

Legends no histories, or, A specimen of some animadversions upon The history of the Royal Society : wherein, besides the several errors against common literature, sundry mistakes about the making of salt-petre and gun-powder are detected, and rectified: whereunto are added two discourses, one of Pietro Sardi, and another of Nicolas Tartaglia relating to that subject. Translated out of Italian. With a brief account of those passages of the authors life, which the virtuosi intended most to censure, and expatiate upon ... Together with the Plus ultra of Mr. Joseph Glanvill reduced to a non-plus, &c; / By Henry Stubbe.

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STUBBE
GLANVILLE
PHILIPPS

1671 ETC







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- 1-3) STUBBE, H. 1) A censure. 1671.
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5) PHILIPPS, F

Pt ii of no. 2 (The Plus Ultra reduced to a
non plus) formerly placed after Campanella
revived. Moved to follow pt. i 1991 (Sept)
Lacks: a1 (blank) (a3 is mis-signed a2) Present in
T.p. 'A specimen of some animadversions'
(between b4 and A1 in 42693)
H. 29/11/06 (10)

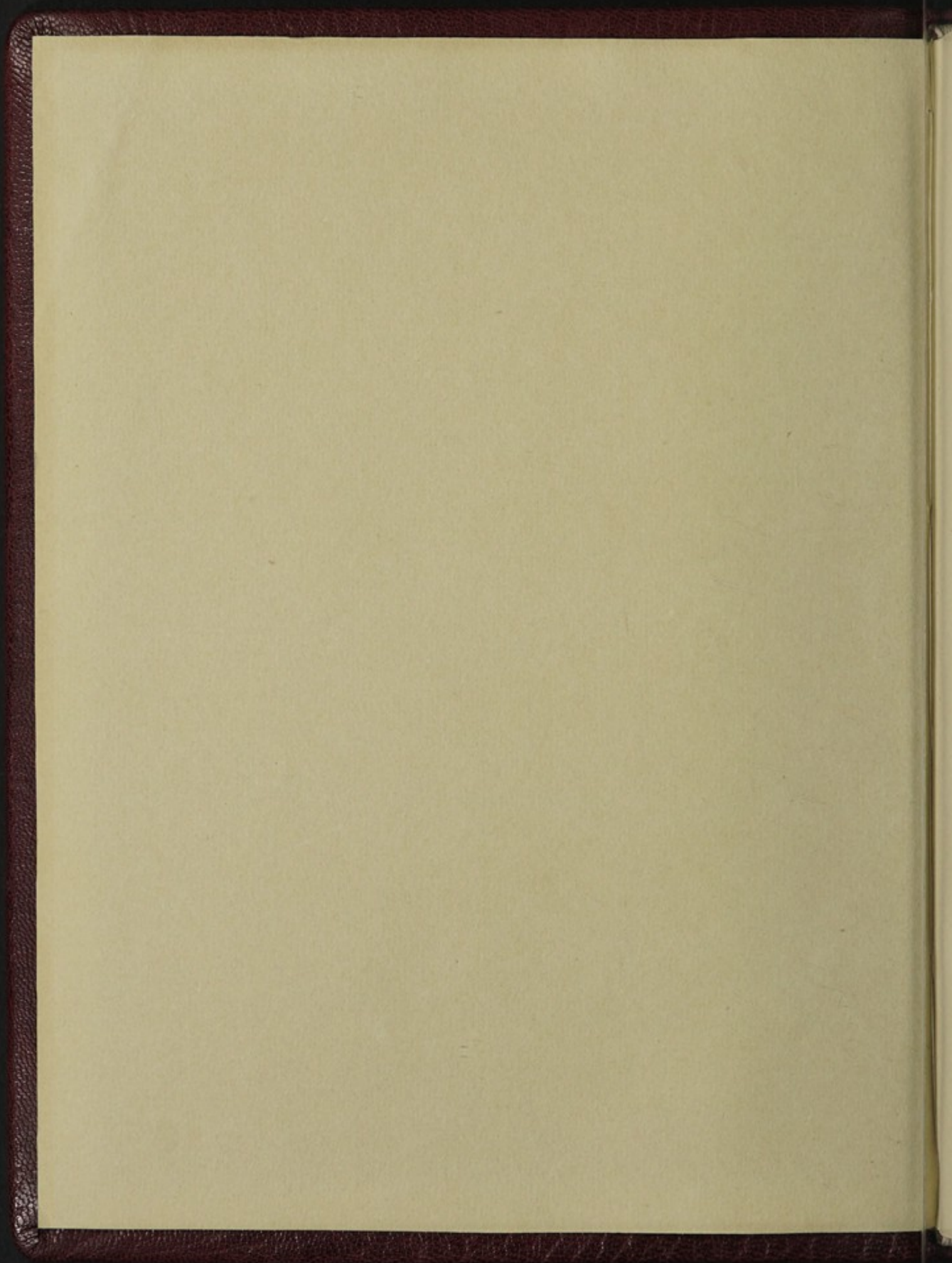
Legends no histories

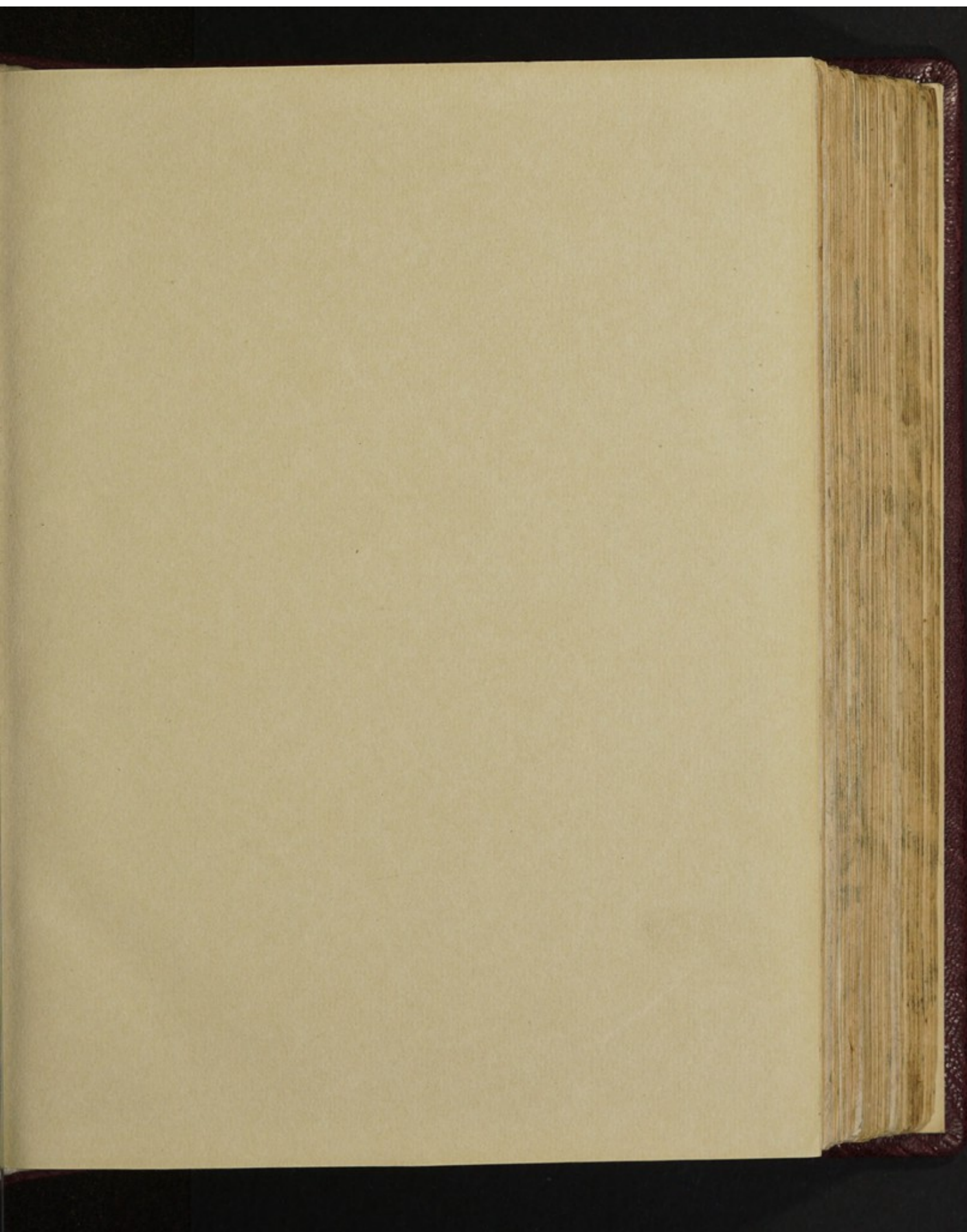
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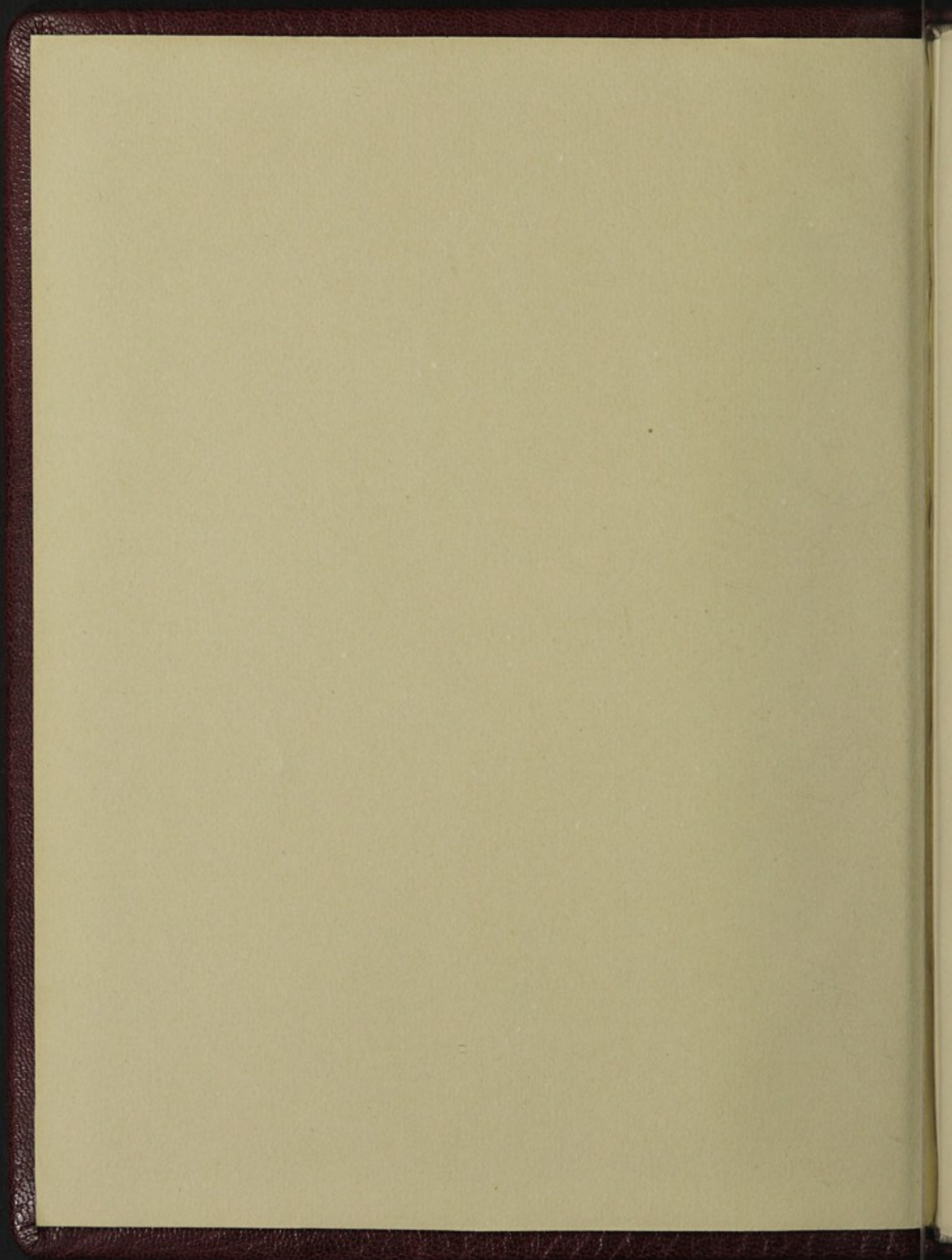
Sig b (between pp 16 and 17) (1 leaf)

Sig D4 (pp 23-24)

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Legends no Histories :

OR, A

SPECIMEN

Of some

ANIMADVERSIONS

Upon the *HISTORY* of the

Royal Society.

