non largiatur; ſimul ac ſuperflua haec oleoſa ſubſtantia ipſi dempta fuit, tum eodem modo, adeo aptum & commodum eſt ad pellucidum vitrum conficiendum, ac *cineres clavellati, vel ſal tartari extemporaneum* ipſum: hanc rem declarat & confirmat, quod ſub ejus praeparatione, durante detonatione cum nitro, *omnis oleoſa tartari ſubſtantia combuſta & deſtructa* eſt: unde hoc Sal Alkali, quamvis tartarus ad ejus praeparationem acceſſerit, per conſequens eodem modo vitrum clarum efficit, quam cineres clavellati, ad quos nihil de tartaro aſſumitur. Quinetiam hoc in tartaro adhuc praeſens, vel alio quoque modo ſali alcalino conciliatum *Phlogiſton* utpote quod tantum & unice *ad cauſticitatem* confert, eſt ſubſtantialis iſta materia, quae ſpiritui inflammabili rectificatiſſimo tincturam conciliat, quanquam etiam ex parte ſpiritus ardens, qua menſtruum, ſi nempe ille *olei dives* ſit, non parum ad hoc contribuat, & *tinctura tanto magis acceleretur, & augeatur.* Quid mirum igitur, ſi ex ſale tartari extemporaneo cum 2 & 3 partibus nitri parato (quippe per quod omne inflammabile, & ad tincturam producendum abſolute neceſſarium deſtruitur) nullam tincturam recipias?

The Relation of fixed Alkaline Salts to other mixt chymical Bodies, and their preſent Application to Chymiſtry.

Quantum ſub definitione horum ſalium dixerim, ea conſiſtere ex terra, in qua parum fixioris vel ultimo magis concentrati ſalis acidi, & inflammabilis, mediante igne, toſtione quaſi & aſſatione impactum eſt, attamen eodem tempore ſimul adduxi, ut ex ipſis definitionis verbis, PARUM VEL ALIQUID, apparet, ſuperfluum ſive acidum, ſive inflammabile, imo ipſas terreſtres ſuperfluas partes, non modo non neceſſaria, ſed, & in reſpectu puritatis & perfectionis, quas ejuſmodi ſal requirit, praejudicioſa & nociva eſſe. Quod ſi purum quoddam Sal Alcali-fixum, ſive de induſtria, ſive per accidens, cum ſatis notabili & aucta portione unius antedictarum conſtituentium partium, ſive ſit nimium acidi, ſive nimium inflammabilis, ſive nimium partium terreſtrium, vel cum duobus horum ſimul, denuo tractatur & commiſcetur; tum novum hoc commixtum rurſus, *non modo aliam* plane *denominationem*, ſed & *plane alias qualitates & effectus*, ac antea ſolum Sal Alkali habuit, ſortitur. Nam, ſi Sal Alcali-fixum cum ſale acido tam diu commiſcetur, donec, poſt remiſſionem effervescentiae, & ſeparationem aquae, utpote quae tantum pro vehiculo ſolutionis inſerviit, ſyrupum violarum, ſi ejus aliquid admiſcetur, in ſuo colore non alteret, eumque nec rubrum, nec viridem reddat, tum appellatur *nova haec mixtio ſal medium, ſal ſalſum*, vel *ſal neutrum.* Quod ſi acidum minerale ad hoc adhibitum fuit, tum novum ejuſmodi mixtum facile *in cryſtallos* concreſcit; ſi vero acidum vegetabile uſurpatum fuit, tum *difficulter, vel plane non cryſtalliſari* poteſt. Cum autem in chymia *valde diſtincta ſalia acida* occurrant, proinde etiam juxta indolem iſtorum acidorum [ſi unum, vel alterum eorum,

cum

cum Sale Alcalino-fixo usque ad saturationem unitum est] exinde productum *sal medium* ordinario *denominationem accipit*, e. g. 1. Si Sal Alcali-fixum *cum acido vitriolico, seu sulphureo*, ita commiscetur, ut *crystalli* exinde emergant, tum ex his utrisque obortum crystallinum sal medium plerumque *tartarus vitriolatus*, vel *polychrestum* vocatur. 2. Si Sal Alcali-fixum, *cum acido nitri* commiscetur, & crystallisatur, perfectum inde *nitrum* crystallinum exoritur, quod *nitrum regeneratum*, vel etiam *tartarum nitratum* appellare consueverunt. 3. Si *cum acido salis communis* saturatur, fit inde *sal commune regeneratum*, ita dictum *sal embryonatum*, vel *digestivum* Sylvii. 4. *Cum acido aceti* fit *terra foliata tartari*, seu, sic dictum *arcanum tartari*. 5. *Cum acido tartari* oritur *tartarus solubilis*, seu *tartarus tartarisatus*. 6. *Cum succo citri tartarus citratus*. 7. *Pars alcalina*, quae *in sale communi* residet, *cum acido vitriolico* ejusmodi sal medium constituit, quod *sal mirabile* Glauberi vocant. 8. Quod si *pars alcalina nitri cum* dicto *acido vitriolico* commiscetur, ita ut ex his duobus ingredientibus *crystallinum sal medium* paretur, illud, quanquam in fundamento à tartaro vitriolato nihil differat, aliud tamen nomen recipit, dum scilicet ab innumeris annis *arcanum duplicatum*, vel *panacea Holsatica* appellatur. 9. Quod si vero ordinariis alcalinis plantarum salibus tantum superfluum quicquam acidi, sive à parte vegetabilis ipsius, sive aliunde accedat, tum communiter inde *sal crystallinum plantarum lixiviosum* oritur.

Si *Sal Alkali-fixum* cum *inflammabili* quodam misceatur sive sint pinguedines, sive expressa, quin & certis sub enchiresibus destillata olea, exsurgit inde pro primo [uti notum est] SAPO, deinde vero etiam *sal volatile & spiritus urinosus*; quod si vero olei empyreumatici animalis quippiam accedit, tum hoc, cum eo etiam tantum impraegnatum, Sal Alcali, prae inflammabili vegetabilium, in curiosis quibusdam laboribus non parum sese distinguet. Si bituminosum & acidum vitriolicum mixta [nempe *in sulphure* communi] cum Sale Alcalino fixo concurrunt, gignitur inde *hepar sulphuris*. Denique, si purum Sal Alkali-fixum in igne, cum terra saturatur, puta pellucida, ut *arena* communi, *silice*, *pyrite*, *glarea*, & similibus, tum non tantum *subtilis spiritus acidus* inde extorquetur, sed & totum mixtum convertitur in pellucidam & transparentem, in igne quidem adhuc fusibilem, in aqua vero amplius *indissolubilem terram*, nempe *vitrum*, vel etiam cum aliis additamentis in *porcellanam*.

In genere Salia Alcalia-fixa, non facile *sese uniunt*, vel haec salia non facile quicquam *dissolvunt*, quod non vel *inflammabilitatem*, vel aciditatem quandam continet, & *unum semper lubentius & intimius quam alterum*. 1. Sic Salia Alcalia-fixa facile quidem *dissolvunt sulphur* commune, quippe in quo *inflammabile & acidum* unita occurrunt, verum *facile* quoque ab eo rursus *separantur* & liberantur. 2. Facile quoque dissolvunt, & sese uniunt cum *axungiis*, *pinguedinibus* & *oleis expressis*, & communicant pinguibus hisce materiis *dispositionem* sese cum ipsis

prompte

prompte *in aqua ſolvendi*, & cum aqua ſeſe uniendi, cum alias iſtae abſque Alcali-fixo unionem cum aqua omni modo fugiant & detrectent. 3. Salia fixa ſolvunt, & uniunt ſe quoque tandem cum *oleis deſtillatis* eſſentialibus, quamvis *paulo difficilius*. Et eadem cum differentia horum jam memoratorum duorum generum oleorum, eorumque faciliori vel difficiliori combinatione cum Alcali, *ſeparatio* quoque eorundem ſuccedit, dum Salia haec fixa à pinguedinibus, axungiis & oleis expreſſis perquam *facile*, & ab oleis aethereis, vel eſſentialibus, contra perquam *difficulter*, *vel plane non* ſeparari queunt, praecipue ſi ſemel intime cum iis unita, & utraque *in perfectum ſaponem* redacta fuere. 4. *Separatio ex vitris* equidem *tarde* aliquatenus ſuccedit, interim poſſibilis tamen eſt factu, quamvis in uno citius quam in alio (prae reliquis in *vitro ſilicum* omnium *facillime*) dummodo denuo cum Alcali ſecundum artem miſceantur, & debito modo tractentur. 5. *Cum ſalibus acidis* haec Salium Alcalino-fixorum *unio & ſolutio* fere omnium *facillime* & *promptiſſime* ſuccedit, & quidem *triplici modo* ; (*a*) Vel *miſcendo*, ſi utraque ſimpliciter abſque intermedio conjungantur ; (*b*) Vel *praecipitando*, ſi vel (*α*) ſal acidum, vel (*β*) ſal alcalinum fixum antea cum alio quodam corpore commixta fuere ; (*c*) Vel etiam *abſque praecipitatione*, dum ſal acidum equidem itidem antea cum alio quodam commixtum fuit, ſed hoc in acido ſolutum per praecipitationem exinde non ſeparatur. 1. *Miſcendo* peragitur haec unio, ſi Sal Alkali fixum in aqua ſolutum, vel etiam quod per ſe in deliquium abiit, cum ſpiritu, vel liquore quodam acido confunditur, prout in elaboratione diverſorum ſupra adductorum ſalium mediorum videre licet, *e. g.* in praeparatione terrae foliatae tartari, tartari tartariſati, nitri regenerati, tartari vitriolati ex ſpiritu vitrioli & oleo tartari per deliquium, *&c.* 2. *Praecipitando* abſolvitur haec unio (*α*) ; ſi *ſal acidum antea cum quodam* (A) *metallico*, vel etiam (B) *animali* combinatum & ſolutum fuit, id quod multiplici ratione, vel per accidens, vel de induſtria, fieri poteſt, & in Chymia Pharmaceutica ſaepius occurrit. (A.) *e. g.* in praeparatione auri fulminantis, in qua, ſi Sal Alcali ſolutum in aquam regiam auro ſoluto impraegnatam, infunditur, unio Salis Alcalici cum utriſque acidis (ſcilicet nitri & ſalis) praecipitando, vel cum proſtratione auri, contingit. Porro apparet hoc in praeparatione mercurii praecipitati albi, in elaboratione tartari vitriolati Tachenii, & aliis metallicis praecipitationibus permultis. (B) Circa *animales* ſolutiones videre licet ejuſmodi unionem Salis Alcalici cum acido itidem praecipitando factam, *e. g.* in praeparatione magiſterii cornu cervi, aliarumque partium animalium. (*β*) Alia ex parte peragitur haec unio modo praecipitationis, *e. g.* in preparatione ſulphuris antimonii ſic dicti aurati, in qua *Sal Alcali primum* ſolutis ſulphureis partibus impraegnatum deprehenditur, quod cum affuſo ſale acido ſeſe unit, ſolutum vero antea ſulphur praecipitando deſerit ; diſpaleſcit hoc porro, ſi commune ſmegma in aqua ſolutum cum acido praecipitatur, & hoc fit ubique, ubi

ubi craſſe pinguia reſinoſa, vel ſulphurea, cum Sale alcalino fixo antea ſoluta & combinata fuere, poſtea vero cum acido praecipitantur. 3. Tertia methodus unionis, quae *abſque praecipitatione*, nec tamen ſimpliciter miſcendo abſolvitur, dum adhuc intermedium quoddam ſimul adeſt, *duplici modo* fieri poteſt; α Vel *ſi ſal acidum antea cum ſale volatili urinoſo combinatum, & in ſal ammoniacale redactum fuit*, ubi, ſi huic ſali volatili medio Sal Alkali fixum adjungitur, ſal acidum, praecipue ſi lenis tantummodo calor applicetur, repente novo huic advenienti alcali fixo ſeſe aſſociat, & deſerit ſal alcali volatile, quod antea continebat, quod tum dicto leni calore, tanquam deſertum & in ſe perquam volatile corpus, facile expelli poteſt; β. Vel ſiſtitur etiam hic unionis modus, *ſi Sal Alcali antea cum debiliori acido ipſo combinatum fuit*, fortius acidum affunditur, hoc novum mixtum in retorto vaſe igni exponitur: tum enim debilius acidum cogitur abſolute fortiori cedere, & deſtillando ſeparatur, quod in deſtillatione ſpiritus nitri & ſalis fumantis, aliorumque luculenter patet. Quanquam autem haec Salis Alcali fixi cum omnibus ſalibus acidis combinatio perquam *amice quaſi* peragitur, inde tamen *non exiſtimandum, ac ſi cum omnibus ÆQUALITER contingat*, vel cum uno eodem modo ac cum altero, *aequali firmitudine* ſeſe uniat. Minime! ſed & hac in re *ingens occurrit differentia*, dum in uno vel altero praeferentia (ut barbare loquar) ſeu *propinquior affinitas*, vel prout cuilibet denominare placet, *inter Sal Alkali fixum* & hoc vel illud *ſal acidum* obſervatur. Et cum haec *affinitatis ſcala* in Chymia *non parvi emolumenti*, ejuſque notitia Chymico practico perquam neceſſaria ſit, proinde de ea, iis praecipue, quibus iſta adhuc forte ignota eſt, quaedam in medium proferre ſuperſedere non poſſum, praeprimis cum ex combinatione Salis Alcalino-fixi cum ſalibus acidis, & ex ſcala iſta, quam jam producturus ſum, major *vis & fortitudo unius acidi prae altero* omnium optime annotari & dijudicari poſſit, nempe *in quantum ad combinationem cum alkali fixo ſeſe refert.*

Purum ergo *Sal Alcali fixum* omnium optime & *firmiſſime* ſeſe combinat cum fortiſſimo prae omnibus acido primigenio, puro puto, & *fixiore acido vitriolico & ſulphureo:* quod ſi hoc acidum adhuc cum principio inflammabili, ut communi ſulphure, commixtum prodit, tum intima ejuſmodi unio cum alcali non celebratur, ſed ſuperficialis tantum ſolutio ſeu cohaeſio emergit, &, ut ſupra jam notavi, fit *nudum hepar ſulphuris*, ex quo alcali *facillime*, imo *cum debiliſſimo acido vegetabili rurſus ſeparari poteſt.* Bona ex parte *firmius* acidum hoc ſulphuris Sali Alcalino cohaeret, ut ad minimum à debiliſſimo acido liberari non poſſit, ſi *portionem* tantum *inflammabilis*, quocum conjunctum fuerat, per deflagrationem *amiſit*, quod clare ſatis patet, ſi durante deflagratione ſulphuris, Sal Alcalinum fixum ea ratione applicatur, ut volatilis ſpiritus Sulphuris ei intricetur & irretiatur; interim tamen cohaeſio haec *non* eſt *ſatis firma*, dum volatilis hic ſpiritus *per* propriae quoque indolis, purius tamen, ab inflammabili plane depuratum &

magis fixum & *concentratum*, *acidum vitriolicum* rurſus inde expelli, & à Sale Alcalino fixo liberari poteſt, ex alia ratione nulla, quam *quia* bona ex parte *adhuc de principio inflammabili participat*, ex quo acidum iſtud adhuc volatile & ſubtile, per conſequens non ita purum & fixum exiſtit, ac oleum vitrioli rectificatum ; ſi vero ejuſmodi ſpiritus ſulphuris volatilis tantum per aliquod tempus *libero aëri* exponitur, tum tenerum hoc inflammabile plane *diſſipatur* & *exhalat*, reſtante è contra itidem puro, fixo, & cum alio ex vitriolo, vel alumine, deſtillato acido, in omnibus probis *æquali*, & in nulla re diverſo acido, quod tum cum Sale Alcali fixo, eadem ratione ac aliud purum, fixum, acidum vitriolicum, ſeſe quam *firmiſſime* commaritabit. Poſt hoc acidum ſulphureum, vel vitriolicum, unit ſeſe noſtrum Sal Alcali fixum lubentiſſime *cum acido nitri*, ſeu ſpiritu nitri. Et poſt hoc cum *acido ſalis communis*, ſeu *marini*. Denique omnium debiliſſime *cum acidis vegetabilium*, ut acido aceti, tartari, ſpiritu lignorum, ſpiritu ſacchari, ſucco citri, vino Rhenano, *&c.*

Ex his igitur ſufficienter addiſci poteſt, qua ratione novae ſemper combinationes Salis Alcalino fixi cum ſale acido perpetrari, & idem alcali aliquoties debiliori acido per fortius rurſus ſurripi poſſit, ubi autem in *ſcala hac* non deviandum eſt. Nam ſi Sal Alcali fixum cum puro acido vitriolico combinatum foret, tum utique nullum acidum ex omnibus aliis potens eſſet, hoc Sal Alcali fixum ipſi rurſus eripere, quia nimirum hoc eſt fortiſſimum omnium, & omnia reliqua acida ſunt multo debiliora, utpote quae ſingula contraria ex parte ab acido vitriolico ſeparari poſſunt. D. *Stahl* etiam ad hoc medium quoddam demonſtravit, qua ratione Sal Alkali ex acido vitriolico rurſus liberari poſſit: verum hoc non ſit mediante alio acido, ſed mediante additione principii inflammabilis, paucis per artificioſam ſulphuris formationem, per conſequens requiſito ad hoc labore in igne. Laudatus *Stahl*, *Anno* 1718, cum *Lutetiæ Pariſiorum* adhuc degerem, hujus liberationis cauſam, *novum* plane *problema*, ad iſtam ſulphuris geneſin plane non applicabile, in conſiderationem & ſolutionem per literas mihi propoſuit ſequentibus verbis: *Qua ratione Sal Alcali fixum ab acido vitriolico, prout utraque ſub figura cryſtallini tartari vitriolati apparent, in ſola cavitate manus, & unico in momento liberari poſſit ?* D. *Geoffroy* ſenior, cui problema hoc communicabam, Anno 1720, in Hiſt. Acad. Scient. illud imprimi curavit, & *putativam* hujus problematis *ſolutionem* annexuit ; ſed penitus *aberravit*, dum deſideratam hanc Salis Alcalini ſeparationem, de formatione ſulphuris diu jam cognita & publice nota, explicat & applicat ; haec vero ſulphuris productio plane *non in unico momento*, *multo minus in ſola cavitate manus*, *ſed in crucibulo igne candente fit*, vel perpetrari debet.

Circa combinationes praecipitatorias, in quibus metalla ſoluta fuere, adhoc obſervandum eſt, quod Sal Akali fixum, durante unione cum acido, cadenti ad fundum *metallo alterationem* quandam *imprimat*, quae

quae non raro tantam mutationem involvit, ut talia cum ipſo praecipitata metalla perquam *difficulter in priſtinam malleabilem & fluxilem*, ſeu fuſibilem metallicam *formam* reduci ſeſe patiantur; cujus rei (ut aliquid tantummodo adducam) etiam ferrum, quod ex commixtione vitrioli martis cum Sale Alcalino fixo, in praeparatione tartari vitriolati *Tachenij*, ad fundum cadit ſufficiens teſtimonium perhibet.