Wherein, besides the several Errors against Common Literature, sundry mistakes about the making of *Salt-Petre* and *Gun-Powder* are detected, and rectified : whereunto are added two Discourses, one of *Pietro Sardi*, and another of *Nicolas Tartaglia* relating to that Subject. Translated out of *Italian*.

WITH

A brief Account of those passages of the *Authors Life*, which the *Virtuosi* intended most to censure, and expatiate upon : Written to save them the trouble of doing any thing besides *defending themselves*.

TOGETHER

With the *PLUS ULTRA* of
Mr. *Joseph Glanvill* reduced to a *NON-PLUS*, &c.

BY

Henry Stubbe, Physician at *Warwick*.

*At vos interea venite ad ignem
Annales Volusi, cacata charta.*

Catullus.

Printed at *London*, and are to be sold by the Book-sellers
there. 1670.



The Preface to the Judicious

R E A D E R.

IT may perhaps, and that not *unjustly*, be wondered, that I should appear in behalf of the *Antient* and *Aristotelian* Philosophy, who have always been thought averse from it, and inclined to that which is more *Novel*. And it is true, that I have not such a *veneration* for the *Peripatetickal* *Physicks*, as some others have, nor do I think they so *satisfactorily* explicate the *Phænomena* in *sublunary* things, as that an inquisitive brain can *acquiesce* therein: but this is not so much the *deficiency* of that *Learning*, as of *humane Nature*; the attempt it self being so little *feasible*, that *whosoever* shall design any such thing, shall involve himself in the like *miscarriages*, as appears from what *Gassendus*, *Des Cartes* and others have done, from whose performances the *greatest* advantages we have yet derived is, that it seems manifest how *easie* a thing it is to find *defaults*, and how *difficult* to amend them; and how the *Man of Stagira* was not *singular* in his *failors*.

If the *Cartesian* Hypothesis seem to be demonstrated *sufficiently* in this, that it is agreeable to the *general* occurrences of *Nature*, and solves the *difficulties* emergent, as if it were absolutely true: If this, I say, may pass for *sufficient* proof, I know not why a *Physician* may not submit unto the like *conviction*, who daily *experiments* that the *Aristotelian* Philosophy (which with some little *discrepancie* of opinions, and *diversity* of *explanations* hath been transmitted from the *Asclepiada*, *Hippocrates*,

How false that Cartesian assertion is, the learned and pious Dr. More hath in sundry pieces demonstrated.

Anton. vnder Linden de circuitu sanguinis.

Exercit. 9. Sect. 2. 1. Hieron. Mercurialis de hom. generat. c. 2. Andr. Lauvent. anatom. 1. 2. q. 17.

*

and

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and *Aristotle* to their *Alexandrine, Grecian, Sarracenic, and Christian* Physicians through so many ages, revolutions, and different *Climates*) is most conformable to the Subject about which his *Faculty* is employed, the explanation of *Diseases, their Nature, their Symptoms, their tendency, and Cure*? Not only the *Chyrurgical*, but *Medicinal* part of *Physick* hath been carried on and stated upon those general grounds, and that with such assurance, that where any learned and solid practitioner of that way shall happen to be at a loss, those which are enemies to it, the admirers of the *Virtuosi* and of *Odowde*, have not been able to make any considerable advantage thereby. Most that the *Novellists* have done, is to find out new reasons for an antient practice, and to shew how the old *Medicaments* wrought to their effects in another way than was supposed: but they have neither discredited the *Medicines*, nor *Method* with any understanding men: Whatever superlative discoveries have been made of late, a short time and tryal hath convinced us of the inutility of the most famed inventions and Theorems; and the tedious, costly, new *Medicaments* have scarce continued to be nine days wonder. I speak not this out of contradiction I carry to these *Virtuosi*; it is the result of my thoughts after twelve years of deliberation, after observations accurately made in my own practice, and in that of other antient men: and as it is known how I never desired any thing so much as the benefit of my Patients; so I hope I may be believed when I protest that my Ambition and Interest both suggested unto me a desire of achieving Miracles in Physick, if it had been possible. But, since whatever reputation I have required I owe it to that Physick which hath descended down unto this age by the means of such as have been of the *Aristotelian* and *Galenical* way, I am but just unto those Worthies in thus declaring against their puny Adversaries, who deserve all that contempt wherewith we depreciate the illiterate and fools, when they tell us that the Antient Method will not qualifie us to work, or enable us TO CURE A CUT FINGER, may less discover the nature, and course of Diseases, the operation of Druggs, and the right compounding of them for the benefit of the sick.

Although

Mr. Glaxvill in his plus ultra pag. 77.

Mr. Sprat, pag. 117. and 327.

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Although that this Reason might sufficiently justify me for what I have done, yet I had more powerful inducements which pressed me unto this design; and those are the exigences of the *English Monarchy*; whereunto since the good Providence of God hath subjected us once again, it is the prudence of every particular person to contribute all he can to the support of it, against all such intendments as may either introduce Popery on the one side, (which renders the Title of our King, and his power precarious, and will subvert the whole Commonalty of England in their Estates, not to mention the concern of our Souls, and that intellectual slavery whereto we must submit) and against all Anarchical projects, or Democratical contrivances, wherof a debauched and ungenerous Nation is not capable, and which cannot take effect without such variety of changes, as no sober man will think upon without horror, nor any that is wise pursue as feasible. I do avow therefore that the desire I had to contribute what I could to uphold the Fundamental Policy of these Kingdoms, was the principal motive I had to write this Treatise: and that how willing soever I was otherwise to discharge all intelligent persons from the insupportable prating of these Comical Wits, and to avenge my own faculty upon these insolents, yet the circumstances which I saw might create me future troubles and vexations were such, that nothing less than a generous and necessary inclination to serve my Countrey could have made me despise them. I have so small a regard for deep and subtle inquiries into Natural Philosophy, and the intricate Mechanismes by which this World is said to be governed, that could Physick be unconcerned in their debates, could Religion remain unshaken amidst the writings of these Vertuosi, could that Education be carried on happily whereby the Subjects are qualified to serve their Prince in all Negotiations and Employments, and their Countrey in Parliament, I should not entermiddle: but, if we

Who so ever would be satisfied about the imprudence, vanity, and perniciousness of all attempts to subvert the Monarchy of England now, and introduce a Democracy; I would advise him to read over the Political discourses of Malvergi in Tacitus, disc. 3. Boccacini advert. cent. 2. advert. 30. Paolo Payuta disc. polit. c. 8. Chr. Forstner, in Tacit. l. 1. p. 3, 4, 5, 6. Ut verissime dixerit Cosmus Medicus Cardinali Salviato, in tanta opum inæqualitate, morumque corruptione, Florentinam Rempub. non esse amplius libertatis capacem, quam optari potius quam sperari debeat. The reasons why the last Brutus miscarried in his design, will convince any man.

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look *de facto* upon these *Experimental Philosophers*, and from too fatal tryals judge how little they are fitted for those trusts and management of business by that so famed *Mechanical Education*: and if we consider how much this Nation owes to *Burleigh, Walsingham, Jewel, Abbot, Perkins, Whitaker, Usher, Davenant, Casaubon, &c.* & that by complying with these *Novel projects* for the breeding up of Youth, we deprive our selves of all our hopes to see such persons either in Church or State; we must rise as high in our resentments against the *Authors of this History*, & Mr. *Glanvils Book* (where more than one or two *Virtuosi* that contributed unto it) as the concerns of the present Age and of our posterity can animate us. That *Art of reasoning* by which the prudent are discriminated from fools, which *methodizeth* and facilitates our discourses, which informs us of the validity of *Consequences*, and the probability of *Arguments*, and manifests the fallacies of *Imposers* and *Comical Wits*; that *Art* which gives life to solid *Eloquence*, and which renders *States men, Divines, Physicians* and *Lawyers* accomplished, how is this cried down and vilified by the *Ignoramus's* of these days? What contempt is there raised upon the *disputative Ethicks* of *Aristotle*, and the *Stoiques*? And those *Moral instructions* which have produced the *Alexanders* and the *Ptolomeys*, the *Pompeys* and the *Ciceroes*, are now slighted in comparison of *day-labouring*! Did we live at *Sparta*, where the dayly employments were the exercises of substantial vertue and Gallantry, and men, like setting-dogs, were rather bred up unto than taught reason & worth, it were a more tolerable proposal (though the different policy of these times would not admit it) but this working so recommended is but the feeding of Carps in the Ayr, the weighing of a pike in water, the cooling of Wine with *Sal Armoniac*, (published long ago by *Berigiardus*) the guilt varnish (no secret to some *Trades-men* in London) or the inventing of an *Ambling-saddle*. As for the study of *Politicks*, and all *Critical Learning* together with *Church-History*, these are either *pedantical*, or tedious to those who have a shorter way of *studying Men*? Those *Metaphysics* which the constant policy of *Chriftendom* hath found so advantageous, that without a *Miracle* we could not have born up against the *Heathen-Philosophers, Arrians, Sarracens, and Soci-nians*,

Mr. Sprat, pag. 324.