Solent etiam noſtra *Salia Alkalina fixa*, praeter memorata ſuperius corpora, per ſe adhuc diverſa *corpora metallica ſolvere*, quanquam pro hac intentione aliqualis cauſticitatis gradus requiratur. (*a*) Solvunt proinde calcem *plumbi*, vel etiam plumbum tenerè raſum. (*b*) Solvunt itidem ſubtilem raſuram *cupri*, vel etiam cuprum è vitriolo praecipitatum, quin & cuprum in viridi aeris contentum. (*c*) Sic & *ſtannum* ſolvunt; (*d*) Ut & *regulum antimonii*, cum quo in calcem, imo etiam ultimatim, ſi fortiſſimo igne torquentur, plane in ſuccinei coloris vitrum convertuntur. (*e*) *Ferrum* ſolvunt duplici ratione; (1.) Vel dum cum nitro detonatur, & nitrum cauſticum ejus ope producitur; (2.) Vel etiam, ſi puram ſolutionem Salis Alcali fixi ſolutioni martis cum ſpiritu nitri antea factae infundo, prout hoc fuſius in Diſſertatione quadam ſub *Stahlio* de hac materia evolvi poteſt. Quod ſi vero fixum noſtrum Sal Alcali *antea ſulphure* bene *impraegnetur*, tum *omnia metalla*, (quaedam etiam ſemimetalla) nimirum *cuprum*, *ferrum*, *plumbum*, *regulus antimonii*, imo etiam *ſtannum & aurum* cum ipſo diſſolvi poſſunt. Denique, quod Salia Alcalino-fixa, Salibus Alcalino-volatilibus *ſiccam conſiſtentiam* conciliant, quod corpora alcalino-terrea non faciunt.

Solvunt etiam haec fixa ſalia tam ex ſpiritibus urinoſis, quam ex ſpiritibus inflammabilibus quoque ſuperfluam, & ſuperficie tenus tantum adhaerentem, *oleoſam* ſubſtantiam.

A large Quantity of Alcalious Salt produced by burning rotten Wood; by Mr Robie, *of* Harward College, *in* Cambridge, New-England No, 366. P. 121.

III. A white Oak Tree, about 2 Foot Diameter, is in *Cambridge*, of ſo wonderful a nature, as that although about $\frac{1}{3}$ of it was decayed, and ſeemed really to be rotten Wood, yet this decayed part, in burning, would turn almoſt wholly into a good white *Alkali*, and it would run down into hard Lumps white and clean. Such a Lump was brought us at College, to know what it was. We taſted it, and found it to be ſalt and very ſtrong. We diſſolved it in clean Water, and upon Decantation, and Evaporation without any Filtration, we produced a very clean white Salt, exceeding in Strength, and whiteneſs, any to be bought at the Shops. We tried it many of the ways of proving the goodneſs of an *Alkali*. Now although *Alkali's* may be extracted from common Aſhes, yet what was peculiar in this, is, 1ſt, That while it was burning, the Wood itſelf would melt, and run down into hard Lumps of Salt; and none of the Wood that was ſound, would do this, but only that which was decayed; and what was moſt decayed, would yield the greateſt quantity of Salt. And, 2. Whereas all other *Alkali's* of

Wood made thus by Incineration, are blackiſh at firſt, and a *Lixivium* made of them, although often filtred, will yet be tinged with a brown Colour, occaſioned from a kind of Coal, or Aſhes, ſo incloſed, as cloſely united to the *Alkali* in burning, as not eaſily to be ſeparated by Filtration, though often repeated, yet this *Alkali* was very white, even before Solution, and when diſſolved, the Lixivium was not in the leaſt tinged, but clear like pure Water, only a very ſmall quantity of Aſhes ſubſided to the bottom of the Veſſel, in which the Solution was made. The Lixivium thence decanted needed no Filtration, but when boiled up to dryneſs, the Salt remained fine and white. And 3. That in the burning of this Wood, as the Heat of the fire grew more intenſe, the Wood did, as it were, melt and clodder together in great Lumps, and did viſibly bubble and boil, with a hiſſing noiſe like the frying of fat in a Pan. 4. That whereas the weight of the *Alkali* Salt produced from other Woods in the common way of Incineration, is very inconſiderable, in proportion to the weight of the Wood producing it, yet this Salt nearly equalled in Weight, the Wood from whence it was taken. 5. Whereas the Aſhes of other Wood are never ſo replete with Salt, as that it can be ſeen, or in the leaſt cauſe the Aſhes to lump or clodder together; yet this, the whole of it, would gather into hard and ſolid Lumps of white Salt, as eaſily to be diſtinguiſhed from Aſhes (though white) as the pureſt Salt of *Tartar* made with *Nitre* would be. 6. That although from other rotten Wood much leſs of an *Alkali* can be produced, than from ſound Wood, yet here it is quite contrary, the decayed part of this Tree yielding, a large Quantity, and the ſound part, no more than other Wood. And we would firſt premiſe, that the Tree was ſtruck, in all probability, with Lightning many Years ſince, it being torn from it's top of the Trunk to the bottom, on that ſide which is now decayed, and which yielded the aforeſaid Salt, there being a Channel from top to bottom, about 5 Inches wide, as we ſuppoſe, at firſt, which the length of time had cloſed. And under this Bark, the Wood next to it was black; which we ſuppoſe was cauſed by the Lightning. From which things we conjectured, that the Wood having been thus expoſed to the Air and Water, for ſo long a time, this was the occaſion of it's becoming defective in that part; and that the Lightning having penetrated the Wood, had ſo altered and diſpoſed the Parts and Pores of it (the Figure and Texture of the parts appearing much different from other rotten Wood) to attract, receive in, and retain, the Nitrous Salt of the Air, which, through ſo long a ſpace of time, could not but be in great abundance. Even as Salt of Tartar, or other *Alkali's*, being expoſed to the Air for ſome conconſiderable ſpace of time, will be wholly reduced to a Nitrous Salt, (as *Glauber* ſays) and it's quantity alſo increaſed very con-

ſiderably. Not that the Lightning had ſo calcined the Wood, as to reduce it to a perfect Salt, but yet by penetrating of it, it had calcined it in ſuch meaſure, as to give it a like Propriety or diſpoſition, of attracting the Nitrous Salt of the Air, as aforeſaid *Alkali's* of Wood that have been fully calcined. Now if it ſhould be objected, that the Nitre in this Wood being volatile, would flee away in the burning of the Wood, we anſwer, that although Nitre cannot be fixed, and reduced to an *Alkali* Salt, by calcining it *per ſe*, yet it may ſo by the Addition of the powder of Charcoal. And here we ſuppoſe the Wood ſo altered by Lightning, in which this Nitrous Salt was lodged, as ſerved inſtead of Coal in the burning of it.

IV. 1. That the Salt, of late Years diſtinguiſhed by the Title of *Sal Catharticum*, is made from what, at the Salt Works, is called *Bittern*, is pretty commonly known; but the particular Manner how this *Bittern* is produced, and from it theſe Salts, has not yet as I know of, been communicated to the World, in ſuch a Manner as to become intelligible. And the *Opprobrium* unjuſtly caſt upon the Salt, of it's being a counterfeit *Epſom Salt*, or ſomething made in Imitation of it, or common Salt diſſolved and recryſtalized, has very much ſunk it's Eſteem among the Learned in Phyſic.

Obſervations and Experiments on the Sal Catharticum Amarum, *commonly called the* Epſom Salt. *By Mr* John Brown, *Chymiſt F. R. S.* No. 377. p. 348.

By the Account M. *Bolduc* gives in the Hiſtory of the Royal Academy of *Paris*, for the Year 1718, I find he did not ſucceed according to his Wiſh in the Experiments he tried, to find out what this Salt was made from, juſtly grounding his Reaſons for it's not being all made from the *Epſom* Waters, or other Springs that afford bitter purging Waters, on the large Quantities conſumed, and the Cheapneſs of it's Price. After all his curious Endeavours, it ſtill remained a Secret, until the Information he received from hence by Dr *Mendez*, whoſe Account is as follows, though very imperfect. It comes, ſays he, from *Lemington* and *Portſea*, both in *Hampſhire*, where from Heaps of foſſile Salt, there runs a ſaltiſh, bitter, ſharp, and pungent Liquor. One would judge by it's Brackiſhneſs and Bitterneſs, that it contained two Kinds of Salt, the one a Sea Salt, the other a bitter Salt. To ſeparate theſe Salts, they cauſe this Liquor to run through hollow Drains on the Ground; there it gets together, and condenſes into Salt; this they put into a large Veſſel, with a great Quantity of common Water, and boil it as long as is ſufficient to diſſolve it; then they let it cool and ſettle for ſeveral Days. The Water, impregnated with the Sea Salt, which is the heavieſt, ſinks to the Bottom of the Veſſel with the earthy Parts, and the Water impregnated with the bitter Salt, which is the lighteſt, ſwims at Top. They take off this upper Liquor, as long as it retains it's bitter Taſte, without any Pungency; afterwards they boil it in one or

two

two Waters, then evaporate it, and it yields white and tranſparent Cryſtals, which are the counterfeit *Epſom Salt.*

What Experiments M. *Bolduc* made with the *Bittern*, ſent him by that Gentleman, I do not remember to have met with, in any of the ſucceeding Memoirs.

Dr *Seipp*, in his Deſcription of the *Pyrmont* Waters, *Page* 127, ſays, that the common *Engliſh* purging Salt, which is ſold in great Quantities in *Germany*, under the Name of *Epſom Salt*, is not prepared from the *Epſom* Waters, but is made in *London* from common Sea Salt, and Oil of Vitriol. In the ſame *Page* he ſays, that the Salt obtained from the *Pyrmont* Waters will part with it's own acid Spirit, upon pouring on the *Ol. Vitriol.* which the *Sal Mirabile* and the *Engliſh* purging Salt will not. By this Means he diſtinguiſhes the firſt Salt from the two laſt.

Dr *Quincey*, in his *Prælect. Pharm.* ſays, there hath lately been contrived a Salt from the Mineral Purging Waters, made by Evaporation, Filtration, and Cryſtallization. It was firſt entitled *Sal Mirabile*, or *Sal Catharticum Amarum*; but it is now ſo ſcandalouſly counterfeited, that it is little elſe than common Salt diſſolved and recryſtallized.

Before I enter into the Account how this Salt is made, it may not be amiſs, firſt, to ſay ſomething of the genuine Salt that has been made from the bitter purging Waters, of which the learned Dr *Grew* was the firſt who attempted the making it at *Epſom.* Some Years after, ſeveral other bitter purging Springs were found in different Counties, and Salts in ſmall Quantities were boiled up from them, but from no Place, nor all the Places put together, in ſuch large Quantities, as from the Springs on one ſide of *Shooters-Hill* in *Kent*, about the Year 1700, which were then in the Poſſeſſion of thoſe two ingenious Chymiſts, Mr *George* and Mr *Francis Moult*; and where they made ſuch large *Apparatus* for evaporating the Water, that they have ſometimes boiled down 200 Barrels in a Week, from which, in a dry Seaſon, and when the Land Waters did not get into their Drains, they have obtained 224 Pound of Salt. After theſe Works had gone on ſome time, Dr *Hoy* found out a more expeditious Way of making a purging Salt ſo nearly reſembling that from the purging Springs, in all it's Properties, that it ſoon paſſed on the World for the other, and continued ſo to do. The great Conſumption of theſe Salts (which then went only by the Name of *Epſom Salts*) as well at Home as Abroad, engaged ſome of our Phyſicians, (many Years before M. *Bolduc* took Notice of it) to ſuſpect, that even what was made at *Shooters-Hill* was ſpurious, and received an Addition of ſomething to encreaſe the Quantity. But theſe Suſpicions, I dare poſitively affirm, were entirely groundleſs, as to the Salts made there, and readily believe the ſame of any other Place, where the Spring Waters were boiled

down for Salt. But upon a Conſideration, that there were greater Quantities of this Salt conſumed than all the Places where the Waters were boiled could produce, which was the real Fact at that Time of Day, there was ſufficient room to ſuſpect, that ſome of them were not genuine, as appeared to be true ſome time after. For the Secret, which was then in a few Hands, of making theſe Salts cheap, gave thoſe, who had it, an Opportunity of under-felling thoſe who made it from the Waters, and, in a Year or two, rendered them incapable of making it to any Advantage: So that the Work on *Shooters-Hill* was thrown up, and I believe there has not been 100 Pound of Salt made from the Waters ſince that Time, in any Part of the Kingdom.

Some time before this Work at *Shooters Hill* was broke up, ſome Pains was taken to diſcover the Secret thoſe had, who ſold the Salt ſo cheap; and upon examining the ſeveral Salts, that were ſold about Town, thoſe diſpoſed of by Mr *G.* and Mr *F. Moult*, were certainly genuine, and were therefore a proper Standard to judge of the reſt by. But from all the Experiments then made, there could no material Difference be found between the Salt made from the Waters, and that made by them who were in the Secret. There was indeed a Salt ſold by ſome, which in the Courſe of thoſe Tryals, was found to be a *Sal Mirabile*, made from the *Ol. Vitrioli* and common Salt, but ſhot into ſuch ſmall Cryſtals, as not at firſt ſight to be diſtingiſhued from the other. Neceſſity being the Mother of Invention, it was not long before it was diſcovered, and the Experiment was tried at the Lady *Carrington*'s Salt-Works near *Portſmouth*; where it was found the ſame thing could be done, as at another Work, not far from it, and in which Dr *Hoy* had been concerned. It was ſome Years after this Salt had been made at *Portſmouth*, before the Saltmakers at *Lemington* attempted, or indeed knew the Method of making it; who are now the greateſt Traders in it, and have ſent ſeveral Ton in a Year to *London*, beſides what has been directly exported from thence.

I remember it to have been the Opinion of the Proprietors of the Salterns near *Portſmouth*, that this purging Salt could not be made at any other Salt-Works except theirs, and that the bitter Taſte in the Salt was communicated from the Earth to the Sea Water, whilſt it ſtood expoſed in their Sun-Pans. But Time has proved this Opinion falſe; for beſides what has been ſaid of it's being made at *Lemington*, it was about 4 or 5 Years ago begun to be made near *Newcaſtle*, where it is ſtill continued to be made; and doubtleſs may be made at any other Salt-Works, where the common Salt is made from Sea Water by Evaporation. Whether any thing of this kind has been attempted at any of our Inland Salt-Springs, either in *Cheſhire*, or *Worceſterſhire*, I am not yet ſatisfied. There is ſome difference in the making the common Salt in *Hampſhire*, from that

about

about *Newcaſtle:* At the firſt of theſe Places, in the beginning of the Summer, at Spring Tides, or at New and Full Moon, the Sea Water is let into their feeding Ponds, which are their *Reſervoirs* for their Summer's working, and from hence is conveyed into ſmall ſquare Pans, and again, after ſome time, from theſe it is conveyed into larger Pans, or Beds, which they call Brine, or Sun-Pans; all which are made of Sea Mud and Earth. In theſe laſt Pans, or Beds, it lies expoſed to the Sun and Wind, in order to exhale the weakeſt Waters; and it is in theſe Beds, if the Weather prove very favourable, that they can make as good Bay Salt as any we have from *France*, and at ſuch a time they never bring their Brine to the Boilers. But if the Weather is not hot enough for that Purpoſe, their Brine is expoſed ſo long in theſe Pans, till it becomes of ſuch a Strength as to ſupport their Eggs, made of Glaſs or Wax, to a certain Height above the Surface of the Brine, which from thence is conveyed into large Store-Ciſterns, and then into Boiling-Pans made of Iron, where it is boiled down (after having been frequently ſcummed) to a Sea Salt. 'Tis obſervable, that whilſt the Brine is boiling, there precipitates a hard cruſty Matter, which is partly taken out by Veſſels placed in proper Parts of the Pan for that purpoſe, and part of it fixes on the bottom of the iron Pan ſo hard, as to be afterwards dug off; and this the Workmen call *Scratch*, and is what Dr *Collins*, in a former *Tranſaction*, concerning the Sea Water boiled at *Shields*, calls a Stone Powder. When the Operation for the Sea Salt is finiſhed, it is taken out hot, and put into wooden Troughs with Holes at the bottom, thro' which runs the ſuperfluous Liquor: Under theſe Troughs are ſet other Veſſels (with Sticks fixed in them in a perpendicular Poſture) to receive what runs thro'. In theſe Veſſels the Liquor is ſuffered to continue ſome time, and according to the Quantity of Sea Salt ſtill left in it, will cryſtallize to the Sticks, ſomething like Sugar-candy, but in much larger Shoots; and this they call *Cat-Salt*, or *Salt-Cats*, and it holds ſome Share of the bitter Salt. When this Salt is broken ſmall, or rather powdered, it is ſo white, that ſome Gentlemen chooſe it for their Tables; but the greateſt Conſumption of it is among the Cake Soap-Boilers. The Liquor that will not ſhoot to theſe Sticks, is what at theſe Works, they call the *Bittern*, fit for making the *Sal Catharticum.*

Continued by the ſame, No. 378. p. 372

2. Near *Newcaſtle*, their Method is to receive the Sea Water into their *Reſervoirs* at High-Water, at any Time of the Moon, if there be no Freſh in the River, occaſioned by Rain in the higher Country; and from theſe *Reſervoirs*, without expoſing of it in Beds, as at *Lemington*, they pump it into their Boiling-Pans, were evaporating it almoſt to a Pellicle, they fill it up again 8 or 9 times, and then waſte it with a gentle Heat for the common or Sea Salt. The Liquor, that runs from this Salt, when taken out, and put into proper Veſſels, is what they call the *Bittern*; which if it ſtands

ſtands ſome time in thoſe Veſſels, a Salt will ſhoot and cryſtallize to the Sides, in Taſte pretty much like Sea Salt, but with a ſhare of Bitterneſs, and ſeems to anſwer to the *Cat-Salt* of the *Lemington* Works, and very probably would ſhoot after the ſame manner, if they made uſe of the ſame *Apparatus.*

I could not but mention this general and looſe Account of making the common Salt, as neceſſary to introduce the Liquor called *Bittern*; which, before Dr *Hoy* found out an Uſe for it, was always flung away; being ſo different in it's Properties from the Brine made uſe of to produce the Sea Salt, that it would not boil up into a Sea Salt again, and required the niceſt Skill and Attendance of the Operator, to determine the Time when to take out the Sea Salt from the Pans, before the *Bittern* incorporated with it, which would otherwiſe ſpoil the whole making.

The *Bittern* at *Lemington* (as obſerved before) not ſhooting to the Sticks, is carried by Channels into Pits made tight with Clay, where it ſtands for ſome Months, and there will ſhoot again: What Liquor remains is boiled down, till it is obſerved to be in a Diſpoſition to cryſtallize, and then is conveyed into wooden Coolers lined with Lead: The Liquor, which will not ſhoot there, is boiled down after the ſame manner, in order for another Cryſtallization. By this time the Liquor ſeems to have altered it's Property, and becomes of a very pungent biting Taſte, and, if boiled down, will no longer ſhoot into Cryſtals as before, but precipitates, during the boiling, a ſmall grained Salt; and if you ſhould continue to boil down the Liquor, ſeparated from this Salt, each Quantity of Salt thus produced, will be ſtill more pungent than the other. If you boil down the whole Quantity of this Liquor, it will produce a Salt, which if expoſed to the Air, will run, *per deliquium.* The Liquor that produces this Salt, is always flung away, wherever the *Sal Carthaticum* is made.

This is what, at preſent, I can give no other Name to, than a third Salt produced from the Sea Water, differing, in ſome reſpects, as much from the other two, as they differ from one another.

To return to the ſeveral Cryſtallizations, ſuch as mentioned to be ſhot from the *Bittern*; theſe will be of different Sizes, as to their Figures, and hold ſome ſhare of the third Salt but now taken notice of, which makes them apt to give and diſſolve; nor is their Taſte come yet to that ſimple Bitter of the pure Salt. Theſe therefore are either ſeparately, or altogether, to be flung into a Copper, with as much common Water as is ſufficient to diſſolve them, and allow of a gentle Evaporation, till they are again ready to be poured into the Coolers in order for Cryſtallization. This generally proves to be the pure *Sal Catharticum*, throughly freed (as far as the Experiments I have tried can be convincive) from either a Sea Salt, or the third Salt. The Liquor decanted from this ſhooting, may be boiled down

 again

again in order for a ſecond ſhooting, and after that a third; but as the Liquors from theſe ſhootings are boiled away more or leſs, ſo you will ſooner or later meet again with the pungent Liquor, which contains the third Salt, as you did in the former ſhootings from the *Bittern*, from which the pure *Sal Catharticum* is as neceſſarily required to be freed as from the common Salt; a Proof of which cannot be better determined than by one of the Experiments to be taken notice of hereafter, *viz.* that with the *Ol. Vitriol.* which will certainly ferment with this Salt, if the Sea Salt has not been well ſeparated from it, or if it ſtill holds ſome of the third Salt. And when any of the Cryſtallizations will not ſtand the Teſt of this Experiment, they ought to be diſſolved and ſhot again, as before, by which means the pure Salt is to be obtained. I do not mention this as a Trial made uſe of at the Salt-Works, but what I have by Experience found to be true. And the ſame Experiment will ſerve to diſtinguiſh a *Sal Mirabile* made at theſe Works, from that made with *Ol. Vitrioli* and common Salt. The Account they give of it is this: They take any Quantity of coarſer grained Cryſtals boiled from the *Bittern*, which when diſſolved and evaporated, more than they would otherwiſe do for making the *Sal Catharticum*, they throw into a wooden Bowl, with ſome Oil of *Vitriol*, where it ſtands for 10 Days, and ſhoots into large Cryſtals, tranſparent, and like the *Sal Mirabile*: But as this Salt, by this Method, is not ſufficiently ſatiated with the *Ol. Vitriol.* (if they uſe any) ſo it is eaſily diſcovered by the *Ol. Vitriol.* which will readily ferment with it; whereas it has no effect on the other *Sal Mirabile* made as above.

By the Aſſiſtance of *Robert Cay*, Eſq; at *Newcaſtle*, I have received the ſeveral ſhootings of Salts from their *Bittern*, as alſo ſome of the *Bittern* itſelf; from each of which I have obtained a pure *Sal Catharticum*, as alſo the like kind of third Salt, as mentioned from the *Lemington Bittern*. The Method I took in doing it is agreeable to that I have already mentioned, and many Years ago tried at the Salt-Works near *Portſmouth*. It is by Mr *Cay* that I am informed, they ſometimes boil their *Bittern* without letting it ſtand any time to ſhoot of itſelf. The Difference is not very material.

If this Account be intelligible, what the *Sal Catharticum* is, will no longer be a Myſtery. And the next thing worth the enquiring into will be, whether this Salt deſerves the Reflections, that have diſcouraged the Preſcription of it? And why it may not paſs for a Salt as excellent in it's kind, and be of the ſame Nature, and have the ſame Properties, as that produced from the *Epſom*, or any other bitter purging Springs. Dr *Grew* in his Treatiſe *de Natura Salis Cathart. Amari*, *Chap.* 2. ſays, that in the Evaporation of any of the bitter purging Waters, they yield a Cremor at top, as alſo a Sediment, both together weighing 6, 8, or about 10 Drams, from a Gallon of

of Water; and that the leſſer Part of this Sediment is, in Subſtance, this ſame with the Cremor; the reſt is all Salt, but conſiſts of two ſorts, one a muriatic Salt, the other which is proper or peculiar to theſe Waters. In the *Epſom* Water, the muriatic Salt is about a 20th Part of the ſaline Mixture; in the *Dulwich* it is in greater Proportion, and the ſame in ſeveral others; it is, both in it's acrimonious Taſte, and Figure of it's Cryſtals, not unlike to common Salt. The other Salt is that which he ſays is particular or proper to the purging Waters, and is made by Evaporation and Cryſtallization. In this Preparation, firſt the earthy or plaiſtery Part is to be ſeparated, next the muriatic Salt, and laſtly, a brown and dark Liquor from the proper Salt of the Waters. And in the 4th Chapter of the ſame Part, having ſhewn the Difference of the Figure betwixt the Cryſtals of this Salt and thoſe of Alum, he goes on, Neither is there any better ground to account the purging Salt a Species of common Salt, from which being perfectly freed, it differs as much in Taſte as from Alum. And in the ſame Chapter, he ſays it will appear, the bitter purging Salt, altho' it hath ſome Qualities in common with other Salts, yet is truly, or ſpecifically different from them all. Thus far Dr *Grew.*

Now I cannot ſee any thing in this Account, but what will, *conſideratis conſiderandis*, very well agree with the purging Salt from the Sea Water. For, firſt, there is an earthy or plaiſtery Part contained in theſe Waters, and this muſt be ſeparated. The very ſame is in the Sea Water, and is precipitated in the boiling them down, as has been obſerved, and by the Operators is called *Scratch.* Next there is a muriatic Salt allowed to be in theſe Waters; in ſome more, in ſome leſs; and this is likewiſe to be ſeparated: The very ſame is done from the Sea Water, tho' in a vaſtly to larger Proportion. And, laſtly, there is a black and dark Liquor be ſeparated; tho' this is but an obſcure Way which the Doctor makes uſe of to expreſs himſelf, it cannot be better explained, than by what has been found to be Fact in boiling down the Waters at *Shooters-Hill:* That after ſeveral ſhootings of Salts by repeating the Boilings of the Waters, there would, at laſt, remain a Liquor of a deep-brown Colour, which would no longer yield a cryſtallized Salt; but, if boiled up dry, would afford a Salt of the ſame kind with the third Salt already mentioned: And this explaining Dr *Grew*'s black and dark Liquor, helps at the ſame time to prove, in this Article too, that the Sea Water affords the ſame kind of third Salt. I have tried ſeveral of the Experiments mentioned by the Doctor, by which he diſtinguiſhes his Salt from other Salts. Such as not affecting the Colour of Syrup of Violets; curdling of Milk when boiled; in the Figure of it's Cryſtals; in

it's eaſy Diſſolution in the ſame Quantity of Water; in it's coagulating with the *Ol. Tartar. per Del.* in it's Calcination, and in the Bitterneſs of it's Taſte, as well before as after Calcination, *&c.* and find this Salt thus ſeparated from the Sea Water, anſwer to all the Trials. Some few Experiments, that the Doctor has not taken notice of, I ſhall here ſubjoin, and then leave the Whole to the Opinion of better Judges; Whether there be any ſpecifical Difference between theſe two Salts?

In order to have a Standard for theſe Experiments, I purpoſely got Mr *Hyet*, Apothecary at *Epſom* (whoſe Fidelity I could depend on) to boil me down ſome of their Waters; which he did from the Well in the Town, and ſent me a ſufficient Quantity of the Salts, to anſwer the Purpoſe I wanted them for. I procured likewiſe ſome of the firſt Salts from the *Lemington Bittern:* Theſe do not hold ſo much of (what I have already diſtinguiſhed by the Name of) the third Salt, as I find the *Newcaſtle* Salts do. This *Lemington* Salt, I, for Diſtinction-ſake, call the *firſt Lemington Salt.* Part of this I diſſolved, and ſhot into pure *Sal Catharticum*, being freed, as well from the Sea Salt, as the third Salt; and this I call the *ſecond Lemington Salt.* I procured likewiſe from *Newcaſtle* the firſt Salts ſhot from their *Bittern*, which I call the *firſt Newcaſtle Salt.* Part of theſe I likewiſe diſſolved and ſhot, and obtained a pure *Sal Catharticum*; and this is what I call the *ſecond Newcaſtle Salt.* I am obliged to make uſe of the *Sal Mirabile*, made from the *Ol. Vitriol.* and common Salt, that having been taken for the *Sal Catharticum* As alſo common Salt, that having been repreſented as the principal Subſtance of the *Sal Catharticum.*

I took ℥ ſß. of each of theſe Salts, and diſſolved them in about ℥ij. of Water to each ℥ ſß. of Salt. A ſmall Quantity of each Diſſolution I poured into as many Glaſſes, and dropped into them all ſome *Butyr. Antimonii.* The Precipitation that followed, ſeemed to be alike in them all; and upon dropping a little *Ol. Vitriol.* into each, what was precipitated being more powerfully attracted by the Oil, the ſeveral Liquors became clear. Theſe are the two only Experiments, in which I found the Conſequences ſo much alike in them all.

In the following Experiments, the *Sal Mirabile* is ſufficiently diſtinguiſhed from all the reſt. Slices of Gall cut into theſe ſeveral Solutions have no manner of Effect upon any, except that of the *Sal Mirabile*, which is ſoon tinged of the Colour of Sack, or rather deeper. *Sp. Sal. Arm. c. Tart.* dropped into the ſeveral Solutions turns them all milky, except that of the *Sal Mirabile*, which keeps it's Tranſparency. The *Sp. Salis Armon. c. calce.* the *Ol. Tart. p. deliq.* the *Tinct. Coccinell. in Sp. Vin. fact.* do every one, uſed after the ſame manner, ſufficiently diſtinguiſh the *Sal Mirabile* from all the reſt.

In the following Experiments, the *Epſom* Salt, the ſecond *Lemington* Salt, and *ſecond Newcaſtle* Salt, agree together, and differ from the common Salt, the *firſt Lemington* Salt, and the *firſt Newcaſtle* Salt. In the ſeveral Solutions I dropped a Solution of Silver in *Aq. Fortis*, from which followed theſe Conſequences. The Solution of the *Epſom* Salt, *ſecond Lemington Salt*, and *ſecond Newcaſtle* Salt, became equally milky, before the Precipitation. The Solution of the Sea Salt, and *firſt Newcaſtle* Salt, let the Precipitation paſs without receiving any milky Tinge. The *firſt Lemingtou* Salt, as holding leſs of the *third* Salt, than the *firſt Newcaſtle* did, took a little milky Tinge. The Precipitation fell nimbly thorough the Solution of the *Sal Mirabile*, leaving it milky.

In the Condition theſe were in, I poured ſome *Ol. Tartar. per deliq.* to each of them; on which, after ſome time, a bluiſh Scum aroſe on the Surfaces of the *Epſom* Salt, *ſecond Lemington* Salt, and *ſecond Newcaſtle* Salt: There likewiſe appeared a little on the *firſt Lemington* Salt, but not any on the reſt.

A Solution of corroſive Sublimate was made in Water, 10 Drops of which, mixed with the ſeveral Solutions, produced little or no Alteration; but upon dropping in the *Ol. Tartari per deliq.* the following Appearances were produced: In the Solution of the *Epſom* Salt, *ſecond Lemington* Salt, and *ſecond Newcaſtle* Salt, the Precipitations were red; in the Solution of the common Salt, and *firſt Newcaſtle* Salt, the Precipitations were white; in the Solution of the *firſt Lemington* Salt, the Particles precipitated approached pretty near the Colour of the three firſt.

I took ſome of theſe ſeveral Salts in Subſtance, and to each of them poured a little *Ol. Vitriol.* which is one of the Experiments Dr *Grew* tried upon his Salt, and which he ſays cauſes a moderate Ebullition, whereby it appears to partake of an alkaline Principle: But without looking for this alkaline Principle from it's fermenting with an acid, (Terms juſtly exploded by the learned Dr *Freind* in his *Prælectiones Chymicæ*) I am inclined to believe, that the Salt on which he tried the Experiment had not, according to his own Directions, been thoroughly ſeparated from his muriatic Salt. For this Oil poured on the *Epſom* Salt, *ſecond Lemington Salt*, and *ſecond Newcaſtle* Salt, produced no ſenſible Fermentation. On the Sea Salt it acts with Violence, forcing off it's acid Spirit with an inſufferable *Gas*. The ſame Effect in proportion it had on the *firſt Lemington* Salt, and *firſt Newcaſtle* Salt; none at all on the *Sal Mirabile*, as being a Sea Salt already ſatiated with the Oil.

What I have all along called the *third* Salt, anſwers in moſt of theſe Experiments to the Sea Salt, and yet has ſome Properties exceedingly different from it; to thoſe I have mentioned theſe may be added; it will not decrepitate like Sea Salt; it readily melts, when

when put in a Crucible in the Fire; and when calcined till red-hot, affords a *Calx* equal to, if not stronger than, a Lime-stone, and ferments violently, as well with Water as with *Ol. Vitriol.* This *Calx*, when exposed to a moist Air, will part of it run *per deliq.* but not so soon as before Calcination. All these Properties differ in every respect from the common Salt, and leave me still in doubt what to call it, as also how far Experiments of this kind may be deemed conclusive.

An Account of the Quantity of Resin in the Cortex Eleutheriæ; *by Mr* John Brown, *Chymist, F. R. S.* N° 371. *p.* 81.

V. Dr *Douglas* having lately delivered in a Paper to be read before this Society, giving an Account (from the History of the Royal Academy at *Paris*) of the *Cortex Eleutheriæ*; and among other things having said of it, that Mons. *Boulduc* had from ℥i. of the Bark, by means of Spirit of Wine, gotten ʒ v. of Resinous Extract, there remaining ʒ iij. of *Fæces*; and that Gentleman's Account of some of the Properties of this Bark being founded on the quantity of Resin supposed to be contained in it: I proposed to Dr *Douglas*, and some other Gentlemen of the Society, (who agreed with me in believing, that scarcely any part of any Plant whatsoever would yield that quantity of Resinous Extract) to try the Experiment, which was performed after the following manner: I took ℥ ij. of picked Bark, and digested it in rectified Spirit of Wine, which was often decanted and fresh Spirit put on, until the Bark would yield no more Tincture. The impregnated Spirit being evaporated by a very gentle Heat; there was left ʒ ij. of Resinous Extract; the Remains of the Bark dried, weighed ℥i. ʒij ß; the Loss this way is ʒiij ß. I boiled these Remains in several Waters, until they would no longer tinge the Water, which being evaporated, yielded ʒi ß. of Extract; the Remains of this dried weighed ℥i. ʒ ß; the Loss by this Method is ʒ ß. I took ℥ ij. more of picked Bark, and boiled it in several Waters, till the Bark gave no more Colour; and then upon an Evaporation of the Water, had ʒ ij. of Extract. The Remains being dried, weighed ℥ i ʒ vi; here the Loss was not any thing, except so much as might answer in weight to the quantity of the *Menstruum* left in the Extract, which Allowance must likewise be made in the other Extracts. I digested the Remains in rectified Spirits of Wine, until they no longer tinged the Spirit, and by a very gentle Evaporation, I found remaining ʒ i. of Resinous Extract. What was left, when dried, weighed ℥ i. ʒij ß; in this the Loss was ʒ ij ß. The Difference in the quantity of Extract obtained by these two different Methods, is but ʒ ß. and the Medium between them, upon putting together the several Extracts made with Spirit of Wine and Water, is in the whole but ʒ iij. 15. *gr.* But the Extract made with Spirit of Wine alone, is no more than ʒij. from ℥ij. of the *Cortex*, instead of ʒ x. which it ought to have yielded according to M. *Boulduc.*

VI. Non-

The common Experiment used to prove French *Brandy, shewn to be false and fallacious; by Mr* C. Neuman, *Chym. Prof. Reg.* Berolin. *F. R. S.* No. 391. *p.* 398.

VI. Nonnulli negotiatores in *Hollandia*, *Anglia*, *Hamburgi*, *Dantisci*, &c. qui maxime in coëmendo & divendendo Spiritu Vini Gallici occupati sunt, certum aliquod experimentum probatorium crepant, idque pro magno artificio ac singulari arcano venditant, firmiter persuasi, se ope hujus experimenti non solum spiritum vini Gallici à spiritu frumenti, sed etiam genuinum ab adulterato discernere, atque ita in coëmendo genuino spiritu vini Gallici, nequaquam defraudari posse. Hinc etiam tanquam indubitatum & infallibile probamentum, imo magnum aliquod arcanum, quod non omnes calleant, adhuc existimatur, adeo, ut nemo hunc liquorem probatorium, nec olfaciendum, neque gustandum mihi concedere unquam voluerit, tametsi fide interposita protestabar, me illorum commercio nec nociturum, nec artem hanc cum aliquo communicaturum. Quid quod nec ego ipse, nec illi praenoscere quibant, utrum ego nudo olfactu vel gustu conjectando illico assecuturus essem, quidnam rei sit, & qua ratione paranda esset?

Subjectum liquor quidam est subfusco-flavescens, quo adhibito mercatores experimentum istud ita peragunt. Complent primo scyphum vitreum spiritu vini Gallici probando, deque liquore isto in scyphum illum vel unicam, vel duas tresve guttas, pro quantitate spiritus vini infusi, instillant. Quod si bonus fuerit & genuinus spiritus vini Gallici, statim in fundo vitri impleti existit admodum caeruleus color pulcherrimus, qui si caule mundiore agitatur, cum reliquo spiritu permistus, totum vitrum colore cyaneo tingit; sin autem spiritus frumenti sit, ne quicquam cyanei coloris in vitro conspicitur, sed spiritus ille colorem suum primigenium retinet, etiamsi de liquore dicto vel vigecuplo plures guttae scypho impleto instillentur. Sicuti igitur hic modus probandi generatim, putum frumenti spiritum à puro puto spiritu vini Gallici, ex opinione Mercatorum discernit: ita hi consequenter hac hypothesi fidentes de utriusque spiritus vini & frumenti adulterinae commiscelae gradibus diversis judicant. Norunt enim ex conspecto colore caeruleo, nisi hic obscure talis, sed subcaeruleus modo, caesius, glaucus, aut ex cyaneo virideſcens appareat, dijudicare, spiritum vini non solum adulteratum, sed etiam quoad gradus tot plusve minusve partibus spiritus frumenti mixtum esse.

Equidem lubens fateor, hanc rationem probandi spiritus, ubi primum eam animadvertebam, admiratione quadam & delectatione me affecisse, ita ut eam omnino certam & falsi nesciam primo adspectu crederem, quo etiam magis nunc talibus Mercatoribus & Oënopolis, rerum Chymicarum ignaris, inscrutabilem sibi errorem condonare possum. Quum autem animo mecum subinde agitarem, quod nullum adhuc, quantum sciam, demonstrativum experimentum prostat, cujus ope peculiares puri spiritus vini Gallici & quidem rectificatissimi partes constitutivas à spiritu frumenti

aeque rectificatiſſimo diſtinctas oſtendere vel ſaltem ſuſpicari poſſimus, ſed quod uterque ex iiſdem partibus eſſentialibus conſtet, in quam communem qualitatem ſimpliciter neceſſaria fermentatione rediguntur, ideo argumentatus quoque mecum ſum, quod ſi qua notabilis diverſitas in dictis ſpiritibus eveniret, ea non à mixto intrinſeco tanquam mixto ſpiritus vini formante, vel à vini indole, ex quo ſpiritus deſtillatus fuit, ſed neceſſario ab additamento quodam heterogeneo, ad conſtituendum ſpiritum vini, qua talem, nullo modo pertinente, ortum ducat, ſive ſub fermentatione aut deſtillatione peregrinum quid addatur, ſive tingendo, extrahendo, vel ipſa commiſcela aliorum liquidorum aut ſolubilium contingat.