See Mr. Glanvill's plus ultra pag. 123. & pag. 118, 119.

Mr. Sprat pag. 341, 342.

Mr. Sprat pag. 326.

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Wians, and out of which we do so confound the *Papists*, these must be laid aside; and are we not then in a fit posture to encounter *Bellarmino*, and *Baronius*? I remit these things to the consideration of all serious patriots, and do earnestly desire that they would with attention read over *Campanella* concerning the Spanish Monarchy, Ch. 23. pag. 142. ch. 25. pag. 157. ch. 27. pag. 177, 182. and the last part of the *History of the Royal Society*, and maturely whether the projects of the one be not put in execution by the other.

I follow the English Edition of *Campanella*, and do recommend these places, especially the last citation, to every serious Patriot his consideration.

I doubt not but this attempt of theirs was no part of the intentions of their Royal Founder: I am sure the publique utility is more dear unto Him than the giving of some men an opportunity to entertain their Melancholy, and divert their idle hours, or to acquire the reputation of Airy wits and Drolls: if He be their patron, it is certain that He is the Father of his Country, and the Head of the Church; the obligations he hath to these are so great and so near unto him, that these little Engagements must give place thereunto: Nay, He hath herein been Exemplary to his Subjects, by withdrawing much of his Encouragements, and testifying frequently his disesteem of these Experimental Philosophers. Thus many of the Nobility, most of the Physicians, and other understanding and serious persons have either totally deserted the Society, or discontinued their presence at their Assemblies. And I could wish they would not abuse the World with false Catalogues, but give us a true one of such men as do now frequent their meetings, keep correspondence with them, and pay the usual contribution.

Having so great Presidents to justify my contempt of them, methinks I need not apprehend the censure of those Illustrious and Honorable personages who might otherwise seem concerned in this Quarrel. The same motives which prompted them to advance the Royal Society, must now excite their indignation against them: the desire of advancing of the Glory, and the trading of this Nation, &c of understanding natural curiosities engaged them in this Society; but now that these men have no way answered their expectation, since their relations and Experiments, are so trivial, defective, and false, since that the Authors of this

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this fatal History have more in them of *Campanella*; than of *Mr. Boyl*; since they have relinquished the *original designs*, and *deviated* so notoriously from the intention of the *Royal Founder*, and what those *Eminent persons* purposed, who first closed with them: I will not think them any more involved in this contest, than patrons are where their favours are abused. And I protest that I bring with me all the respect and Honor in the world for those persons of Honor, who in so dissolute an Age gave the world that testimony of their generous intentions, which was to design the improvement of useful knowledge by these men: And I am concern'd to see their Gallantry so abused, so that nothing exasperated my peace more than a resentment for their Honor: Had the Experimental Philosophers acquitted themselves in their trust better, yet ought I to have been commended for animadverting upon these Books: the notorious untruths and Errors against common Literature were such, that Foreigners, who inquire into the writings and transactions of these Comical Wits, would have concluded that we were universally degenerated into the old British ignorance, and that the Bards once more sway'd in this Land: But I have taken off from the generality of this imputation; and dare presume that those that were no more than Honorary Members (and consequently not concerned in the private contests and suits of the Corporations they so stand related unto) will express a kindness for my performance.

Having thus excused my self to the persons of Honor, I shall briefly say something to those of unquestionable Learning that reside amongst the Society: I am sorry to finde them there, and that I must accommodate to their worth that Ancient saying, *Ingenium Galbæ male habitat*: their number, and interest seems so small there, that this History could pass with applause, notwithstanding them, and Mr. Glanvil be commended: with what credit can they resort unto the meetings of these Comical Wits, whose ridiculous actions reflect upon them, and upon which Assembly to bestow the *Elogies* of the Learned, or *Virtuous*, 't would be as improper in an *Aristotelian*, as to denominate an *Æthiopian* to be white because of his Teeth? He must be

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be insensible of all merit that can derogate from Sir Robert Murray, Dr. Wren, or Dr. Wallis : and to suspect that the truly Honorable and inquisitive Mr. Boyle would abet a design that should subvert piety, and the Protestant Religion, doth not become any that knows him, or his writings. But since good men are often-times made use of to pernicious ends, and unwittingly become instruments of the basest frauds ; since none are to judge of Affairs by their tendencie, and not by the persons that openly manage them, I doubt not but even these persons and others of integrity and solid worth will not imagine themselves concerned in the maintenance of those Errors, which they cannot approve of, and every one knows they could not commit, nor hinder.

I have been thus large in the Preface to remove all umbrages and misconstructions to which this undertaking might subject me : the Preface also against Mr. Glanvill may seem a little prolix in comparison of the subsequent Discourse ; but the Specimen being lodged at London, partly in transcribing, and partly because that the distance of the Term made the Edition less seasonable, I thought fit to enlarge that Preface much during my stay at Bathe, and to annex those other Observations made there, and what else is taken out of the Disputations of Vander Linden about the Circulation of Blood, which Book I could not procure the sight of before.

There be many defaults in the Language, and connexion of passages which may be liable to some censure : But whilst the Body of my Discourse stands firm, the advantages which the Comical Wits shall derive from those peccadilloes will not be much : especially when I shall plead that the work was written amidst the heat of my practice : that the papers were not written, nor any discourse finished at one time, but with frequent interruptions : that the several parcels and fragments were sent to sundry Learned persons to experiment their judgment ; that they were joyned together with some alterations and new connexions, without any review of mine, at London : several additions being to be inserted, as they came into my mind, in divers places, and so transmitted by the post : which occasioned
great

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great trouble: in fine, had not some publique spirited Gentlemen there undertook to translate the *Italian* pieces, and to see the work transcribed, and the insertions made, and the connexion in some measure supplied, I could never had leasure to finish my intendments.

After this piece there shall follow the next Term (if God give me leave to perfect what is almost finished now) *A Vindication of Aristotle from the calumnies with which Mr. Glanvill hath aspersed his person*, in his Letter which is joyned to the Edition of his *Scepſis Scientifica*, which bears the Arms and is dedicated to the Royal Society, : as as he repeats again and again the same things, so he is still the same illiterate person : having never so much as read over *Diogenes Laertius*.

There are also three Letters of mine which may at some time or other become publique. The first, to a person of Honor and Member of the Royal Society, shewing how my writing against these Comical Wits doth not derogate from the persons of *Quality* who are Honorary Members of the same Assembly: especially since they have acted so much contrary to the intentions of those illustrious Patriots that at first encouraged them; there are the passages of *Campanella* set down, and commented upon, & the third part of the *History of the Royal Society* animadverted upon, as being directly subservient to his Propoposals for the restoration of *Poper*y, with some accessional Characters, which Mr. Sprat, and Mr. Glanvil bestow upon the useful University-Learning.