Meum non eſt in ſolis ejuſmodi cogitatis, praecipitatis ut plurimum & fallacibus, acquieſcere; quare varia, ad rem pertinentia, experimenta inſtitui, quibus etiam facile impetravi conjecturae meae confirmationem, quod ſcilicet in iſta per dictum experimentum apparenter proveniente diverſitate, nulla ſit ratione ſpiritus ardentis vera & eſſentialis diſtinctio, ſed quod productio coloris caerulei, ex quo differentia judicatur, heterogeneo cuidam, & ad ſpecialem conſtitutionem ſpiritus vini plane non requiſiti additamento debeatur, atque ita totum experimentum, quacunque demum veriſimilitudine ſeſe commendans, falſum ſit, fallax, & inutile, id quod jam ulterius comprobabo.

Praemonendum autem mihi eſt quod, cum de additamento hoc ſpiritus vini, liquore ad experimentum pertinente deſtitutus, certior fieri non aeque poſſem, operam dederim ſedulam, dictum modo liquorem, utpote ipſummet artificium laudatum, adinveniendi, quamvis ab initio parum in id concitatus, quod eum nunquam, ceu dixi, neque guſtu, neque odoratu ſentire, nec niſi ſub inſtitutis experimentis, eminus intueri licuerit, neque etiam difficultate ſua caruiſſent eum explorandi tentamina (quamvis, ut apparebit, ſimplex ille ſit & ſatis notus) niſi ab amico, qui *Gedani* eum quondam guſtaverat, percepiſſem, quod ſtyptico ſapore ſe exhibeat, quorſum cum omnia mea experimenta dirigerem, tandem reperi, quod arcanum illud tanto in pretio habitum aliud nihil ſit, quam mera ſolutio Martis in acido vitriolico, ſive ex Marte cum ſpiritu vitrioli ſoluto, & cum aqua diluto, ſive ex vitriolo Anglico, ſive ex vitriolo quodam Venereo-Martiali, praecipitando parato, ſive ex minerae cujuſdam Martis, qualis Haſſiaca eſt, extractione conſtet, quamvis color caeruleus omnium elegantiſſimus cum ultima, nempe cum ſic dicto liquore terrae Martis ſolaris appareat, quo ſaturatior ſolutio eſt, eo minus ejus pro experimento faciendo requiritur.

Additamentum autem illud flavedinem primum ſpiritui vini Gallici concilians, hinc & ſub experimento caeruleum colorem provocans,

vocans, lignum quercinum eſt, ſive ſegmenta aut ramenta ejus cum ſpiritu vini infundantur, ſive in dolio quercino novo ſervetur ſpiritus, uſque dum flavedinem ex ligno extraxerit ; quo magis autem flaveſcit ille, eo magis coeruleus quoque cum liquore martiali evadit ſub experimento, niſi croco vel alia quadam re flava tinctus fuerit.

Quod autem totum negotium non niſi ligno quercino debeatur, experimento ſequenti in contrarium facto, confirmo : Aſſumo nempe ſpiritum frumenti, eundem, qui cum liquore neque coeruleum colorem exhibet, neque ullam aliam mutationem ſubit, atque ideo à mercatoribus pro puro frumenti ſpiritu judicatur, huic indo ramenta quercina, & infuſa relinquo, donec ſpiritus frumenti flavedinem ſpiritus vini Gallici fere contraxerit, filtrato huic ſpiritui dum liquorem vitriolicum, ſicuti ſpiritui vini Francici, inſtilio, eundem colorem coeruleum & aeque elegantem acquiro, nulla ne leviſſima quidem diverſitate, aut diſſimilitudinem indicante phaenomenon interveniente ; quod abunde teſtatur, omnem mutationem coloris ex ligno quercino originem ducere.

Poſſumus quoque ſpiritum frumenti cum alio quodam, analogia ad lignum quercinum accedente, cum Gallis, *v. g.* infundere, ſequente ſimiliter experimento. Succedit quoque res quodammodo cum cortice granati & aliis vegetabilibus adſtringentibus, omnium tamen optime cum ligno quercino, cui cortices granatorum longe ſunt inferiores, violaceum potius, quam coeruleum colorem, & cum agitatur, viroris aliquid trahentem, exhibentes.

Notatu dignum eſt, quod perparum liquoris ex ligno quercino extracti ſufficiat ad qualitatem ſpiritui frumenti bene multo inducendam, pro coeruleo colore, cum dicto ſaepius liquore, exhibendo, ſiquidem cum gutta unica infuſi ligni quercini dimidiam ſpiritus frumenti unciam pro experimento ſubeundo aptam reddidi.

Liquorem ſive ſolutionem ex puro vitriolo Martiali, nullatenus Venereo, conſtare & paratam eſſe debere, exinde apparet, quod experimentum 1. cum Goſslarienſe, Ungarico, Dantiſcano, omnibuſque ſimiliter mixtis vitriolis, quae qualitercunque venerea vel cuprea ſunt, pro copia cupri commixti plus minus male ſuccedat, & colorem valde dilute coeruleum, ſeu caeſium producat. 2. Quod cum puro vitriolo Veneris plane non ſuccedat, nec ullum colorem coeruleum provocet, ſicuti id variis experimentis, infra in ejus teſtimonium allatis, tentando didici.

Dicendum adhuc reſtaret ut, quibus de cauſis & quomodo color iſte coeruleus oriatur, explicarem ; quia vero rem pro incipiente, vel diluto, atramentorio ſcriptorio habeo, cujus ingredientia, colorem ſuppeditantia, praecipua ex iiſdem, nempe ex vitriolo Martis & adſtringente vegetabili conſtant, de quibus *D. Lemery* ſcite & copioſe diſſeruit (*v.* Hiſt. de l'Acad. des Sciences An. 1707.)

hunc potius allegare volui illis, qui talibus delectantur, quam observationem hanc meam allegatis hujusmodi complere & extendere. Qui opticis aliisque Philosophicis rationibus capiuntur, D. *Boyle*, D. *Newton*, & alios legant, qui de coloribus scripserunt.

Sub finem discursus mei paucis commemorabo, quod inter Gallici vini & frumenti spiritum, purum nempe hunc & cum cura destillatum, non alia quam peculiaris odoris & saporis in Francici spiritu vini à vinaceis, petiolis & acinis uvarum oriundi differentia indagari debeat, licet idem quoque odor & sapor variis modis spiritui frumenti conciliari, atque hic ita in Francicum adulterari queat, ut eam vel peritissimus pro genuino Francico aut ad minimum pro frumenti spiritu plane non habuerit, unde apparet, quod uti primo allegatum, ita & alia experimenta spirituum ardentium probatoria nullius, vel saltem insufficiantis usus sint.

An Account of the Experiments.

I. Octuplas paravi solutiones vitriolicas, pro qualibet drachmas duas vitrioli & unciam unam cum dimidia aquae communis destillatae recipiendo. Habui autem solutiones vitrioli. 1. Goslariensis; 2. Gedanensis; 3. Hungarici; 4. De Cypro; 5. Anglici; 6. Martis cum oleo vitrioli parati; 7. Martis ex vitriolo venereo martiali per praecipitationem facti, & 8. solutionem minerae Martis Hassiacae, vel sic dictae solaris, cujus itidem binas tantum drachmas ad dictam aquae quantitatem assumpsi. II. Triplices feci adstringentium vegetabilium extractiones per infusionem, ad quamvis unciam vegetabilis libram unam medicam spiritus frumenti, qui à liquore probatorio antea instillato nihil plane coerulei ostenderat, accipiendo; fuerunt autem extractiones, 1. Ligni quercini; 2. Gallar. Turcic; 3. Granatorum corticum. III. Cum tribus hisce admodum saturatis extractionibus, triplicem quoque Gallici vini spiritum adulterinum, colorem saltem & flavedinem imitando, ex frumenti spiritu effinxi, & quibusvis octo spiritus frumenti unciis unam extractionis unciam singulatim commiscui. IV. Ordinarium sumpsi spiritum vini Gallicum flavescentem, atque etiam ordinarium recens destillatum spiritum frumenti, & de utroque, secundum ordinem modo dictum cum solutionibus vitriolicis, experimenta cepi ac successive institui. V. Infudi nempe quavis vice ℥ ß. spiritus vini Francici in vitrum mundum infra acuminatum, & solutionis vitriolicae unicam, vel si non sufficeret ad coeruleum colorem proferendum, 2, 3 usque ad 4 guttas instillavi, vidique diligenter attendendo, quod spiritus vini Gallici dictus 1. cum solutione vitrioli Goslariensis pallide coeruleum, 2. cum solutione vitrioli Gedanensis, & 3. vitrioli Hungarici itidem subcoeruleum, 4. cum solutione vitrioli de Cypro autem nullum plane coeruleum, sed subviridescentem colorem induerit, 5. cum solutione vitrioli Anglici, atque 6. cum solutione vitrioli Martis, cum oleo vitrioli parati, itidemque 7. cum solutione vitrioli Martis per

praecipitationem facti, valde elegantem, sed cum liquore Martis solari sic dicto, seu solutione minerae Martis Hassiacae, amoenissimum colorem coeruleum acquisiverit. Causam diversitatis hujus supra jam dedimus. VI. Cepi porro pro quovis experimento probatorio dimidiam itidem spiritus frumenti unciam, & cujusvis solutionis vitriolicae 1, 2, 3, imo 10 & plures guttas instillavi, sed à nullius neque etiam ipsius liquoris saepius dicti commiscela, quamvis plus ad hunc, quam ad Gallici vini spiritum additum fuerit, ullam ne levissimam quidem livedinem coerulei coloris observare licuit. VII. Postmodum assumpsi dicti sub numero III, & de eodem spiritu frumenti, triplici modo imitando effecti spiritus vini Gallici ℥ ß. pro quovis experimento, eandemque cum ordinario spiritu vini Francici factam, ac sub numero V, commemoratam instillationem cujusvis solutionis vitriolicae institui, & ecce conveniebant experimenta cum genuino, & cum adulterato hoc spiritu vini Gallici facta, per omnia phaenomena; nisi quod propter combinatas variorum vegetabilium extractiones aliqua hinc inde, quamvis admodum levis differentia interveniret, uti ex sequentibus apparebit. VIII. Spiritus frumenti cum extractione gallarum ab instillata solutione vitrioli 1. Goslariensis, itidemque 2. Gedanensis nigrescebat quodammodo, 3. cum solutione vitrioli Hungarici ab initio, sub instillatione, dabat quidem aliquid coerulei, sed inter commiscendum perdebat penitus, 4. cum solutione vitrioli de Cypro plane non tingebatur, 5. cum solutione vitrioli Anglici eleganter coerulescebat, & 6. cum solutione Martis utroque modo parati, ab initio quidem coeruleo, sed commiscela vero & interagitatione cum caule pennae, violaceo colore tingebatur; denique 7. cum solutione minerae Martis, & quidem una saltem ejus gutta, mixtus hic spiritus frumenti egregium acquisivit colorem coeruleum. IX. Spiritus frumenti extractione corticum granatorum, ceu dictum, imbutus, cum solutionibus vitriolicis, juxta ordinem praecedentem confusus, parum vel nihil coerulei provocavit, & circa priora quatuor puncta, eodem fere modo, se exhibuit, atque supradictus frumenti spiritus gallarum extractione impraegnatus, in posterioribus quoque experimentis mox viridiusculi quid, mox atramenti aemulum ostendebat. X. E contrario spiritus frumenti extractione ligni quercini in similitudinem quandam Gallici infucatus, cum solutionibus vitriolorum pure martialium, & prae caeteris cum liquore Martis solari, omnium pulcherrimo colore coeruleo inficiebatur. Cum primis quatuor solutionibus vitriolicis vero eodem se modo habuit, ac caeteri spiritus frumenti fucati, imo non secus ac ipse spiritus vini Gallici. XI. Tandem cum satis essem confirmatus, rem cum ramentis ligni quercini optime succedere, experiri libuit, quantum infusi vel extractionis ligni quercini, ad minimum pro aliquali saltem coeruleato colore producendo requi-

reretur. Varias ergo quantitates minuendo ſemper parciores, à ʒſſ. ad 20, 15 & pauciores guttas deſcendendo, probavi, adeo ut unica gutta ſufficeret totam ſemiunciam ſpiritus frumenti qualitate impraegnando, quae ad colorem coeruleum, licet non adeo faturatum, unica ſaltem gutta liquoris minerae martis accedente, producendum requiritur.

An Account of a Spiritus Vini Æthereus, *with ſeveral Experiments tried therewith; by Dr* Frobenius, *F. R. S.* No. 413. *p.* 283.

VII. Exp. 1. The Æther of Plants appears to be almoſt deſtitute of all groſs Air, from placing it under the Receiver of the Air-Pump; for exhauſt the Air ever ſo accurately, this Ætherial Liquor remains unmoved, nor does it emit any Air-bubbles which immediately ariſe in other Liquors, and according as their Quantity of intrinſic Air is greater, ſo much the ſooner are ſuch Liquors put into Agitation, and emit alſo more Froth, and more vehement Ebullitions in proportion to their Viſcidity. Hence it follows, that this Æther may be preſerved beſt (becauſe without any Diminution) under the Receiver in *Vacuo*, whereas on the contrary, expoſed to the open Air, it's Parts ſoon evaporate, and it's whole Bulk, but not compreſſed by the Air, vaniſhes. (*This Experiment failed remarkably.*)

2. A little of it poured on the Surface of the Hand, affects it with a Senſe of Cold equal to that from the Contact of Snow, and blow upon it but once or twice with your Mouth, immediately your Hand becomes dry. Beware however of approaching a lighted Candle with your Hand thus wet, leſt it take Fire and burn you. (*Succeeded.*)

3. It cauſes ſuch a Stridor and Hiſſing, being poured upon hot Water, as is frequently occaſioned by a piece of hot Iron thrown into it. Take a Lump of Sugar, imbibe ſome of this Æthereal Liquor, and put it into a Veſſel full of hot Water, the Sugar will indeed ſink to the Bottom, but the æthereal Liquor ruſhing violently forth, excites a great Ebullition in the Water. If one Spoonful of this Æther be poured into a Copper-pot full of boiling Water, without any Sugar in it, and approach immediately with a Candle or a lighted Paper, inſtantly there iſſues forth from the Water very great Lightning. The Handle of a Spoon, as well as the Tongs for holding and applying the lighted Paper, muſt be of a proper Length, that the Effuſion of the æthereal Liquour upon the hot or boiling Water, and the Application of the lighted Candle or Paper may be performed at the ſame time; otherwiſe the Æther is immediately diſſipated, without any ſuch Effect. "There is "therefore need of an Aſſiſtant, or of both Hands, and alſo of "a Room where Entrance may readily be given to freſh Air, "proportionable to the Magnitude of the Flaſh of Lightning "which ſo rarifies the Air as to endanger the Stoppage of Reſpi-"ration. (*Succeeded.*)

4. Hence

4. Hence it appears, that this Æther is both Fire and a very fluid Water, but ſo volatile that it ſoon evaporates, and that it is the pureſt Fire ; inſomuch, that if kindled in a thouſand times the quantity of cold Water, it burns inextinguiſhably. Wherefore, if you take an earthen Veſſel of any magnitude, whoſe Mouth or Orifice may be one or two Yards wide, but the inferior Latitude of the Veſſel may contain 600 or 6000 Gallons of Water, the Experiment will be the ſame, pour on the top but one Ounce, or a ſmall Vial full of this Æther, and apply to it a lighted Wax-candle, it takes Fire immediately, burns placidly, and is ſo far from being extinguiſhed by the moſt profuſe Supereffuſion of common Water, that it much increaſes the Vehemence of the Flame, and laſts till the ſubtil Parts of the Æther are conſumed and ventilated by the Flame. This Experiment ſhould be made in a large and lofty Room, not in danger of taking Fire. *(Not ſhewed.)*

5. The Senſe of Touch does not manifeſt the leaſt Oilineſs or Fatneſs in this æthereal Liquor, notwithſtanding that it is the true, natural, and only Diſſolvent, or Menſtruum of all Fat, Oil, Roſin and Gum whatſoever : By means whereof all Sorts of Fat, and every kind of Fire or Flame is extricated by a ſpeedy, ſafe, and pleaſant Operation. On theſe Accounts it is that this æthereal Liquor will not unite with any kinds of Salts whatſoever, but all Sorts of Oils, Pitch, Turpentine, Opobalſams, Camphire, Wax, Ambergris, Sperma Ceti, Maſtich, Muſk, Copal, and the like, it diſſolves moſt readily, and with the greateſt Eaſe extracts their beſt Eſſences.

6. And indeed a wonderful Harmony is obſervable betwixt Gold and this Æther, even greater than between Gold and *Aqua Regia* ; inſomuch as from hence Gold appears to approach nearer to the Nature of Oils than of Earths, as ſhall be proved when we treat in their proper Place of the three harmonious Menſtrua which we have diſcovered, *viz.* The corroſive one for the Devoration or Diſſolution of Earths, Minerals, and Metals ; the aqueous one for the Diſſolution of all kinds of Salts ; and laſtly, the æthereal Liquor, or *Oleous Menſtruum.* If a piece of Gold be diſſolved in the beſt *Aq. Regia*, and upon the Solution, cold, be poured ℥ ſß. or what Quantity you pleaſe of the Æthereal Liquor, ſhake the Glaſs carefully, and all the Gold will paſs into the æthereal Liquor, and the *Aqua Regia*, robbed of all it's Gold, will preſently depoſite the Copper at the bottom of the Veſſel as a white Powder, which turning of a green Colour, contains the Portion of Copper wherewith the Gold was adulterated. The Æther will ſwim like Oil on the Surface of the corroſive Waters. The Experiment deſerves the utmoſt Attention ; for here the heavieſt of all Bodies, Gold, is attracted by this very light Æther, or (whereas the Air, which with a common Force preſſes alike all Bodies, is here excluded, and the

the Æther itself encompasses and touches the Surface of the Water) the Gold, by the Force of it's Gravity, as by an Impulse, would descend from thence; or lastly, this Phænomenon is owing to a certain Harmony and Similitude of both of them. (*Succeeded.*)

7. Æther then is certainly the most noble, efficacious and useful Instrument in all Chymistry and Pharmacy, *Ubi enim ignis potentialis, ibi actuali non opus est*, inasmuch as Essences and Essential Oils are extracted by it immediately, without so much as the Mediation of Fire, from Woods, Barks, Roots, Herbs, Flowers, Berries, Seeds, *&c.* from Animals, and their Parts too. Thus from Castor, by a certain Manufaction, may be prepared an Oil sweeter than that of Cinnamon, and also the true Oil of Saffron, of wonderful Efficacy; and all by this particular Encheirasis, without the Help of Fire or Distillation. For an Example of our Method, take Mint, Sage, or Orange-peels, Cinnamon, *&c.* or all these together; cut and bottle them; pour upon them a Spoonful or two of the æthereal Liquor; and after it has stood an hour in a cold Place, fill up the Bottle with cold Water, and you shall see the essential Oil, swimming upon the Water poured upon them, easily separable by the Funnel, or *Instrumentum Tritorium.* Of this essential Oil, one Drop only upon a Lump of Sugar, manifests to the Taste, *&c.* the medical Virtues of the Plant, exquisitely drawn out, comprehended in this Essence, deservedly named *COS*, as containing the Colour, Odour, and Sapor or Taste of the Plant or Plants. In like manner the essential Oils of Exotics are easily prepared. (*Succeeded.* But it is not a true essential Oil, but an excessive strong Tincture, which you may call the Essence.)

8. Of the like Use it is in the Animal Kingdom, where it produces an essential Oil of *Phosphorus*; as likewise in the Mineral Kingdom, though not so immediately, because the Resolution of Earths must proceed. Moreover, it is easily proved that the same Liquor extracts the purest Gold, or every Part of the golden System from any, or all the baser Minerals, and that this Gold thus extricated, is by this one Operation better and sooner purified than by Fusion of Minerals with Antimony.