Here I further pursue Mr. Sprat for the mistakes against common Licence, with which the History abounds

The second, to a person of Honor, no Member of the Royal Society, shews, that it is impossible to arrive at any exact Science in *Natural Philosophy*; that if it were possible, yet these Comical Wits and their Method could never achieve it: I shew here their negligence in making observations; their falshood in relating them: that they either are ignorant of what is published by Antient and Modern Writers, or most egregious plagiaries: that the Aristotelians and Galenists were never enemies to Experiments, but cautious about concluding any thing rashly from them, or making such as were unsafe and inconsistent with a good conscience: and that the Experiments recorded by the Galenical

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lenical Physicians infinitely surpass as to *Physick*, and even *Natural Philosophy*, what ever these *Comical Wits* can pretend unto. I add, that the deep study of *Natural Philosophy* is not requisite, but rather destructive to all *Politics*, (as appears by *History*) neither is that or the *Mathematicks* necessary to the improvement of *Manual Trades and Arts*, since those *Countries* where *Philosophy* and *Mathematicks* have been generally ignored, (as in *Asia*, and during the times of the *Romans* luxury) *Mechanical Artisans*, and such *Manufactures* have most flourished: that the *Luxury* which is now in fashion hath nothing in it that may compare with the ingenuity of the *Antient Virtuosi*: that those of old *Rome* did make an *Icarus* to fly, and in his flight to fall down and besprinkle *Nero* with his Blood; whereas our *Fopps* have been these many years studying how to fly, yet have not so much as effected the most facile part of the attempt, which is, to break their necks.

The third is to a learned *Physician*, shewing the damages our *Faculty* hath sustained by these *impertinents*: the condition of *Physick* and *Chyrurgery* as it is at present by reason that the *Divines*, *Mountebanks*, *Quacksalvers*, *Apothecaries*, and every rude *Experimentator* countenanced by the principles and repute of these *Virtuosi*, all praise it: the inconveniences to the *Monarchy* thereby are considered, and the unreasonableness of what the *Virtuosi* alledge, as also the vanity of sundry of their *Experiments* (besides what are old, and impudently obtruded on us for new) is demonstrated.

And if there be any person worthy of my indignation that will justify the *Rhetoricalness* of the *History of the Royal Society*, I will write a fourth about that, shewing that choice of words, and a smooth and numerous period is not compleat *Eloquence*; but if the Subject-matter be foolish and irrational, 'tis a sort of madness in the judgment of *Tully*: and that if all the instances of *puerile & jejune Eloquence* were lost, which are recorded by *Seneca* and *Quintilian*, I protest I could supply a great part of that damage out of this famed *History*: and if any fitting *Adversary* declare hereupon, I will make these *Comical Wits* as much renounce the *Antient Orators*, as they do now the *Philosophers*.

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I should here put an end to this *Introductory* discourse, but that 'tis fitting the world should know how not only *illiterate*, but *mean-spirited* these *Vertuosi* are: when I declared that I would *animadvert* upon Mr. *Sprat*, and Mr. *Glanvill*, these *Comical wits* not only intimated to me, but in all places divulg'd that if I attempted any such thing, they would appoint some *ingenious men* of their number to write my *Life*, thinking hereby to terrifie me, and make me fear their *Satyres*, who despised their *Learning* and other abilities. The effect of this their project was such, that I found all persons of *Honour* and *ingenuity* to condemn it *universally*: pitiful *Mechanicks*, that being so ridiculous already, multiply occasions of further contempt! The course is usual amongst the *Papists*, and therefore less to be admired or strange in these *Virtuosi*. When the Bishop of *Spalato* writ his excellent Books against the *Romanists*, they answered him by *calumniating* his life: when *Padre Paolo* writ the *History* of the Council of *Trent*, the Jesuit *Palavicini* begins his *Anti-History*, with a long debate, wherein he attempts to prove that the *Author* of the said *History* was an *Heretique*, and *Atheist*. This procedure of his hath been laughed at every where, and *Cesar Aquilinus* a *Papist*, thus censures it.

Cesar Aquilinus
de tribus
Historicis Con-
cilio Tridentini.
p. 18, 19, 20.

" An *Petrus Soave* fuerit *Hæreticus* an *Atheus*? *Questio-*
" nem hanc proponit *Henricus* initio præfationis ad suam *Censu-*
" ram, loquens enim de *Petro Soave*, hæc addit, *Scriptor Hære-*
" ticus an *Atheista*? nihil oportet inquirere: quare ipse *Que-*
" stionem hanc ut superfluum contemnendam potius quam examinan-
" dam & determinandam judicat. *Palavicinus* vero existiman-
" statim uno ictu adversarium, atque ejus *Historiæ* sternere autori-
" tatem, *Questionem* istam proponit, & solvit, asserens in primo in-
" trodutionis suæ limine *Petrum Soave* fuisse *Hæreticum*, &
" quod pejus est, *Atheum*: hoc etiam addit secundi voluminis in-
" itio in epistola quam tribuit sui operis *Bibliopole*. Probat hoc
" ex quibusdam verbis *Manu scriptarum epistolarum*, quæ juxta
" ejus sententiam *Petro Soave* tribuuntur. Verum satis stultè
" videtur incedere, & assimilatur ei, qui umbram insequitur
" relicto corpore: habet præ manibus *Historiam Concilii Tri-*
" dentini scriptam ab illo & typis datam, in qua tanquam in spe-

culo

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culo posset cognoscere, quanam sit Petri Soave Religio. *An Ca-*
tholicus, an Hæreticus ? An fortasse Atheus ? & laborat a-
pud nonnulla privata manu scripta, quæ vel vera non sunt, vel
certe ancipitis expositionis. — Primus igitur Palavicini
istius satis vanus & inutilis est, & ipse videtur assimilari ho-
mini, qui cum non valeat suis viribus inimicum vincere, utitur
clarioribus, & maledicis vocibus : debuisse solum respondere
ad opposita, quæ in illius Historiâ inveniuntur, & non lacerare
hostem injuriis & imitari prudentiores, ac Sanctos Scriptores
adversus Hæreticos, qui relictis injuriis tantum eorum doctri-
nam confutant ac damnant.