9. This our Water is neither corrosive nor joined with apparent Corrosives: Wherefore fill as many Bottles with æthereal Water as there are Sorts of Salts, and into the first, drop by drop distil Oil of Vitriol; put into the second, Spirit of Sea Salt; into the third, Spirit of Nitre, or of Alum, or of Sal Ammoniac prepared with Water, or the Lixivium of Tartar, or rectified Wine-Vinegar, all the Salts immediately sink to the bottom: Besides, it is the lightest of all Liquors; for fill any Vessel with ℥xx. of Oil of Vitriol, the same emptied, will contain but ℥vii. of Æther. It is the very Ens, or Being, most pure of Flame; where-

fore

fore neither Soot nor Aſhes are ever found upon it's Deflagration. (*Succeeded.*)

Thus far Dr Frobenius ; *but to make this Paper more than a mere Harangue, it is abſolutely neceſſary to ſubjoin two Paragraphs out of a Paper of that excellent Chymiſt Mr* Godfrey, (*Dr* Frobenius's *Fellow-Labourer*) *in theſe Experiments which he delivered in when this* Æther *was made public before us.*

" *Feb.* 19, 1729-30. That this Liquor *Æthereus*, was formerly " very much eſteemed and enquired into, doth clearly appear by " an Experiment I made formerly for my worthy Maſter, Eſq; " *Boyle*, by the Means of a metallic Solution, namely, by the So- " lution of crude Mercury united with the *Phlogiſton Vini*, or other " Vegetables, and this *Æther* ſwam on top of the Solution which " I ſeparated *per Tritorium. Note*, This is what I have done for- " merly in Eſq; *Boyle*'s Laboratory, and Sir *Iſaac Newton* was very " well acquainted with it too ; which by reaſon of Shortneſs of " Life was not brought to a full End, to do it ſo readily " in quantity. But when Dr *Frobenius*, by Experiments on this " in my Laboratory, did produce it in greater quantity, he " wanted to ſee how far Sir *Iſaac Newton* had gone on with it in " his Book. There we ſaw that great Man's Application in Fol. " 330, that he had done it *cum Ol. Vitr. & Sp. Vin.*

This of Sir Iſ. Newton, *is the* Sp. Vini Æthereus, *only there is a difference in the Proceſs : The Liquor* Æthereus *is made with equal Parts in Meaſure, not Weight. The upper yellow Liquor is ſeparated from the inardent ſulphureous* per Tritorium. *The inferior Liquor is thrown away ; and the ſuperior yellow is put into a Retort to be diſtilled with the moſt gentle Heat ; and the Extraction of the æthereal Liquid continued ſo far until the ſuperior Hemiſphere feels cold, and the Retort being clapped in the Hand, there is found in the Receiver a* Vino-ſulphureous Gas *very æthereal. Let the Sulphur be precipitated by adding an* Alkali, *and gently throwing it in till all Ebullition ceaſes, and the Liquor will not farther ſtrike itſelf againſt the Hand, but will ſtrangely attract it. Then the* Alkali *will go to the bottom of itſelf, or precipitate itſelf in the common Water.*

VIII. 1. ℞ Tartari crudi & Nitri crudi Siccati ad ℥iiii. pulveriſentur minutiſſime, & commiſceantur, deinde admoto igneo carbone detonentur, & habebis Salis Tartari extemporanei ℥iiii. Dum adhuc calidum eſt hoc Sal, pulveriſetur ſubtiliſſime, & addantur ſanguinis Bovini probe exſiccati & ſubtiliſſ. pulv. ℥iiii. Haec, bene mixta, indantur crucibulo, ut tertia pars vacua ſit ; impoſito dein operculo igni committatur, & circumdetur crucibulum carbonibus, ut ſenſim ardeſcat, & materia ſine praepropera accenſione flammam concipiat & igneſcat. In hoc ignis gradu teneatur materia, donec flamma & accenſio remittat ; augeatur demum ignis, ut

The Preparation of the Pruſſian *Blue, ſent from* Germany *to* John Woodward, *M. D. Prof. Med.* Greſh. *F. R. S.* No. 381. *p.* 15.

ut valde candeat materia, & parum flammae è crucibulo amplius emineat. Remove demum ab igne crucibulum, & materiam mortario ingeſtam leviter contere, & ad manus habeto aquae ferventiſſimae pluvialis libras 4 ponderis civilis, cui materiam, adhuc ferventem, immittas, & per ſemihorae ſpatium coque; decoctum per linteum coletur, & materia remanens nigra, aquae portioni denuo affuſa, igni iterum apponatur, coquatur, & percoletur; id quod eouſque continuandum, donec ſalſedo & acrimonia omnis è materia ſit elixiviata, & aqua redeat inſipida. Humores omnes in linteo & materia reſiduos, fortiter exprime, & ubi ſingula in unum colligeris, igni iterum committe, & ad remanentiam 4 librarum evapora, & ulteriori uſui ſerva, ſub No. 1.

℞. Porro Vitrioli Anglici ad albedinem leviter calcinati ℥i. ſolvatur in Aquae pluvial: ℥vi. filtretur per chartam & ſignetur: No. 2.

℞. Denique Aluminis crudi ℥viij. ſolvatur in libris 4 aquae ferventiſſimae ad omnimodam Aluminis conſumptionem, hoc rite peracto, adjunge ſolutionem Vitrioli ſub No. 2. aſſervatam, quae ex igne fervens ingeratur ollae ſatis magnae & amplae, & cum lixivio No. 1. ſeorſim bene fervefacto, combinetur. Fiet ex continenti magna ebullitio, & apparebit color viridis montani ſeu chryſocollae; effundatur alternis vicibus, durante ebullitione, ex uno vaſe in aliud, qua ceſſante, quieti committe. Tum linteo inſinuetur, ut aquoſitas tranſeat, color vero in linteo remaneat; ſi igitur nihil humiditatis amplius diſtillet, cum ſpathula lignea è linteo in ollam novam minorem remove; ſuperfunde poſtea ſpiritus falis comm. ℥ij. vel ℥iij. & ſtatim apparebit color coeruleus pulcherrimus: quae probe mixta per noctem quieſcant, quo facto aquae pluvialis magna quantitas addatur, in gyrum moveatur ſpathula, & poſteaquam reſedit materia, aqua decantetur, & recens aqua ſuperfundatur, & eouſque labor reiteretur, donec omnis acrimonia ſit deſumpta, & aqua inſipida defluat; hoc pacto praecipitatum tuum ſummè coeruleum linteo expanſo ingere, ut aqua diſtillet, ſenſimque color calore leni exſiccetur uſui.

N. B. Calcinatio magni momenti eſt in hoc opere, nam color cyaneus & coeruleus obſcurus ortum ſuum trahit à calcinatione levi, mediocri, & forti ſanguinis arefacti cum ſale Tartari, & inde diverſitas coloris.

Lixivia ferventiſſima uno eodemque feſtinatiſſimo actu ſunt confudenda.

Obſervations and Experiments upon the foregoing Preparation; by Mr John Brown, *Chymiſt F. R. S.* N° 381. *p.* 17.

2. In going thro' the foregoing Proceſs exactly, according to the Proportions preſcribed; I obſerved that by a Calcination of ℥iiij. of Blood dried, with ℥iiij of *Sal Tartari*, in 2 Hours time that Part of the Operation was over, and a black ſpongy Subſtance remained in the Crucible weighing ℥iiij; a Diſſolution of which being

made in boiling Water and afterwards filtred, the Remainder, when dried, weighed ℥ ix. *Avoird.* the former having been weighed by the ſame kind of Weight. The Loſs and Filtration of the Vitriol and Alum, is not worth taking notice of, they having both been very clean before they were diſſolved. The Mixtures being made as preſcribed, with the Addition of the *Spiritus Salis*, the Product was a very fine Blue, which when well edulcorated by frequent Waſhings, and after that thoroughly dried, weighed ℥ i. or a little more, and entirely anſwered the Character the Author gave of it.

Among the ſeveral Experiments that were made with theſe Liquors, I mean the *Lixivium* with Blood, the Solution of Vitriol, the Solution of Alum, and the Spirit of Salt, tho' they always produced a Blue, yet that Blue differed in degrees of Colour, according to the varied Proportions of the Vitriol and Alum, and the Colours produced from theſe ſeveral Proportions were each of them improved by the Addition of the *Spiritus Salis.* I ſhall mention only two of the ſeveral I tried, in one of which the Alum was entirely left out, and a pale Blue produced; in the other, the Proportions of Vitriol and Alum were equal, and a very deep Blue was produced. Theſe Differences in Colour, ariſing from the ſeveral Proportions of the Vitriol and Alum, are only mentioned to confirm the Truth of the Author's Preſcript, as being the moſt exact and beſt proportioned to produce the fineſt Colour of any I have tried. The only Misfortune he takes notice of, as attending his Preſcript, is what may happen in the Calcination.

It would be curious to know what gave the firſt Hint for the Production of ſo fine a Colour, from a Combination of ſuch Materials; eſpecially when we come to conſider, that the Blood has the greateſt and principal Share in this ſurprizing Change. I doubt not but Blood, or Fleſh of any kind, would produce the ſame Effects, but have reaſon to believe the latter would not produce ſo beautiful a Colour as the former. I purpoſely dried ſome Beef freed from it's Skin and Salt, and purſued the ſame Courſe as with the Blood; but there was a ſenſible Difference to be obſerved during the Calcination, and a very manifeſt one in the Beauty of the two Colours, when finiſhed.

To prove the Share the Blood has in this Change, the following Experiments (ſome of which I ſhewed before this Society) may be convincive. The Solution of Alum mixed with that of the Vitriol produces no Alteration of Colour: If to theſe you add the *Spiritus Salis*, the Appearance is the ſame; but if to the whole you put the *Lixivium* with Blood, there precipitates a Blue. If you ſubſtitute, inſtead of the *Lixivium* with Blood, a *Lixivium* made with the ſame Salt of Tartar only, which then becomes an *Ol. Tartari*; and after

the Mixture of the Solution of the Alum, with that of the Vitriol, you pour on this *Ol. Tartari*, there follows indeed a Precipitation, but of no Colour; and if you add the Spirit of Salt, it ſo ſtrongly attracts what is precipitated, as to render the muddy Mixture perfectly clear. The very ſame Effect will follow, if any volatile alcalious Spirit is made uſe of as a Precipitant, or any volatile Salts diſſolved in Water; nor can the Blood itſelf be ſuppoſed to communicate this Change from any ſuch Properties, the Heat of Fire it undergoes in the Calcination, being ſufficient to throw them off.

In the Calcination of the dried Blood and Salt of Tartar it was obſerved, that there was a Loſs of juſt $\frac{1}{2}$. It is difficult to determine exactly what Quantity of either was loſt by this Calcination, but it will eaſily be granted, that there was loſt a far larger quantity of the Blood, than of the Salt of Tartar; and that is obvious from an Experiment, by which, when the Salt of Tartar was calcined by itſelf, with the ſame degree of Heat, it loſt leſs than $\frac{1}{8}$ Part, whereas, when the dried Blood was calcined by itſelf, it loſt more than $\frac{6}{8}$. The Blood, in Calcination with the Salt of Tartar, communicates it's tinging Quality to the Salt, or that Quality is extracted from it by the Salt, and paſſes with it in it's Diſſolution in the boiling Water. To prove this, ſome dried Blood was calcined by itſelf, and a ſtrong Decoction was made of it in Water, and afterwards filtred: This, when mixed with the former Solutions, produced little or no Alteration; but on the Addition of the *Spiritus Salis*, changed to an Amber Colour, without any Precipitation. When this Liquor was mixed with the *Ol. Tartari*, and poured to the former Solutions, it cauſed a Precipitation, but no Colour, and the *Spiritus Salis*, as in the other Experiment, made the Liquor clear again, but left this alſo of an Amber Colour. The Change of Colour is not effected in any of the Materials, except in that of the Solution of Vitriol, ſo that the Alum ſeems only to be of uſe in fixing the Colour, as it is often uſed by the Dyers for that Purpoſe, and the *Spiritus Salis* gives it a deeper Dye. For if the *Lixivium* with Blood be poured to the Solution of Alum alone, there will fall a Sediment a little on the Purple, to which if you add the *Spiritus Salis*, it changes the Colour, and the Sediment is of a Brown.

So, much the ſame Changes will be produced, if you pour the *Spiritus Salis* to the *Lixivium*, but not the leaſt Appearance of a Blue; whereas, when the *Lixivium* is poured to the Solution of Vitriol, there immediately follows the Blue, which is ſtill heightened by the Addition of the *Spiritus Salis*. It will not be improper to take notice, that as the Author orders all the Liquors, except the *Spiritus Salis*, to be boiling hot when mixed, ſo it is certain the Colour is thereby more immediately produced, and looks more beautiful; but moſt of the Experiments here mentioned were made with the

the Liquors cold, and the Colours came to their Beauty with a little waſhing. In one of the Experiments with the Liquors cold, after the *Lixivium* with Blood had precipitated the Blue in the Mixture of Alum and Vitriol, by pouring in a little more of the *Lixivium*, the Blue all diſappeared, and an ugly muddy Colour was left; but the Addition of the *Spiritus Salis* ſoon diſcharged that, and the Blue returned. In calcining the Beef and Salt of Tartar, I found the Matter left in the Crucible to weigh juſt ½ of the whole Mixture, as in that with the Blood; but after the boiling it in Water, the *Reſiduum* in the Filtre, when dried, was very near ⅓ leſs in proportion than the other. From whence may be reaſonably inferred, that the Salt of Tartar holds a larger Share of the Beef in the one Operation, than of the Blood in the other.

Having in the former Part of this Account of the *Pruſſian* Blue proved, by the Experiments there mentioned, that the Solution of Vitriol was the only Subject among thoſe Ingredients, that the *Lixivium* of Blood produced this Change of Colour in it; and having ſince conſidered that the Vitriol made uſe of in this Preparation, is no more than Iron diſſolved by a Liquor running from the *Pyrites*, when expoſed to the Weather, which is afterwards boiled up and ſhot into Cryſtals; it ſeemed to follow, as a natural Conſequence, that this Metal is the Subject on which the *Lixivium* of Blood produces the Change; and this Thought gave occaſion to the following Experiments on metallic Bodies, in order to obſerve if the ſame Change of Colour could be produced in any of them.

To a Solution of Silver in *Aquafortis* was poured the *Lixivium* of Blood, which occaſioned a *Coagulum* of a pure Fleſh Colour. The *Lixivium* made with Fleſh produced a whitiſh *Coagulum*, and the *Ol. Tartari* (which was continued to be uſed by way of compariſon with the other *Lixivia*) a much whiter. By the Addition of the *Spiritus Salis* to each of theſe, the Bloom of the Fleſh Colour was taken off in the firſt, but ſuffered no other Change. In the ſecond the *Coagulum* was a little tinged with Blue; and in the third the White was manifeſtly improved. The bluiſh Tinge in the ſecond of theſe Experiments cannot entirely be aſſigned as the Effect of the *Lixivium* with Fleſh, becauſe Silver, when thus diſſolved, whether precipated with ſalt Water, or *Ol. Tartari*, will, after it has ſtood ſome time, contract a bluiſh Tinge, and this from an Alloy of Copper, from which it is not entirely freed.

The ſame Liquors were made uſe of to precipitate the Mercury in the *Mercurius Sublimatus Corr.* diſſolved in Water; the Conſequence of which was, that the *Lixivium* with Blood produced a pure yellow; the *Lixivium* with Fleſh and Orange Colour; and the *Ol. Tartari* a dingy red. The Addition of the *Spiritus Salis* to theſe, made ſome very odd Alterations; for the firſt changed it's yellow

Colour for an Orange; the ſecond, it's Orange for a Blue; and the third became quite clear again without any Colour. The blue Colour in the Mixture of the *Lixivium* with Fleſh, and Solution of Sublimate, may be accounted for from the Vitriol in the Compoſition of the Sublimate; but it will not be ſo eaſy to give a Reaſon why the ſame Colour ſhould not have been produced from the *Lixivium* with Blood, and the ſame Solution.

Copper, when diſſolved in *Aquafortis*, tinges the Water of a green Colour; and if to this you pour the two *Lixivia* of Blood and Fleſh, the *Coagula* are much alike, *viz.* a white tinged with green; but when you add the *Spiritus Salis*, they both change and become of a Colour not unlike the Copper itſelf before it is diſſolved in the *Aquafortis*. If the *Ol. Tartari* be poured to a Solution of the Copper, the *Coagulum* is a pale green, which *Coagulum* the *Spiritus Salis* diſſolves, and leaves the Liquor clear, but green, as before Precipitation.

Tin-Glaſs (an imperfect Metal) diſſolved in *Aquafortis*, and mixed with the *Lixivium* of Blood made a milky *Coagulum*, and by the Addition of the *Spiritus Salis*, after ſome time ſtanding, it's upper Surface changed to a light Blue. The *Lixivium* of Fleſh and the *Ol. Tartari* produced both white *Coagula*, which the *Spiritus Salis* ſcarcely alters.

Lead diſſolved in Spirit of Vinegar produceth much the ſame white *Coagulum*, when mixed either with the *Lixivium* of Blood, Fleſh, or the *Ol. Tartari*, nor doth the *Spiritus Salis* make any Alteration.

By all theſe Experiments it is pretty evident, that not any of theſe metallic Bodies were affected by the *Lixivium* of Blood, ſo as to produce this fine Blue. The two Metals untried are Gold and Tin, the latter of which, when diſſolved in Spirit of Vinegar, has ſo near a Reſemblance to Lead diſſolved in the ſame *Menſtruum*, that in all Probability the Experiments would anſwer much alike in both. What may be expected from Gold, I am not yet ſo well aſſured of, as I am from Iron, which when diſſolved in *Spiritus Vitrioli*, will anſwer all the Experiments that have been tried with the Solutions of Vitriol, and produce as fine a Colour; nor can this be owing to any Property in the Diſſolvent itſelf, which, tho' drawn from the ſame kind of Vitriol all along made uſe of in theſe Experiments, yet is ſo altered by the violent Fire in the Production of it, as not to anſwer in any Trials to the Vitriol itſelf.

May we not therefore hence conclude, that Iron is the Metal, that is the Subject of this beautiful Colour produced by Means of the *Lixivium* with Blood?

An Account of a Book, entituled, Adverſariorum Anatamico-Medico-Chirurgicorum Decas tertia. *Auctore* Fred. Ruyſch, *M. D. Anat. & Bot. Prof.* Amſtel. *R.S.S.* No. 379. p. 428.

IX. In §. I. The learned Author ſays, that many Years ago he drew, by ſimple Diſtillation, from crude Vegetables, a perfect volatile Salt; and that it is eaſily done from freſh Seeds of the hot anti-ſcorbutic Herbs, ſuch as Muſtard, Rocket, Onions, *&c.*

The End of the Third Part.

THE
Philosophical Transactions
ABRIDGED.

PART IV.
CONTAINING THE
Philological and Miscellaneous PAPERS.

CHAP. I.
PRINTING.

THE Advantage of Printing above Writing, has at last prevailed with the Grand Signor to permit a Printing-Press to be set up at *Constantinople*. It was obtained upon a Memorial presented to him by the Grand Vizier, with the Consent of the Mufti. The Privilege is granted to *Zaid* the Son of *Mehemet Effendi*, late Ambassador in *France*, and *Ibrahim Mutafarrica*, the Author of a small Tract in this Book. The Licence extends to the printing all Sorts of Books written in the Oriental Lan-

A short Account of a Book intitled, Tuhhfat ilkibar, *printed at* Constantinople, An. Dom. 1728. *By Mr.* John Eames, *F. R. S.* N°. 424. p. 338.