In fine, I was so far from being daunted at those rumors and
threats, that I enlarged much this Book thereupon, and resolved
to charge the Enemy home, when I saw how weak resistance I
should meet with. I knew that recriminations were no an-
swers ; and that a sober virtue needed not to stand in fear of a-
ny aspersions. I understood well that the passages of a life like
mine, spent in different places with much privacy and obscuri-
ty, was unknown to them ; that even those actions they would
fix their greatest calumnies upon, were such as that they under-
stood not their grounds, nor had they learning enough and skill
in casuistical Divinity to condemn : that it would be imprudent
in them to look beyond the Act of Indemnity and Oblivion, which
was more necessary to many of the Royal Society than to me ;
nor can their deportment be justified, as mine, who joyned with
no party, frequented no conventicles, writ very honorably con-
cerning the Episcoparians, and pleaded for their * Toleration :
I was at Westminster-School when the late King was beheaded :
I never took Covenant, nor Engagement. In sum, I SERVED
MY PATRON ; I endeavoured to express my Gratitude
unto him who had relieved me being a Childe, and in great po-
verty (the Rebellion in Ireland having deprived my Parents of
all means wherewith to educate me) who made me a King's
Scholar, preferred me to Ch. Ch. C. in Oxon. who often suppli-
ed me with money, when my tender years gave him little hopes
of any return, and who protected me amidst the Presbyterians
and Independants, and other Sects, with none thereof did I

*Tis a kind of
Impiety to dis-
turb the bu-
ried : and of-
tentimes the
exposing of
things to the
Air that have
been long kept
close, or the o-
pening of Tombs,
hath raised va-
pours so pesti-
lential that
they have al-
most ruined
flourishing
Kingdoms and
Seignories.
* See my pre-
face to the
Good Old
cause.

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contract any relation or acquaintance : my familiarity never engaged me with ten of that party, and my genius and humor inclined me to fewer. I neither enriched, nor otherwise advanced my self during the late troubles, and shared the common odium, and dangers, not prosperity with my Benefactor. I believe no generous man, who hath the least sense of bravery will condemn me ; and I profess, I am ashamed rather to have done so little, than that I have done so much for him that so frankly obliged a stranger, and a childe. When Gracchus was put to death for sedition, that faithful friend and complice of his was dismissed and mentioned with honour by all Posterity ; who when he was impeached, justified his Treason by the avowing a Friendship so great, that whatever Gracchus had commanded him, he would not have declined it : and being further Questioned, whether he would have burned the Capitol at his bidding ? He replied again, That he should have done it ; but Gracchus would not bid such a thing. They that knew me heretofore, know I have a thousand times thus apologized for my self : adding, that in Vassals and Slaves, and persons transcendently obliged, their Fidelity exempted them from all ignominy, though the principal Lords, Masters, and Patrons might be accounted Traitors. And I am so far from dreading the Censure of the world (especially from Cavaliers) that I believe most men with their favours so well placed, and that in their exigencies they might meet with as brave acknowledgments. My Youth and other circumstances incapacitated me from rendring him any great Services ; but all that I did, and all that I writ, had no other aim than his interest ; nor do I care how much any man can inodiate my former Writings, as long as that they were subservient to him.

* * *

I think this defence to be the most proper and seasonable that I can now make ; and I will not suffer my self to be engaged in any Disputes that may contribute to the dissettlement of this Nation, and Monarchy ; it will therefore be but meanly done

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The Preface to the Reader.

to assault what I now abandon ; and to revive the *mention*, nay, perhaps to contrive any answer (after so many years omitting it) is scarce prudential. I have been confirmed by the Right Reverend father in God the Lord Bishop of Winchester, and they that would write my life well, must consult that excellent Prelate, and a Letter which He hath of mine : I have lived in Communion with the Church of England hitherto, as standing upon the foundations laid by Qu. Elizabeth ; and my neighboring Diocesans of Worcester and Lichfield can certify with how much respect I have demeaned my self to them upon occasion ; and I abhor all thoughts but such as shall contribute to the support of the Monarchy, the Protestant Religion, the Honor and welfare of these Kingdoms. Having made this Declaration, let them (or more able men than they) write against any piece of mine which hath been published since his Majesties restoration, and consider the manner of my assertions ; and let them write the life of a man who hath some virtues of the most celebrated times, and hath reserved himself free from the Vices of these, I shall not regard their malice, nor value the indulgence of a sort of people whose credit (since the Answer to Mr. Sorbier, the History of the R. S. the Calumnies against Aristotle, and the Plus Ultra of Mr. Glanvill) cannot equal that of Amadis de Gaule, King Arthur, Timæus, or Schioppius. All that they shall say of this nature will be notorious, and illiterate malice ; and my Reply shall be a scornful silence.

I shall add now, that in such times as I thought it our interest to subvert the Monarchy of England, and the repute of the Clergy, I was passionately addicted to the new Philosophy, and motioned several ways for the introducing it amongst the Gentry and youth in this Nation ; I was confident that it would render all the Clergy contemptible, and take from their esteem and reverence in the Church, whilst they must seem egregious fools in matters of common discourse ; nor did I question but the Authority of all Antiquity in spiritual affairs would vanish when it appeared how much they were mistaken in the common occurrences and Histories of Nature. How rational this opinion of mine was, and how it is verified in these days, let the Hierarchy and Universities judge.

To



To the two famous *Universities* of
this Land, *Oxford* and *Cambridge*,
the *Chancellors*, *Vice-Chancellors*,
Heads of Colledges and *Halls*, *Pro-*
fessors, *Fellows*, and *Students* in the
same.

Reverend Fathers and Gentlemen;

THe goodness of the Quarrel I am
engaged in makes me fear no Judg-
es; but yet to chuse the most com-
petent: I am secure of the honest and
true; but submit the decision to the
learned and prudent. All that are
sensible of those studies by which the
Morality, Religion, and Civil Policy
of this Nation hath been carried on
happily before these Impertinents &
Innovators; and how this Nation is de-
clined and debauched from every thing
that is serious and sober now, are con-
vinced of the justice of my complaints,
and how necessary it was that some
body

body should attacque them ; but it is
for you to determine of the validity of
my charge, and of those proofs with
which I come to implead them. I am not
troubled at the glorious Titles with
which these Comical Wits boast them-
selves ; Of the Lyons which they bear,
they have only this faint resemblance,
that they are not so brave as they are
painted I have stooped the Talbots
(your Supporters) for them, and if they
ever hunt well hereafter, this Age
knows whom they are obliged unto.
The name of Virtuoso signifies as little
with me, as it does in Italy, where they
will bestow on a Pastry-Cook or Mil-
lener, even with that fair accessional of
molto Illustre; But it seems a little too
open and palpable to fetch the project
of the Society from Italy ; and their
name too : though Campanella contri-
ved the former, yet would He not have
advised them unto the latter ; and if
their

their invention were so barren as not to
saggest unto them a fitting denomina-
tion, they might without robbing mea-
ner Artizans, have borrowed one from
the Academy of Perugia, or some
where else there, and stiled themselves
the *INSEÑSATI*, &c. It is
manifest now that the Antient Learn-
ing (and not only the Natural Philoso-
phy) is the Rubbish they would re-
move; This work they have so dili-
gently pursued, as if they had forgot
“ Their first and chief Employment,
“ carefully to seek, and faithfully to
“ report how things are *de facto* —
This Specimen acquaints you with
what integrity they perform their un-
dertakings; and if the Ensamples they
exhibite to the world, whilst They are
yet probationers for the glory of Natu-
ral Philosophers, if they be so faulty.
What estimate may we rationally make
of those that are laid up in the Treasu-
ry

Mr. Glauvill
pag. 91.