Languages, except ſuch as treat of the *Mahometan* Religion. The Book before me ſeems to be one of the firſt that ever was printed there. For though *Giauhauri's Arabic* Dictionary, tranſlated into *Turkiſh*, was what the *Turks* deſigned, for particular Reaſons, to begin withal; yet the Manuſcript, from which they printed off the firſt Sheets, was found to be ſo incorrect, that the Grand Signor ordered the printing of it to be ſtopt, 'till a more correct Copy could be procured. During this Stop, the Book I am to give a brief Account of was printed, containing about 150 Leaves. The Language of it is not *Arabic*, as was ſuppoſed, but *Turkiſh*, though it has ſeveral Words and ſome Sentences that are ſo. The Title, or what may ſerve as ſuch, is *Tuhhfat ilkibar*, or, *A Preſent to the Great*; containing an Account of ſeveral Engagements at Sea. The Author is *Hagi Califa*, ſtiled *Chelebi Almurhhum*, *i. e.* A Gentleman who has obtained Mercy, or deceaſed. It conſiſts of two Tracts, a large, and a very ſmall one. The latter is done by the Publiſher, *Ibrahim Mutafarrica*, *Mutafarrica* is a Title of Honour ſignifying a Horſe-Soldier, obliged to go to the Wars when the Grand Signor goes in Perſon, but not elſe. It is a ſhort Account of Geographical Meaſures of Diſtances, *&c.* particularly of the Circumference of the Earth. The principal Treatiſe is partly Hiſtorical, and partly Geographical; the latter treats of the Nature of the Terreſtrial Globe, the Uſe of Maps, and Situation of Places, particularly of *Venice*, *Corfu*, *Albania*, *&c.* and ſuch as border upon the *Turkiſh* Dominions. The Hiſtorical Part is an Account of ſeveral Naval Expeditions and Battles between the *Turks* and *Chriſtians*, eſpecially during the Holy War, in the *Mediterranean* Sea, with their Conqueſt of the Iſlands and Places of Note upon the Sea-Coaſts. It is an Abridgement of the Hiſtory of their Admirals, from the taking of *Conſtantinople* to the Year 1653; gives a Deſcription of the Grand Signor's Arſenal at the *Porte*, with the Charges of maintaining it; and concludes with ſome Directions to the *Turkiſh* Officers. Beſides a general Map of the World, there are three others; one of the *Mediterranean*, or *White Sea*, as the *Turks* call it; another of the *Archipelago*, and the third of the *Venetian* Gulph: They have each Scales of *Turkiſh*, *French* and *Italian* Miles annexed; but what is ſomething ſurprizing theſe Maps have the Degrees of Latitude, but not of Longitude, marked upon the Sides. The laſt Plate has two Mariner's Compaſſes, the one containing the *Turkiſh* Names of the ſeveral Points; the other, beſides the *Turkiſh*, has the *Arabic* Names, which are taken from certain Stars ſuppoſed to riſe and ſet upon or near thoſe Points. The Book ends with Words to this Senſe: This Treatiſe was done by the Perſons employed in the Buſineſs of Printing, at the Printing-Houſe erected in the noble Month of *Dulkaadah*, in the Year 1141, (*i. e.* 1728.) in the good City of *Conſtantinople*. May God, *&c* I forgot

got to obſerve, it has the Imprimatur, or Commendations of a *Turkiſh* Divine, and three *Effendies*, prefixed; and at the End an Index of the *Errata*, with their Emendations in three Pages. The whole is done upon ſhining or gummed Paper, ſtamped with three Creſcents in Pale, and an Imperial Crown, proper to the *Turks*. I join with the learned Mr. *Clodius* (Author of a *Turkiſh* Lexicon and Grammar lately publiſhed at *Lipſic*) in wiſhing the *Turks* would print a compleat *Livy*, which Fame ſays is repoſited in the Grand Signor's Library in the *Turkiſh* Language, together with other *European* Books tranſlated into *Turkiſh*, whoſe Originals are not to be met with in *Europe*, a Catalogue of ſome of which is expected from the younger Monſ. *Fourmond*.

CHAP. II.

CHRONOLOGY, HISTORY, ANTIQUITIES.

Remarks upon the Observations made upon a Chronological Index of Sir Isaac Newton, *translated into* French *by the Observator, and publish'd at* Paris. *By Sir* I. Newton *P. R. S.* N°. 389. p. 315.

I. 1. NOV. 11, 1725. A small Tract in print was delivered to me, as a Present, from Mr. *William Cavelier*, Jun. a Bookseller at *Paris*, a Person unknown to me, entituled, *Abregé de Chronologie de M. le Chevalier Newton, fait per lui même, & traduit sur le Manuscript Anglois.* And the Bookseller hath premised an Advertisement, in which he endeavoureth to defend himself for printing it without my Leave, saying, that he had writ three Letters to me for my Leave, and in the Third had told me, that he would take my Silence for a Consent; and that he had also charged one of his Friends in *London* to speak to me, and procure my express Answer; and that having long expected my Answer, he thought that he might take my Silence for a Sort of Consent, and so procured a Privilege, and printed it, and then received my Answer from his Friend, which was as follows.

I remember that I wrote a Chronological Index for a particular Friend on condition that it should not be communicated. As I have not seen the Manuscript which you have under my Name, I know not whether it be the same. That which I wrote was not at all done with Design to publish it. I intend not to meddle with that which hath been given you under my Name, nor to give my Consent to the publishing of it,

London, May 27, 1725, St. Vet.

I am,

Your very humble Servant,

ISAAC NEWTON.

The Privilege was granted *May* 21, and registered *May* 25, Old Style, my Letter was dated *May* 27, and the Chronological Index, or Abridgement as he calls it, was printed before the Arrival of my Letter, and kept ever since to be published at a convenient Time. The Bookseller knew that I had not seen the Translation of the Abridgment, and without seeing it could not in reason give my Consent to the Impression. He knew that the Translator was unknown to me, and was against me; and therefore he knew that it was not fit that I should give my Consent, nor be asked to do it. He knew that the Translator had written a Confutation of the Paper translated, and that this Confutation under the Title of *Observations*, was to be printed at the End of it, and he told me nothing of all this, nor so much as the Name of the Observator, and yet

yet ask'd my Consent to the publishing; as if any Man could be so foolish as to consent to the publishing of an unseen Translation of his Papers, made by an unknown Person, with a Confutation annexed, and unanswered at their first Appearance in Publick.

After the Recital of my Letter, he adds, that the Author of the Translation, and of the Observations upon it, pretends to have an entire Certainty that this Index, or Abridgment of Chronology, is the same with the Writing owned by me in my Letter, and is persuaded that the Manuscript, which hath been communicated to him, hath been copied from that of this Friend, that is, from that of the particular Friend above-mentioned in my Letter. And therefore the Manuscript, which hath been communicated to him, is that of *Abbè Conti*, a noble *Venetian* now at *Paris*. He, being about seven Years ago in *England*, gave me Notice, that the Friend above-mentioned desired to speak with me. And this Friend then desired a Copy of what I had written about Chronology. I replied that it was imperfect and confused, but in a few Days I could draw up an Abstract thereof, if it might be kept Secret. And some Time after I had done this, and presented it, this Friend desired that Signor *Conti* might have a Copy of it. He was the only Person who had a Copy, and he knew that it was a Secret, and that it was at the Desire of this Friend, and by my Leave, that he had a Copy, and he kept it secret, while he staid in *England*; and yet, without either this Friend's Leave or mine, he dispersed Copies of it in *France*, and got an Antiquary to translate it into *French*, and to confute it; and the Antiquary hath got a Printer to print a Translation and the Confutation; and the Printer hath endeavoured to get my Leave to print the Translation, without sending me a Copy thereof to be perused, or telling me the Name of the Translator, or letting me know that his Design was to print it with a Confutation unanswered and unknown to me.

The Translator near the End of his Observations (Page 90) saith, I believe that I have said enough concerning the *Epocha* of the *Argonauts*, and the Length of *Generations* to make People cautious about the rest. For these are the two Foundations of all this new System of Chronology. What he saith, concerning the *Epocha* of the *Argonauts*, is founded on the Supposition that I place the Equinox in the Time of the *Argonautic* Expedition, fifteen Degrees from the first Star of *Aries*, Pag. 75, 79. I place it in the Middle of the Constellation, and the Middle is not fifteen Degrees from the first Star of *Aries*. The Observator grants that the Constellations were formed by *Chiron* (Pag. 70, 71, 79.) and that the Solstices and Equinoxes were then in the Middle of the Constellations (Pag. 65, 69, 75.) and that *Eudoxus*, in his *Enoptron* or *Speculum* cited by *Hipparchus*, followed this Opinion, Pag. 62, 63, 65, 69, 79. And * *Hipparchus* names

* *See* Hipparchus *published by* Petavius, Vol. 3. Pag. 116, 117, 119, 120.

names the Stars, thro' which the Colures passed in this old Sphere, according to *Eudoxus*, and saith expresly that *Eudoxus* drew one of these Colures thro' the Middle of *Cancer* and the Middle of *Capricorn*, and the other thro' the Middle of *Chelæ* and the Back of *Aries*. And the Colurus, passing thro' the Back of *Aries*, passes thro' the Middle of *Aries*, and is but eight Degrees from the first Star of *Aries*. I follow *Eudoxus*, and, by doing so, place the Equinoctial Colure about 7*gr*. 36′ from the first Star of *Aries*. But the Observator represents, that I place it fifteen Degrees from the first Star of *Aries*, and thence deduces that I should have made the *Argonautic* Expedition 532 Years earlier than I do. Let him rectify his Mistake, and the *Argonautic* Expedition will be where I place it.

As for the Length of *Generations*, the Observator saith, that I reckon them one with another at 18 or 20 Years a-piece (Pag. 52, 55.) which is another Mistake. I agree with the Antients in reckoning three Generations, at about an hundred Years. But the Reigns of Kings I do not equal to Generations, as the antient *Greeks* and *Egyptians* did; but I reckon them only at about 18 or 20 Years a-piece one with another, when 10 or 12 Kings, or more, are taken in continual Succession. So the first 24 Kings of *France* (*Pharamond*, &c.) reigned 458 Years, which is one with another 19 Years a-piece. The next 24 Kings of *France* (*Ludovicus Balbus*, &c.) reigned 451 Years, which is one with another 18 $\frac{3}{4}$ Years a-piece. The next 15 Kings (*Philippus Valesius*, &c.) reigned 315 Years, which is one with another 21 Years a-piece. And all the 63 Kings of *France* reigned 1224 Years, which is 19 $\frac{1}{2}$ Years a Piece. And, if the long Reign of *Lewis* XIV. be added, the 64 Kings of *France* will reign but 20 Years a-piece. And they, that examine the Matter, will find it so in other Kingdoms: And I shorten the Duration of the antient Kingdoms of *Greece*, in the same Proportion that I shorten the Reigns of their Kings, and thereby place the *Argonautic* Expedition about 44 Years, and the taking of *Troy* about 76 Years after the Death of *Solomon*, and find *Sesostris* contemporary to *Sesac*.

So then the Observator hath mistaken my Meaning, in the two main Arguments on which the whole is founded, and hath undertaken to translate and confute a Paper which he did not understand, and been zealous to print it without my Consent; though he thought it good for nothing, but to get himself a little Credit, by translating it to be confuted, and confuting his own Translation.

The Observator saith, that I suppose that the *Egyptians* began, about 900 Years before Christ, to form their Religion, and deify Men for their inventing of Arts, notwithstanding that it appears by the Scriptures, that their Idolatry and Arts were as old as the Days of *Moses* and *Jacob*, Pag. 82, 83. But he is again mistaken. I deny not that the Kingdom of the lower *Egypt* called *Mizraim*, had a

Religion

Religion of their own, till they were invaded and subdued by the Shepherds, who were of another Religion: But I say, that, when the *Thebans* expelled the Shepherds, they set up the Worship of their own Kings and Princes. I say also, that Arts were brought into *Europe* principally by the *Phœnicians* and *Curetes*, in the Time of *Cadmus* and *David*, about 1041 Years before Christ; and do not deny that they were in *Phœnicia*, *Egypt*, and *Idumea*, before they came into *Europe*.

The Observator saith also, that 884 Years before Christ, I place the Beginning of the canicular Cycle of the *Egyptians* upon the vernal Equinox, although that Cycle never begins in Spring, Pag. 84, 85. But he is again mistaken. I meddle not with that Cycle, but speak of the *Egyptian* Year of 365 Days.

The Observator represents, that I have a great Work to come out: But I never told him so. When I lived at *Cambridge*, I used sometimes to refresh my self with History and Chronology for a While, when I was weary with other Studies: But I never told him, that I was preparing a Work of this Kind for the Press.

Abbè Conti came into *England* in Spring 1715, and while he staid in *England*, he pretended to be my Friend, but assisted Mr. *Leibnitz* in engaging me in new Disputes, and hath since acted in the same Manner in *France*. The Part he acted here may be understood by the Character given of him in the *Acta Eruditorum* for the Year 1721, Pag. 90. where the Editor, excusing himself from repeating some Disputes which had been published in those *Acta*, subjoins: *Suffecerit itaque annotasse Abbatem quendam Italum de Conti nobilem Venetum (de quo admiratione digna sibi præscripta esse ab Hermanno fatetur Leibnitius) cum ex Gallia in Angliam trajecisset, mediatoris vices in se suscipere voluisse, atque literas Newtoni ad Leibnitium deferri curasse, Leibnitianas cum Newtono communicasse.* And how Mr. *Leibnitz* by his Mediation, endeavoured to engage me, against my Will, in new Disputes, about occult Qualities, universal Gravity, the Sensorium of God, Space, Time, Vacuum, Atoms, the Perfection of the World, Supramundane Intelligence, and Mathematical Problems, is mentioned in the Preface to the second Edition of the *Commercium Epistolicum*. And what he hath been doing in *Italy*, may be understood by the Disputes raised there by one of his Friends, who denies many of my Optical Experiments, though they have been all tried in *France* with Success. But I hope that these Things, and the perpetual Motion, will be the last Efforts of this Kind.

Remarks upon some Dissertations lately publish'd at Paris, *by the Rev.* P. Souciet, *against* Sir Isaac Newton's *Chronology*. *By* Edmund Halley, *Astron. Royal, F. R. S.* N°. 397. p. 205.

2. There has been lately put into my Hands a Book published last Year at *Paris* by F. *Souciet*, Jesuit, against Sir *Isaac Newton*'s *Chronology*, without waiting till the Book be published, and without knowing

knowing the Contents thereof, otherwise than by a short Extract, made at the Desire of a very great Person, and without intention that it should be publickly seen. However, a Copy thereof having been (as I suppose) surreptitiously obtained and carried over into *France*, the same was first translated into *French*, and then printed at *Paris* with a pretended Refutation thereof by the same *P. Souciet*. Since then, Sir *Isaac* having answered, as he thought, his Objections, has thereby given him a handle to publish five other Dissertations against the new System of Chronology, as he calls it; the first and last of which, being chiefly Astronomical (since the great Author is no more) seem properly to fall under my Examination, both on account of the Post in which I have the honour to serve his Majesty in quality of his Astronomer, as also from the long Acquaintance and Friendship that had subsisted between the Deceased and my self.

And first, I observe, that *P. Souciet* readily allows what seems to be the most exceptionable part of the whole System, *viz.* that *Chiron* the Centaur fix'd the Colures, in the ancient Sphere of fix'd Stars, in the same Places as *Hipparchus* tells us they had been supposed by *Eudoxus* many Centuries of Years after *Chiron*. His Words are these, ἐν δὲ τῷ ἑτέρῳ κολούρῳ φησὶ κεῖσθαι τοῦ κήτους τὴν κεφαλήν, καὶ τοῦ κριοῦ τὰ νῶτα κατὰ πλάτος. This, undoubtedly, was the Position of the Colure of the Vernal Equinox many Ages before *Eudoxus*; but whether so old as *Chiron*, and the *Argonautick* Expedition, I shall not undertake at this time to enquire; but only observe, that *P. Souciet* in his *Fastes du Monde*, or Abridgment of his Chronology, prefix'd to these Dissertations, makes the *Argonautick* Expedition 1467 Years before our *Æra* of the Birth of Jesus Christ, and the taking of *Troy* 1388 Years before it, which Date is 120 Years sooner than the *Parian* Chronicle, read and publish'd by our Learned *Selden* in his *Marmora Arundeliana*, makes it; and above 500 Years earlier than the time assigned by Sir *Isaac Newton*.

Now both of them making use of the same Premisses, it may seem strange that their Conclusions should be so widely distant: And indeed upon a Prepossession that the *Argonautick* Expedition and the Siege of *Troy* could not have been less than 1000 Years before Christ, I must own, I was at first somewhat prejudiced in favour of *P. Souciet*, taking his Calculations for granted; and not having seen Sir *Isaac*'s Work. But observing that he quotes Sir *Isaac*, as saying, that in consequence of what *Hipparchus* has recorded from *Eudoxus*, the Equinoctial Colure in the old Sphere was about 7° 36′ from the first Star of *Aries*, I was resolved to examine the Matter with due Attention, especially since the Good Father seems to triumph over his Adversary, and to treat a Man of his Figure in the Common-wealth of Learning in a very ludicrous Manner, notwithstanding the several fine things he says of him to palliate it.

I find

I find the Dispute to be chiefly over what part of the Back of *Aries* the Colure past: The Words of *Hipparchus*, as from *Eudoxus*, are simply, that it past over the Back, without saying over what Star, or over what part of the Back it past. And the same *Hipparchus* shews, that if it past over the Star in the middle of the Back, it greatly differed from the Situation thereof in his Time; and conceiving thence that the Æquinoctial Points might have a regressive Motion, he was the first that attempted to define their Motion; but having no Observations older than those of *Timocharis*, made within less than 200 Years of his own Time, and very coarse withal, he was not able to determine the Quantity thereof, but guest it to be about a Degree in 100 Years; which, length of Time, and the more curious Observation of the Moderns, have now proved to be 1° 24′. or rather 50″ *per Annum*.

In a Word, Sir *Isaac* takes the Colure to have past over the Middle of the Constellation of *Aries*, and very near the Star in the Middle of the Back (*ν Bayero*). And *P. Souciet* will have it, that it past over the Middle of the Sign or *Dodecatemorion* of *Aries*, reckoning the Sign to begin with the first Star of the Constellation; and by Consequence his Colure must pass about midway between the Rump and first of the Tail of *Aries* (ε and δ *Bayero*;) which Situation could never be said to be over the Back: But whilst Sir *Isaac* makes the Colure but 7° 36′ from the first Star of *Aries*, which *P. Souciet* makes 15 Degrees from it, the difference 7° 24′ at 50″ *per Annum*, makes 533 Years difference in the Result.

Let us now examine when the Stars in Question did actually pass under the Colure of the Vernal Æquinox, assuming their Places as they are in Mr. *Flamsteed*'s *British* Catalogue, fitted to the beginning of the Year 1690. He places the first Star of *Aries* in 28° 51′ of *Aries* with 7° 9′ North Latitude. And supposing the Obliquity of the Ecliptick 23° 29′, it will be as Radius to the Tangent of 23° 29′ : : so the Tangent of 7° 9′, to the Sine of 3° 7′ $\frac{1}{2}$, the difference of Longitude between the Star and the Point in the Ecliptick which past under the Colure, at the same Time with the Star; so that this Point was, *Anno* 1690 *ineunte*, in ♈ 25° 43′ 30″, and therefore allowing 50″ *per Annum*, the Star was under the Colure 1852 Years before the *Epocha* of the *British* Catalogue, that is, 162 Years before our *Æra* of the Nativity of Jesus Christ; in which very Year *Hipparchus* began to observe the Æquinoxes recorded by *Ptolemy*, *Lib.* III. *Cap.* 2.

If therefore with Sir *Isaac* we add 7° 36′ to the Long. of the first Star of *Aries*, as it was in 1690, we shall have 36° 27′, which the Colure moves in 2624 Years: And deducting 1690 therefrom, we shall have 934 Years before Christ for the *Argonautick* Expedition. And if to 7° 36′ we add 3° 7′ $\frac{1}{2}$ we shall have 10° 43′ $\frac{1}{2}$, that is, 772 Years before the first Star of *Aries* past the Colure.

Next let us inquire when the Star in the Middle of the Back of *Aries* (*ν Bayero*) past the Colure. Its Longitude *Anno* 1690 *incunte*, was 9° 48′ 35″ of *Taurus*, with North Lat. 6° 8′; but by the foregoing Analogy, the Point in the Ecliptick over which the Colure past at the same Time with it, was 2° 40′ ½ before it, that is, in ♉ 7° 8′. Now 37° 8′ give 2674 Years nearly, or 984 Years before Christ, when that Star was under the Æquinoctial Colure, being but half a Century earlier than Sir *Isaac* places the *Argonautick* Expedition; and shews that he took the Middle of *Aries* over which the Colure is supposed to have past, to be the Middle of the Constellation, and not of the *Dodecatemorion*, and in so doing, no doubt, had reason to place this Colure 7° 36′ in consequence of the first Star of *Aries*, instead of 8° 17′, as it was when the Star in the Middle of the Back of *Aries* was under the Colure.

But if with *P. Souciet*, you make the Colure to intersect the Ecliptick 15 Degrees from the first Star of *Aries*, or 43° 51′ from the Æquinoctial Point, as it was *Anno* 1690, we shall have the time nearly 1470 Years before Christ; but then the Colure will be very far from the Middle of the Back of *Aries*, and leave only his Tail to the Eastward, as it leaves the Head of the Whale to the Westward, so as by no means to agree with the Description we have of it from *Hipparchus*; which it were to be wish'd had been more definitive, and as well circumstanced as what *Hipparchus* has left us of the Position of the Colures in his own Time, which upon Examination I find to be very consistent, and the Observations made with sufficient Care.

Thus I hope, I have shewn *P. Souciet*, that there was no Affectation of Mystery in Sir *Isaac*'s placing the Colure 7° 36′ from the first Star of *Aries*, nor any occasion to drole as he does Pag. 131, 132. on that Account; as also that he ought to have deducted 3° 7′ ½ out of the 15 Degrees he assumes for the Distance of his Colure from the first Star of *Aries*, which will bring him 225 Years nearer to Sir *Isaac Newton*'s Time. He is likewise entreated, in the next Edition of his Dissertations to be a little more careful of his Numbers than he has been Pag. 134, 135, and to inform himself in the Sphericks, so as to give us the Right Ascensions of the Stars truly, from their given Longitudes and Latitudes.

Lastly, I would inform him, that the Star in the Centaur which *Hipparchus* describes, as being in his time very near the Autumnal Colure, was not Ψ of *Bayer*, but certainly Φ, and that, *anno incunte* 1690, its Longitude was *Scorpio* 8° 43′ 40″, with South Latitude 27° 59′. But the Colure passing through that Star, by the Proportion given above, cuts the Ecliptick 13° 20′ 50″ in Antecedence of the Star, that is in *Libra* 25° 22′ 50″. But 25° 22′ 50″ give 1827 Years: Wherefore the Time this Star was in the Colure was 137 Years before Christ, when *Hipparchus* flourished, and might very well observe it.

3. When

3. When I gave you my Paper of Remarks on *P. Souciet*'s Dissertations against Sir *Isaac Newton*'s Chronology, I was obliged to take what he was pleased to give us out of *Hipparchus*'s Comment on *Aratus*, not having then that Author himself by me. Since then, by the favour of a very good Friend, having gotten the *Florence* Edition of *Hipparchus*, *Anno* 1567, I find an Argument very much *ad Hominem*, which the R. P. must confess will bring the *Argonautick* Expedition full as low as Sir *Isaac Newton* makes it. *Continued by the same.* N°. 399. p. 296.

P. Souciet in his fifth Dissertation, Page 119, 120, finds out a Star of the first Magnitude, close adjoining to that we now call *the first Star of Aries*, as it is in the Catalogue of *Ptolemy*, where it is said to be in the *Horn of Aries*, and not in the *Ear*. This Star the R. P. supposes long since to have disappeared; but that being of old very considerable, it was from this first Star of *Aries*, the Zodiack began, though for Argument-sake he is contented to let it begin as Sir *Isaac* does, with the aforesaid Star in the Ear or Horn; which *Hipparchus*, in the last and 54th Page, tells us, in his time followed the Equinoctial Colure the 20th part of an Hour: And supposing the Star that has disappeared, to have been at that time precisely on the Colure, it must differ but 45 Minutes of Right Ascension therefrom: But how he comes to make the difference of Longitude 40 Minutes no way appears, and is *gratis dictum.*

In Page 49 of the said *Florence* Edition, *Hipparchus*, treating of the rising and setting of the Constellations, tells us, that that of *Aries* began to rise with 18 ½ Degrees of *Pisces* in the Ecliptick, and was wholly risen with the 24th Degree of *Aries*, whilst the Zodiack past the Meridian from 23 ½ Degrees of *Sagittary* to 14 Degrees of *Capricorn:* And again (Page 52) he says, that the Constellation of *Aries* began to set with the 29th Degree of *Pisces*, and was wholly set with the 26th Degree of *Aries*, whilst the Zodiack past the Meridian from 29 Degrees of *Gemini* to 29 Degrees of *Cancer*. He tells us also that it was the very same Star that both rose and set first in that Constellation, calling it ὁ ἐπὶ τοῦ ἐμπροσθίου ποδός, Page 49: And again, Page 52 'tis named ὁ ἐν τοῖς ἐμπροσθίοις ποσίν, or *that in the Fore-feet* of the Ram.

This certainly is the Star P. *Souciet* would place on the Equinoctial Colure, and makes it long since to have disappeared; without enquiring whether the aforesaid *Data* were not abundantly sufficient to determine its place in the Zodiack at that Time; and without regard to the odd uncouth Posture he must suppose the Constellation of *Aries* to be in, when he makes one or both of the Fore-feet so near to, and above the Horn or Ear.

Hipparchus expressly says, that it rose when 23 ½ Degrees of *Sagittary* was on the Meridian, and set when 29 Degrees of *Gemini* past it; and take the Middle between those Points, it is plain, that it

culminated with about 26 Degrees of *Pisces*, and that it had North Declination; the Excess above 180 Degrees shewing that the Ascensional Difference was about 2 $\frac{3}{4}$ Degrees. But to give the Argument its full Scope, the right Ascension of 23 $\frac{1}{2}$ of *Sagittary* (allowing *Hipparchus*'s Obliquity 23° 51′ 20″) will be found 262° 54′. And that of 29 Degrees of *Gemini* will be 88° 54′: So that this Star was above the Horizon (in the Latitude of 36 Degrees North; to which *Hipparchus* has adapted his Calculation) 12 Hours 24 Minutes or 186 Degrees; whence the Right Ascension of the Star is justly concluded 355 Degrees 54 Minutes; and its Ascensional Difference precisely 3 Degrees; which in that Latitude makes its Declination 4 Degrees 7 Minutes North. We have therefore gotten both the Right Ascension and Declination of this supposed first Star of *Aries*.

Let us now see what Longitude and Latitude results from the aforesaid Right Ascension with 4 Degrees 7 Minutes North Declination, assuming the Obliquity with *Hipparchus*, to have been 23° 51′ 20″; and we shall by a just Computation, find the Star at that time to have been in 27° 53′ of *Pisces*, with 5° 24′ North Latitude, which therefore was reckoned the Place of the Star at that time by *Hipparchus*. Add 2° 40′, for 265 Years between *Hipparchus* and *Ptolemy*, and we shall have its Place, in *Ptolemy*'s Account, *Aries* 0° 33′, with 5° 24′ North Latitude. But the 22d Star of *Pisces* in *Ptolemy*'s Catalogue has the same Longitude and Latitude, with sufficient exactness, *viz.* *Aries* 0° 40′, with North Latitude 5° 20′, and is *Media trium in Lino Boreo Piscium* (η *Bayero.*) Hence it cannot be doubted but that this Star which *P. Souciet* takes to have been once a Star of the first Magnitude, was no other than the said 22d of *Pisces*, which in the *British* Catalogue, fitted to the Year 1690, is put down in *Aries* 22° 29′ $\frac{1}{3}$ with North Latitude 5° 21′.

How *Hipparchus* came to reckon this Star to be in the Fore-foot of *Aries*, does not at present appear; but it is not unlikely that these Commentaries of his upon *Aratus* were written some time before he set about making his Catalogue of the fixed Stars; when he might change his Opinion, and replace it in the *Line* of the *Fishes*, to which it seems more properly to belong.

Be that as it will, we will for once, suppose with *P. Souciet*, this Star to have been in the Beginning of the Zodiack, or of the Constellation of *Aries*, and that at the time of the first fixing the Colures, that of the Vernal Equinox past 15 Degrees in Consequence thereof. Now *anno ineunte* 1690, this Star being in *Aries* 22° 29′ $\frac{1}{3}$, if we add thereto 15 Degrees, we shall have *Taurus* 7° 29′ $\frac{1}{3}$, for the Point in the Ecliptick that was then the beginning of the Zodiack. Now 37 $\frac{1}{2}$ Degrees, at 50 Seconds *per Annum*, gives 2700 Years; from which deducting 1690, we shall have 1010 Years before Christ. But this Star having 5° 21′ North Latitude, the Colure, when

when it past over it, intersected the Ecliptick in 2° 20′ less Longitude, which gives the time 168 Years later, or but 842 Years before Christ. So that *malgré cette* grande *decouvérte*, the new System of Chronology is so far from being refuted, that it seems to be very much confirmed thereby, at least in the Opinion of the R. *Pere*.

I have assumed the Latitude to which *Hipparchus* might have adapted his Calculations, to be 36 Degrees; because I find in Page 14. of the aforesaid Edition that he makes the longest Tropical Day 14 h. 30′: And in Page 29, he tells us, that the Southern Star in the left Foot of *Bootes* (*υ Bayero*) having 27° 20′ North Declination, was above the Horizon, 14 h. 57′; whence it follows, that the Latitude must be 36° 5′. He also tells us, in the same Page 29, that this Star set when 22° of *Capricorn* culminated, and 6° of *Taurus* ascended; repeating the same thing in Page 39, which leaves no room to suspect that those Numbers are not the same that *Hipparchus* had computed. I therefore thought it worth while to enquire in what Latitude 6 Degrees of *Taurus* rises when 22 Degrees of *Capricorn* is on the Meridian; and with the Obliquity of the Ecliptick, as now we have it, the Latitude resulting is 35° ½ North; but with the Obliquity allowed by *Hipparchus*, it will be found less than 35°.

This I say, only to obviate any Objection that may be made by *P. Souciet* to the foregoing Argument; though if he pleases to examine it, he will find that an Error of a Degree in the assumed Latitude, will by no means invalidate the Proof here given that this *First Star of Aries*, could be no other than the middle Star *in Lino Boreo Piscium* marked η by *Bayer*.

II. The *Chinese* Original from which the Translation was made, is owing to the learned *Nien hi yao*, a *Tartar*, illustrious by Birth and Merit, and Viceroy of *Canton* in the Year 1724 ‖: For the *Tartars*, since their Conquest of *China*, are become well versed in Sciences, and especially in the History of the Empire they conquered. Yet this Gentleman is not the Author of the Chronological System he has here drawn up. He himself tells us, he has taken it from the most valued historical Work in his Country †. What renders this Writer Praise-worthy, is his ranging his System in a beautiful

An Explanation of the new Chronological Table of the Chinese History, *translated into* Latin *from the Original* Chinese *, *by Father* Joh. Franc. Foucquet, *Soc. Jes. Bishop of* Eleutheropolis, *published at* Rome *in* 1730. *Collected from* 2 *Accounts thereof, written in* French, *one sent from* Rome *by Sir* Tho. Dereham, *to the R. S. the other from F.* Foucquet *to F.* Eustache Guillemeau, *a* Barnabite *at* Paris, *and by him transmitted to Sir* H. Sloane. N° 415. p. 397.

* *One of the Original* Chinese *Tables printed at* Canton, *was presented to the Society by Sir* Tho. Dereham, *and is now reposited in their Library.*

‖ *His Father possessed the like Post, and in the Year* 1722, *his Brother was* Tsong Tou *of two Provinces, a more considerable and more important Employ than that of Viceroy.*

† China *is now the Country of these* Tartars *who were born there since the Conquest, that is about ninety Years since.*

tiful Order, which gives an extream Facility of seeing at first Sight the Series of the Dynasties, or Imperial Houses, the Names and Succession of the Emperors, the Beginning, End and Duration of each of their Reigns. However, this is not the only Advantage of this new Table: The ancient Chronology of *China* is therein reduced to its true Beginnings. The most remote Epoque of this Chronology, according to this Author, does not surpass the first Year of a Prince called *Guei lie wang*, who began his Reign 424 Years before the vulgar Æra. Some there are, who think this Epoque might still be brought nearer to us; not to fix there the Origin of the Nation, which, for strong Reasons, may be traced back to Time near the Deluge; but because from much later Date only, doth any Certainty appear, of whatever is pretended to have befaln this famous People. * *Se ma quang* and *Tchu hi*, the two gravest Historians *China* has produced, were of this Opinion. The first flourished in the Year of Christ 1061 †; the second about the End of the twelfth Century ‖. They have both omitted whatever is before the Time of *Guei lie wang*, nor would they mention ought of it in their Histories: Nay, they have not begun them till the 23d Year of *Guei lie wang*, somewhat later than *Nien hi yao*, who begins with the first of this Prince's Reign. It is on the Example and Authority of these two illustrious Philosophers that *Nien hi yao* has relied in suppressing what precedes. By fixing this Epoque at *Guei lie wang*, fabulous Times, and a thousand Errors and Absurdities current in *Europe* concerning three Imperial (absolutely imaginary) Families, and Reigns anterior to, but no less chimerical than these Families, are retrenched. These Errors will soon vanish of their own accord; so that the Subject of so much laborious, but useless Lucubration and Study, will at length cease: a worthy Motive for congratulating the learned World.

This is not all; we are still particularly obliged to the ingenious *Tartar*, for having found Means to place in his Table the Cycle of 60 Years, called *Kia Tse*, so much esteemed by the *Chinese*, that it is as the Foundation of their whole Chronology: a Point which requires Explanation. As we mark the Incidents of ancient History by the Years of the Olympiads, so the *Chinese* mark what has happened in their Country by the Years of this Revolution. According to the *Chinese*, the Prince under whom the great Wall was finished, began his Reign the 52d Year of a Cycle, which is found to be the 4th in this chronological Table, reckoning from the Cycle of the general Epoque inclusively. This general Epoque, is the first Year of *Guei lei wang*. Every Year of the *Chinese* Cycle is marked by two Letters, which make up its proper Character, and distinguish it from the other 59. Thus the first Year is called (1) *Kia Tse*, and gives its

Plate I.

* Se ma wen, *or* Sema wen Kong. † Sœculo 11º vel 12º. ‖ Sœculo 13º.

its Name to the whole Cycle. Thus the 52d Year of the 4th Cycle, in which the Prince, who finished the great Wall, began his Reign, is called (2) *y mao*. This Prince, after bloody Wars, became Monarch of *China*; and then abandoning himself to such impious Pride, as the Philosophers reproached him with, caused himself to be called (3) *Chi hoang Ti*, that is, *the first Master, the first Emperor reigning of himself*; for this is the real Signification of these Characters well analysed; and those glorious Titles belong to God alone in the ancient Monuments. This unheard of Usurpation happened in the 26th Year of his Reign, which is the 17th of the 5th Cycle, and is there called (4) *Keng Chin*. It is thus that all the Years of the Emperors, for above 2000 Years, have Names in History common to them with the corresponding Years of the Cycle: And these Names common to both, are a Sort of Link which unites the Years of the Emperors to the Cycle, and thereby prevents Confusion. Hence we see how the Cycle among the *Chinese* is the Basis of all their Chronology.

Here a Question naturally arises, concerning the Signification of these Characteristics, which distinguish the Years of the Cycle and Emperors: It is to be wished it were as easy to answer this Question as it is natural to propose it: But it regards Characters so infinitely different from ours, that their Nature or Origin have never been well extricated, nor has there been any Principle hitherto established for their Explanation. We must remark, 1. That it is not possible to give these Names any Translation. 2. That these Names are composed of 2 Sorts of Characters * very famous among the *Chinese*, who get them by Heart in their Youth, and employ them on a thousand Occasions. These of the first Sort are ten in Number, and are called the *Year-Letters*; these of the second, twelve, and are named *Hour-Letters*. 3. That these two Sorts of Characters are combined, by repeating the ten *Year-Letters* six times, and the twelve *Hour-Letters* but five times; and from this Combination result 60 Names for the Years that compose the Cycle. These three Points well comprehended suffice for the Use and Understanding of the chronological Table.