I shall hereaf-
ter give the
wor'd an exa-
men of the rest
of the h-
story: and I,
design to try
them by that
pieces.

ry of *their* Archives? Mr. Glanvill
tells us, that "They have done more
" than all the Philosophers of
" the notional way, since *Aristotle*
" opened his shop in Greece: which
" saying (*he adds*) may perhaps look
" to some like a bold and fond sen-
" tence; but whosoever compares the
" *Repository* of this Society, with all
" the volumes of the Disputers, will
" finde it neither immodest nor un-
" just; and their History hath given
" us instances sufficient of their *Ex-*
" *periments* and *Observations*, and *In-*
" *struments* to justifie a bolder affir-
" mation. ----- I am indeed apt to be-
lieve that all the Philosophers of the
notional way in Greece, Alexandria,
Arabia, Spain, and the rest of Europe,
neither have, nor would have attempted
anything like to what they have done;
and when I reflect upon the lamentable
narratives and proposals which their
History,

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History, the Transactions and other
Books of theirs represent unto us, I
think they purpose to grow famous, as
the Turks do to gain Paradise, by trea-
suring up all the waste paper they
meet with. But I shall not anticipate
your censure, nor endeavor to prepos-
sess you against them by the sense of
your interest, nor exasperate your pas-
sion any way: Be as unbyassed as it is
possible; Be as Loyal and Monarchi-
cal, as any English-man imaginable;
Be as great friends as you can to the
Protestant Religion, sober vertue, and
the real Honor and utility of these
Kingdoms; I wish for such Arbitra-
tors; and your Sentence shall never be
declined upon those accounts, by

Warwick Oct. 6,
1669.

Your affectionate humble Servant.

Hen. Stubbe.

History, the Transactions and other
Books of their respective authors. I
think they purpose to give names, as
the Turks do to gain a name; by
sowing up all the waste paper they
meet with. But I shall not anticipate
your censure, nor endeavor to pre-
vent you against them by the force of
your interest, nor express your dis-
like any way: Be as undisturbed as it is
possible; Be as loyal and Monarchi-
cal, as any Englishman imaginable;
Be as great friends as you can to the
Protestant Religion, to her virtue, and
to her real Honor and utility of these
Kingdoms: I wish for such Arbitra-
tors; and your Sentence shall never be
declined upon those accounts, by

Your affectionate humble servant,

Hen. Stables.

A

A 2

Specimen of the *Animadversions* upon the History of the Royal Society.

Epicurus and those of his followers which declined the
(a.) entermingling with such employments as related
unto the Government of their Countrey and Civil Po-
licie, did agreeably to their inclinations and principles,
flight and vilifie all that *παιδεία* or (b.) course of studies consist-
ing of Grammar (which in its extent included all Criti-
cal Learning, History and Chronology) and Rhetorick, and
Logick, and even Mathematicks. That great Epicurean Philoso-
pher Metrodorus had the confidence to (c.) write unto one,
that whereas he was ignorant of the first Verses in Homer, and
understood not whether Hector were a Trojan or a Grecian Com-
mander, nor any of those things almost which were the subject of
common discourse and knowledge, yet he should not be troubled there-
at. We have seen in this Age not only the Philosophy, but the
Ignorance of that Sect revived, but with this disparity, that
wheras the former Epicureans did own & avow their being unac-
quainted with that sort of Literature, our Modern Insolents pre-
tend to understand it in such perfection, that the Empire of Lear-
ning as well as of wit, and solid Philosophy should seem inclu-
ded in the same walls. But how vain such their pretensions are,
and how justly I charge them with the imputation of ignorance,
is apparent to any that are conversant with the Books that
wear their Name, and by their ordinary Discourses. I shall vin-
dicate my Censure by instancing in those pieces which had more
than one Comical Wit to pen them, and which if they be not the
most elaborate & substantial that it is possible for that sort of men
to produce, the world must suspect henceforward their discre-
tion, as much as now their abilities. The History was many
years in writing, and the Author assures us, he had no mean as-
sistants in that work: Mr. Glanvill wanted not a convenient
space

(a.) Vide Dio-
gen. Laert. l. x.
& notas Men-
agii pag. 275.
Vid. Diog.
Laert. ubi su-
pra. Menagii
notas pag. 260.
274. & Vos.
de Phil. Sect. c.
8. Sect. 2, 3, 7.
Plutarch. in
libello quod
non potest sua-
riter vivise-
cundum Epicu-
rum.

(*)

pag. 170.

pag. 7.

a Conringius de
Medicin. Her-
metica.

space of time to perfect his *Plus ultra*; he consulted with several of the *Virtuosi* for materials wherewith to advance their *Renown*, and silence not only his opponent, but all opposites against the *Royal Society*. I know some that he writ unto about it; and others saw his papers as they were remitted unto him, *blotted* and *altered*. The result of all which their care and pains is, that whereas some only imagined that these men were a company of *talkative* and *superficial* — now it is become *past denial* by any body. Who can with any patience read how this famous *Society* sent to the Governor of *Batavia* in the *East-Indies* to know what grows in *Mexico* in the *West-Indies*? How poor and mean are their inquiries, not such as serious men design to erect a *Natural Philosophy* upon, but to yield empty fellows, and the *Impertinents* matter for *Table-talk*! Just so when I went to *Jamaica* and desired that Honorable Personage Mr. *Robert Boyle* to procure me some directions for *Philosophical* inquiries in that Countrey; He, with *blushing* and *disorder*, tendered me from them a ridiculous paper which concerned most some particularities of *China*, and those *Oriental* parts: Had not that paper been lost, I would have printed it; but if they please to remember it, it is about half a sheet of *Instructions* given to an *East-India* Captain, and beyond any *Almanack* were to serve for all *Meridians*, and *Countreys*, though the enquiries were *specialties*. I can scarce endure to hear Mr. *Sprat* tell us, that the *graver* and *more reserved* *Egyptians* did confine their *Philosophy* to their *Temples*. There is a great noise made by some concerning the antient *Hieroglyphical* Learning of the *Egyptians*; but I never heard that it was confined to their *priests* by the *graver* *Authority*; but rather that a company of *cheating* *lying* *Rogues* did make fools of the people, and by pretences of a *sacred* and *mysterious* Character amused them: they had little of *Natural Philosophy*; somewhat more of *Geometry* and *Astronomy*: all their Knowledge amounted not to much, as *Conringius* hath (d) demonstrated; and after that the *Sucessors* of *Alexander* had settled themselves in *Egypt*, that *foppery* decayed, & the *grave* *Egyptians* at *Alexandria* endowed the professors of *Physick* and sundry *Philosophies* there, (the place or Colledge was

was called *Museum*, *Strabo lib. 17.*) and erected *Libraries*, and furnished the *Roman Empire* with *Physicians* to the days of *Valentinian*, and (e) *Domitian* with *Books*.