The *Chinese* pretend that these 22 Letters were invented by a very ancient King, whom they name (5) *Hoang Ti*, in order to determine the Beginning, Progress, End, and successive Periods of a great Year; for they have one which includes a certain Number of Ages, though its total Duration be no where distinctly marked. They say the great Year is successively at *Kia*, at *y*, and at *Ping*. Now it is no easy Matter to determine the Extent of these different Parts of the great Period (for there is room to conjecture that they are unequal) how long, for Example, lasts that which commences at (6) *Kia*, that at (7) *y*, and so of the rest; nay, it is perhaps impossible, for want of certain Principles, the Knowledge of which is entirely lost. When

* *See the Characters in the Plate.*

When the Year was at *Kia*, which seems to signify when it began, this Point of Time, according to Tradition, is called (8) *O fong*; when it was at *y*, this is called (9) *Tcheou Mong*; when at (10) *Ping*, the Name given to it was (11) *Jeou Tchao.* Every one of the other 19 Letters has in this manner a Word for its Device; but as it is plain, that all these Words are very strange to *European* Ears, and that those which remain are as obscure and barbarous as *Kia Tse*, *Y mao*, *Keng chin*, it is best to omit mentioning them. Nevertheless one should not easily believe that these Words are void of all Meaning, or that the Letters, whose Names they are, are Figures made at Hazard, or arbitrarily imagined. The Inventor of these Names must have proposed to himself some End. It is already known in general, and is demonstrated, elsewhere, that the Characters preserved by the *Chinese*, but much more ancient than them, are true Hieroglyphicks. It is likewise known, and strongly demonstrated, that the Doctrine veiled under the Appearance of these Hieroglyphicks, is very mysterious and sublime: And it is unreasonable to regard as Nonsense, and reject such as we understand not, purely because we do not understand them. And indeed when we closely examine the 22 Letters in Question, we perceive in several of them somewhat very mysterious, with which the *Chinese* themselves present us, without understanding them, For Example, (12) *Tse*, the first of the *Hour-Letters*, signifies with the *Chinese* both the Moment of Midnight and a tender Babe just born (wrapt up in his swadling Cloaths.) *Ou*, the 7th of the *Hour-Letters*, signifies the Moment of Noon, and a Man lifted on a Cross. This Letter signifies Noon, according to the Primitive Meaning, which still subsists without ever having been disused. It also signifies a Man lifted on a Cross, as is evident to the Eye of any Person, who has the first Tincture of the Characters. I know some Difficulty may be raised on this Point, but it shall be resolved in its proper Place. Where have this People got such Ideas? They are incomprehensible to them at present, and yet (it is strange) they preserve them preciously, and use their utmost Endeavours to find out the Sense of them, but to no Purpose. It will encrease the Surprise to reflect on a *Chinese* Axiom, the Sense whereof is, that the Heavens opened at the Hour of *Tse*, which according to the foregoing Exposition, ought to be understood of the Moment of Midnight. And in order to raise the Admiration a Degree higher, *Tse*, which signifies an Infant, is literally and properly used to signify *Son.* Now let the Reader give Attention to the surprising Words of a *Chinese* Writer on this Son. "(13) The first "Instant, says he, of the Production of Things, their Principle "and Origin came from the Son. The Son is the Cause by which "all Things had a Beginning." When the Year is at (12) *Tse*, that is called (14) *Kouen Tun.* This *Kouen*, in the common Acceptation, signifies Work, Pain, Grief. *Tun* signifies being reduced

to

to great Anguish. The Application of these Words to the tender Babe, to the Son lately born, produces a Meaning, which by being too intelligible and too beautiful, raises Wonder. When the Year is at *Ou*, it is called (15) *Tun Tsang*. We have seen that *Tun* signifies Anguish, Affliction. To have the true Signification of *Tsang*, Recourse must be had to the Analysis, as on infinite other Occasions. The Analysis gives (16) *Yang*, the Emblem of a Lamb, and (17) *Tsang*, which signifies to divide, to pierce. Thus at the Hour of Noon, marked by (18) *ou*, that is, a Man on a Cross, the Lamb was pierced. This so useful Cycle, which in the printed History is a certain Rule to fix Time, the ingenious *Tartar* has disposed in his Table with such Art as renders the Relation of the Years of the Cycle to the Years of the Emperors very sensible; whence spring great Advantages that are very visible to whoever attentively considers the Table, and penetrates into its Arrangement. In the Front of the Table appears a Line writ in Capital Letters, which extends Horizontally from Right to Left: This Line contains, according to the Order of their Succession, the Names of 21 Dynasties, or Imperial Families, who have reigned since four Centuries before *Jesus Christ* unto this Time. These Names placed exactly on the Lines, where are the Beginnings of the Dynasties to which they belong, are as sure Guides for easily finding them, and under the Direction whereof one comes without Difficulty to the Knowledge of the Emperors of these Imperial Families, as well as the Incidents of their Reigns. This Cycle is placed in the Middle, in a perpendicular Line or Column, which extends from the Top to the Bottom of the Table, and is divided into 60 little Lodges or square *Area*'s, every one of which answers a Year of the Cycle, and contains the Name of the Year it answers. The Angles, or empty Spaces which surround the Name in each of these Lodges, were coloured black, that the whole may the more readily strike the Reader's Eye, and be the more easily distinguished. On the Right and Left of the Cycle thus placed are ranged 20 other Columns, divided into 60 Lodges each, in the same manner as the Cycle; and consequently equal to the Cycle to which they are parallel. It is in the Lodges of these Columns parallel to the Cycle, that the Years of the Emperors are disposed in their natural Order for above 2000 Years. They are disposed from Top to Bottom, from the Right to the Left, after the *Chinese* Custom; but to avoid Mistake, I mean the Right and Left to the Person who reads the Table. And it is essential to remark, that the Arrangement is such, that each of these Imperial Years referred to the Column of the Cycle by a horizontal Line which falls at right Angles on this Column, answers the Year of the same Cycle, whose Name it bears in History *. Pursuant to this Explanation, the first Year of the Prince named *Guei lie wang*, at which begins the Table, whereof that is the Epoque, will be found in the first Column at the right Hand,

* *The blank Columns at the End are left to put down the future Emperors as they shall succeed.*

pretty near the Bottom, under the Author's small Preface; and opposite to the 53d Year of the Cycle called (19) *Pin chin*; because in History this first Year of *Guei lie wang* has the two Letters *Ping chin* for its Characteristick. The Reason why this first Year of *Guei lie wang* is taken for the general Epoque of the whole Table, is, because there is neither Clearness nor Certainty in the History before it: But if, because this first Year of *Guei lie wang* is taken for an Epoque, it were placed opposite to the first Year of the Cycle, it would occasion an Anachronism of 53 Years. A capital Point, to which those, who intend to use this chronological Table, cannot give too much Attention. In a Word, since History has given this first Year of *Guei lie wang* the Name of *Pin chin*, it is not allowed to give it any other in the Table; and one is obliged to refer it therein to the Year of the Cycle that bears that Name, to avoid confounding Time, and puzzling Chronology. It is in this Arrangement that all the Artifice of this new Table consists. And this Point once well understood, is a Key which gives Entrance into all the rest.

The Characteristick Names of the 60 Years which compose the Cycle, do by their Connection with the Years of the Emperors determine the precise Time of Incidents. Hence arises Clearness and Certainty in the *Chinese* Chronology; for these Characteristicks contribute to the Discovery of Errors, which either the Ignorance and Neglect of Copyists and Printers, or the Want of Attention in Authors, often introduce into Chronology. For Example: In the chronological Table of the *Chinese* Monarchy, printed at the End of the Work, whose Title is, *Confucius Sinarum Philosophus*, it is said, that *Chi hoang Ti* *, in the 24th Year of his Reign, built, or (to speak more accurately) finished the great Wall; and consequently the burning of the Books is placed in the same Emperor's 25th Year. Now according to History, the great Wall was finished in the Year of the Cycle called (20) *Ting hai*, a Name that can agree only with the 33d Year of this Emperor's Reign. As to the burning of the Books, it is marked in History in the Year (21) *Vou Tse*, which necessarily answers the 34th Year of this evil Prince.

Thus these Characteristic Names of the Years that compose the Cycle, are as a Touch-stone, that is of wonderful Service for distinguishing Truth from Falsehood, and re-establishing Order when disturbed. This Cycle removed, the Years of Emperors might be very easily confounded, by augmenting or diminishing their Number. When an Emperor is newly come to the Throne, if the first Year of his Reign be reck-

* Vide Monarchiæ Sinicæ tabulam chronologicam, p. 24, & 25. Chi hoang Ti, anno Imperii 24° murum celeberrimum 400 & ultra leucarum extruxit contra Tartarorum eruptiones: anno 25° libros omnes præter medicos & judiciarios cremari jussit.
(Chi *should be pronounced like our* English She.)

reckoned that, wherein his Predeceſſor died, it is placing two Years in one; becauſe according to the *Chineſe* Cuſtom the Year, wherein an Emperor ends his Reign, is wholly attributed to him, though he died in the Beginning of the firſt Month; and his Succeſſor is held to reign only from the Beginning of the enſuing Year. Yet this Cuſtom, tho' very common, is not ſo univerſal, but that ſome Emperors have derogated from it. The *Tartarian* Emperor *Tchang hoang Ti*, Founder of the Dynaſty now reigning, cauſed the Year, wherein *Hoai Tſong* had murdered himſelf, to be taken for the firſt Year of his Reign, which was the ſeventeenth and laſt of this laſt Emperor of the *Mings*. If, according to Cuſtom, this 17th and laſt Year of *Hoai Tſong* were diſtinguiſhed from the firſt of *Tchang hoang Ti*, it would be making two Years of one, which would confound Time. Reſume the Cycle, apply it to the Years of the Emperors, and theſe Errors will appear of themſelves. You will ſee that the Year wherein *Hoai Tſong* died was called (22) *Kia Chin*; that that, wherein *Tchang hoang Ti* began his Reign, was likewiſe called *Kia Chin*: therefore they are the ſame Year. If it were made two, the Miſtake would be found at firſt Sight, and ſhould be corrected.

Under the (23) *Yven* thoſe occidental *Tartars*, whoſe Domination over *China* began in the Year 1280, and ended in 1368, the Emperor *Wen Tſong* died in 1333: *Ning Tſong* his Succeſſor reigned but ſome few Months, and *Chun Ti*, who ſucceeded *Ning Tſong*, mounted the Throne towards the End of the ſame Year. Three Years may be eaſily made of this one, in order to place the three Princes juſt named. But whoever makes uſe of the Cycle need not fear the Miſtake. The Deaths of the two firſt Emperors, and the Acceſſion of the third to the Throne, are three Incidents, which Hiſtory refers to the Year of the Cycle named (24) *Quei yeou*. And this Characteriſtic Name is a Link that binds them all together, ſo that it is no longer poſſible to ſeparate them.

Another Property of this new Table, no leſs remarkable or uſeful than the foregoing is, that it lays before the Eye all the Names of the particular Epoques aſſumed by the Emperors of *China* for near 2000 Years. For *Han uou Ti*, the firſt who took this ſort of Epoque, began his Reign 140 Years before *Jeſus Chriſt*.

No body, to the beſt of our Knowledge, has given *Europe* a ſufficient Account of the Nature of theſe Epoques, though they are very well worth explaining. The Emperors of *China* have a particular Cuſtom, little known in *Europe*, which, if Care be not taken, would infallibly ſpread Darkneſs and Confuſion over Chronology and Hiſtory. It is not allowed to pronounce the proper Name of any Emperor during his Life, which is looked on in ſome Meaſure as ineffable. This Reſpect continues even after their Deaths; for then it is not by their proper Names they are mentioned, but are conſecrated (if we may uſe the Term) by a Surname, which is a ſort of Character of

Canonization. And under this Title are they received into the Burying-place of their Ancestors, and afterwards ranked in History. But in their Life-time, to supply the Name that dare not be pronounced, they themselves, in Imitation of *Han uou Ti* already mentioned, choose and determine a Term that serves for an Epoque to the Incidents of their Reign. This Term we call Epoque, because it is from it the Years of Emperors are reckoned, and to it is referred every thing that falls out during these Years. Examples will make these Things easy to comprehend. The famous Emperor who died *Dec.* 20, 1722, after a Reign of 61 Years, had the Letter (25) *Hiuen* for his proper Name. During his Reign, this Letter was not to be put into any publick Memorial, Book or Writing. The Letter (23) *Yuen* was substituted in its Room, because it would be a kind of Prophanation to employ for common Use the Name of a Prince, who stiled himself (25) *Son of Heaven.* After his Death his 4th Son, who succeeded him, gave him for Title of Canonization, the glorious Surname of (27) *Ching Tsou gin hoang Ti*; as much as to say, *the holy Ancestor, the august, good and merciful Emperor* *. It is under this Surname that he has been interred among his Ancestors, and it is under the same that History will make mention of him for the future. Upon his ascending the Throne after a Father who had conquered *China*, he assumed for the Epoque of his Years the two Letters *Kang hi*, the Sense whereof is *Solid Peace*, or *lasting and glorious Tranquillity.* Thus because in the † 38th Year of his Reign he conquered by his Generals a Prince of *Tartary* named *Kaldan*, this Victory is said to be gained the 38th Year of *Kang hi*, or of *the lasting and glorious Tranquillity.*

The Letters (28) *Yn Tchin* compose the Name of his 4th Son, who now reigns; wherefore the Use of these Letters is and will be prohibited until a new Government. As to the Title of Canonization, by which this Prince is to be recorded in History, it will not be given him till after his Death. But upon his Accession to the Crown, as he had a great Number of Brothers and Nephews, he took for Epoque of his Years the two Letters (29) *Yong Tching*, which signifie *Direct Concord*; to give to understand, that if his Brothers and Nephews pay him the Respect and Submission they owe him, he would treat them with Kindness. The Empress his Mother died some few Months after he began his Reign; so the Death of this Princess will be marked in History in the first Year of *Yong Tching*, or of the *Direct Concord.* Thus will all other Incidents be fixed by the

* *This Character* Gin, *which I have translated* gracious and merciful, *signifies* Charity: *It also expresses sometimes* the Conjunction of all Virtues: *And it may bear that Sense here.*

The Character Hoang (27 *) *when analysed, is found to be composed of* Tse, *which signifies* of himself, *and* Wang, *which translated is* Reigning.

† *In the thirty-fifth.*

the Years of the *Direct Concord* in which they will happen. It is plain from these Examples, that the Names of Emperors, and the Names of their Epoques are essentially different, and that those of the Epoques comprehend very instructive Meanings, the understanding which must be of great Service to the clearing up of History. But there is great Danger lest the Name of an Epoque be made the Name of an Emperor, which would double the Number of Emperors, supposing even that each of them had taken but one Epoque during his Reign. No *European* Writer, that we know, has faithfully given them all: But this Table presents us with an exact and entire Series of them. And yet it is a thing much to be wished for, to have a faithful Explanation of them; a Work which would engage one in a Review of the whole History, but will be undertaken nevertheless, if we find room to hope, that it will not be disagreeable to the Learned. The Inconveniency is, that a great Number of Emperors have often changed these Names of Epoques. This Inconveniency is not found in the Dynasty now reigning; but in the more ancient it is a very common Disorder. *Han uou Ti*, who first introduced the Use of Epoques, assumed, during his 54 Years Reign, to the Number of 11 very different Epoques. Several others have followed his Example, which cannot but cause a great deal of Confusion in History, if one happened to imagine, as it is natural enough to do, that these Names of Epoques are the Names of so many Emperors. It was of Importance to clear up these Things thoroughly; this the Table does: And to avoid Mistake, Care has been taken to have the Emperors Names or Titles engraved in large Characters, and those of the Epoques in small Letters. Moreover, when an Emperor, not content with one Epoque, has taken several, Notice is given of it by a Star placed on one Side of the first.

In short, to leave nothing conjectural, as often as a Reader considering this Table, shall find two separate Ranks of Figures opposite to one another in a Series of several Lodges, denoting different Numbers, he is to remember, that these Figures mark the Years of Emperors of two Families, which dispute the Empire, one of which being soon to perish, will give room to the other to ascend the Throne. The Column found under the Title *San Koue*, that is to say, *the three Kingdoms*, is an Example hereof. This Title of three Kingdoms denotes the Time when *China* was divided into three different Parts; and the Column, on the Top of which is found that Title, in the Order of the Dynasties is the twelfth, reckoning from the first at the Reader's right Hand inclusively. We see in the 43d Lodge that the first Year of the Epoque *Tai ho* assumed by the Emperor *Ming Ti*, of the Family called *Guei*, answers to the fifth Year of the Epoque *Kien hing* assumed by *Heou Tchu*, Emperor of the *Han's*: The second Year of the Epoque *Tai ho* answers to the sixth of the Epoque *Kien hing*, and so of the rest that follow. The Reason is, that the Empire

pire was at that Time torn in Pieces by bloody Wars: The *Guei*'s were getting the upper Hand, and the *Han's* very near their Ruin.

As to a great Number of Lodges that have but one or two Figures, without any Account of Hiſtory, they are unpleaſing Blanks, which however the *Chineſe* matter not, ſatisfied to have an exact Series of their Emperors Years in theſe Lodges. But ſuch Blanks may be filled by inſerting ſome conſiderable Incidents of Hiſtory, as ſome few have already been in the *Latin* Edition, *viz.* the building of the great Wall, the burning of the Books, the *Chriſtian* Æra, the Introduction of the Chriſtian Religion into *China*, the Appearance of a Star ſeen in the Heavens upwards of 70 Days *, the true Year in which our Saviour was born, *&c.* If this Addition pleaſe the Learned, it will be no difficult Matter to add ſeveral other Incidents unknown in *Europe*.

The principal Advantage of this Table is, that conformably with the moſt valued Hiſtory, it fixes the true Epoque of the *Chineſe* Empire to four Centuries or thereabouts before the Birth of our Saviour. By the true Epoque of the Empire underſtand not the Beginnings of the Nation, which is credible (as we have remarked before) remount to the next Ages after the Deluge; but the Beginning of the Monarchy, which is the Time, when the Incidents that happened in this Nation, appearing grounded on certain Proofs, deſerve the Credit of learned Men. This important Point once cleared up, ought to put an End to the Diſputes of the Learned on the fabulous Antiquity of *China*.

Some Amendments and Additions to the Account of Things found under Ground in Lincolnſhire, *in the* Tranſact. N° 279. *By Mr.* Ralph Thoresby, *F. R. S.* N°. 377. p. 344.

III. Whereas there is ſome Difference betwixt the Accounts of the Depth of the Things found; that in the Letter, *Sect.* 5, accounting it to be about 8 or 10 Foot, and that in the Letter, *Sect.* 4. to be 12 or 14 Foot deep; the Reader may pleaſe to underſtand, that the Depth was not meaſured, but conjectured, and accounted for according to the Relator's beſt Remembrance. That which makes the Depth the greater being that of *Sect.* 4. (firſt placed, but laſt writ) was writ upon Information (but by Conjecture alſo) of another that lived near the Place, and viewed it often. But the Difference may eaſily be accommodated or ſalved, by ſuppoſing (which will not be far from Truth) that when the Labourers or Dikers firſt diſcovered and encountered the Jetties and other Things there found, it might be about the Depth of 8 or 10 Foot; but the Bottom of them, when they came to be all taken up, might be at the Depth of about 12 or 14 Foot, as in the other Relation.

Take notice alſo, concerning what is ſaid *pag.* 1159. *lin.* 14. that ſome very judicious Perſons ſay, that the Stones which the Spectators ſaw at the Botton of *Hammon Beck*, were ſuch as the Dikers had firſt thrown out, (when they were taking up the old Goat) and were fallen

* *The* Chineſe *ſay of this Star, that it was a Sign of Renewal in the World.*

The Year Letters.	The hour Letters.
1 甲 Kia.	1 子 Tse.
2 乙 y.	2 丑 Tcheou.
3 丙 Ping.	3 寅 Yn.
4 丁 Ting	4 卯 mao.
5 戊 Uou.	5 辰 Chin.
6 己 Ki.	6 巳 Se.
7 庚 Keng.	7 午 ou.
8 辛 Sin.	8 未 Wei.
9 壬 Gin.	9 申 Chin.
10 癸 Kuei.	10 酉 Yeou.
	11 戌 Sio
	12 亥 hai.

(1) 甲 Kia. 子 Tse.

(2) 乙 y. 卯 mao.

(3) 始 Chi. 皇 hoang. 帝 Ti.

(4) 庚 Keng. 辰 Chin.

(5) 黄 hoang. 帝 Ti.

(6) 甲 Kia.

(7) 乙 y.

(8) 閼 o. 逢 Fong.

(9) 旃 Tchcou 蒙 Mong.

(10) 丙 Ping.

(11) 彔 Jeou. 兆 Tchao.

(12) 子 Tse. 午 ou.

(13) 生 物 之 初 其 本 原 昔 芒 子 子 子 者 黄 物 之 所 始 也

(14) 困 Kouen. 敦 Tun.

(15) 敦 Tun. 牂 Tsang.

(16) 羊 Yang.

(17) 丑 Tsang.

(18) 午 ou.

(19) 丙 Ping. 辰 Chin.

(20) 丁 Ting. 亥 hai.

(21) 戊 Uou. 子 Tse.

(22) 甲 Kia. 申 Chin.

(23) 元 Yuen. 癸 quei. 酉 Yeou.

(24)

(25) 玄 hiuen.

(26) 天 Cæli. 子 filius.

(27) 聖 Ching. 祖 Tsou. 仁 gin. 皇 hoang. 帝 Ti.

(28) 胤 yn. 禎 Tchin.

(29) 涎 yong. 正 Tching.

(*) 丘 Tse. àse. 王 Wang. Regnans

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