But it were unpardonable in a common School-boy to pass by the *Ionique* and *Italique Philosophers* un-mentioned; and to tell us, "That in Greece the most considerable (and indeed the only successful) trials were made at Athens? Whereas, if we regard *Natural Philosophy*, and abstract from the Experiments of the *Aristotelians*, there was never any thing in Athens could compare with the discovery that *Thales*, *Anaximander*, *Anaximenes* and

Anaxagoras made, which were of the *Ionique Sect*: and since the *Dialect* in which he writ (not the place of his Nativity) authorizeth me to do it, I shall reckon *Hippocrates* amongst the *Ionian Philosophers*, and Mr. *Sprat* may be certain he is not to be accounted for in Athens. And as to the *Italique* and *Eleatique Sects*, dare any man say they, that they were inferior to Athens, or that their trials were un-successful; who knows the performances of *Pythagoras*, *Empedocles*, *Acron*, *Parmenides*, *Melissus*, *Leucippus*, *Democritus*, *Ocellus*, *Lucanus*, *Archytas*, *Archimedes*, &c? At *Alexandria* (a place we may not improperly reckon in Greece, since not only Mr. *Sprat* omits the mention of those Professors as *Egyptians*; but they writ in Greek, followed the *Grecian* (f) account and customs, not *Egyptian*; and as *Athenaus* shews (lib. 4.) taught Greece it self *Philosophy* and the *Liberal Arts*) if we remember that it was the seat of (g) *Euclid* the *Mathematician*, and there is scarce one *Mathematician* recorded but was related to *Alexandria* as

Vossius shews. "Valde autem illud commendat Scholam ab *Euclide* erectam *Alexandriae*, quod non solum multos reliquerit discipulos; de quo auctor *Pappus* in septimo collectionum Mathematicarum; sed ab ejus tempore, usque ad tempora *Sarracenicæ*.

e *Domitianus* — misitque *Alexandriam* qui exemplaria describerent; emendarent. Ita discimus tempore *Domitiani* non caruisse Bibliotheca *Alexandriam*; nam semper urbs illa professores plurimos aluit. *Pagnin. Gaudant. de Philos. apud Roman. c. 168. p. 456.*

pag. 7.

I believe the *Cyrenæic Philosophers* in the Court of *Dionysius* made very successful Experiments: and their number is paralleled by *Lyppius* (if my memory fail me not) in his *Stoical Stanudation*, to any that Athens ever saw.

f *Conring. de Med. Hermet. c. 12. pag. 152.*

f *Euclides Mathematicus floruit temporibus Ptolomæi Lagidæ, eoque regnante primus Alexandria docuit Mathematicam: ut ex Proclo diadocho videre est. Voss. de Phil. Sect. c. 11. Sect. 1.*

cenica.

“cenica vix ullum invenire sit nobilem Mathematicum; quin
 “vel patria fuit Alexandrinus; vel saltem Alexandriae de-
 “derit operam Mathesi. Voss. de Scient. Mathemat. c. 15. pag.
 “52. The same is avowed by Sir Henry Savil in his second
 “Lecture. “Post Euclidem exivit Archimedes — & E-
 “ratosthenes. Hos insecuti Apollonius Pergæus, Geminaus,
 “Theodosius, Menelaus Geometra dictus, & alii ex Schola fere
 “Alexandrinâ profecti omnes, usque ad tempora Sarraceno-
 rum. There flourished Herophilus and Themison, and
 Dioscorides, and many other Professors of Physick, Ana-
 tomy, and Philosophy (even Chymistry, and the Philosophers-
 stone) ’tis extreme imprudence to mention Athens thus! But, to
 gratifie him further than he deserves or can expect; to yield
 that up to Aristotle and his Peripatetick followers in Athens
 which cannot seem due to such as (b) spent their time in idle
 talking and wandring under the fruitless shadows of nature, in
 their first institution, (as their successors have done ever since) and
 were utterly useless in respect of the good of man-kinde. To grant
 our Virtuoso more than the walks, porches, and gardens he prates
 of, do merit, what a stranger is he in the History of Philosophy,
 and how ignorant of the Subject he discourseth about, not to know
 what Dialects the Grecian Philosophers writ in, nor how ele-
 gant was their style? Some used the Jonique, others the Do-
 rique dialect, and those embased several ways according as
 their humors, their Countreys, or the novelty of the Subject put
 them upon it: And even at Athens, neither the Stoiques, nor
 Epicureans were so solicitous about Rhetorick, as to chuse that
 for Philosophy which they could most eloquently express. And
 since Plato had his λέξεις, and Aristotle his ὑπεκρίματα and other
 terms and expressions, ’tis hard to think that they did so regulate
 their Philosophy by their regards to the ornaments of speech, as
 Mr. Sprat imagines. How comes it to pass then that our Hi-
 storian intimates to us (’tis a “new invention! to give the Co-
 “mical Wits their due, though fooleries) that the Athenians
 “were the (i) Masters of the Arts of speaking to all their Neigh-
 “bours [which is false concerning the Ionians, and probably
 “of some others] and so might well be inclined, rather to chuse
 such

Mr. Sprat. pag.
 327. 817.

Did the Athe-
 nians teach
 Hippocrates, or
 Democritus to

(*)

“such opinions of Nature, which they might
“most elegantly express, than such which
“were more useful, but could not so well be
“illustrated by the ornaments of Speech.

Mr. Sprat further informs us, (and who
can deny him to glory of being the first
discoverer?) that “in the City of Athens
“the knowledge of Nature had its Original
“before either that of Discourse, or of hu-
“mane Actions. — This is notoriously false; for it is mani-

fest that Anaxagoras Clazomenius first brought from Miletum

news of Natural Philosophy to Athens, teaching it to Pericles

and Euripides: and before that time there were Orators, and

Moral Philosophers, as certainly as ever there was a Solon, or

(1) the Sophists at Athens.

I must profess here in the Introduction that 'tis an hard thing to

write against men that understand nothing: and that it is not my

present intention to manifest all those mistakes against common

reading and Literature, which are in that History. I shall insist

now but on some, but such as are so gross as to justify the most

harsh of my censures, and to gain a belief from my Reader, that

those who could not prevent these saylors may be guilty of an in-

finite more. I appeal unto my Reverend and Learned School-

Master Dr. Busby at Westminster, whether he, or any other

Learned man, would have admitted of, much less have ap-

plauded such an Exercise as Mr. Sprat offers to his Majesty by

way of Dedication? Do a few empty though smooth-placed

words make up all Rhetorique? Is this Nation sunk so low, that

non-sense and ignorance can be voiced for the most Exemplary

Eloquence that late years have published? Oratio, si res non sub-

est ab oratore percepta & cognita, aut nulla sit necesse est, aut om-

nium irrisione ludatur. Quid enim tam furiosum, quam verborum

vel optimorum atque ornatissimorum sonitus inanis, nulla subiecta

sententia aut scientia? The Epistle follows, and is this.

write? did these two shew so great a
care of eloquent language that they chose
their Philosophy accordingly? Or did not
the one in the Ionique, the other in the
Dorique phrase joyn many words and ex-
pressions thereby to describe their Philo-
sophical sentiments. Read over, Oh! tres-
haute & tres-agreable virtuosi Diogenes
Laertius, & Foesius before you tell these
Stories.

k Vossius de
Phil. Sect. c. 5.
Sect. 7.

Isocrat. in
orat. περὶ
ἐκείνων.

cicero de ora-
tor. l. 1.

THE

The Dedication of the History of the Royal Society unto his Majesty.

To the King.

SIR,

OF all the Kings of Europe, Your Majesty was the first, who confirmed this Noble Design of Experiments, by Your own Example, and by publick Establishment. An Enterprize equal to the most renown'd Actions of the best Princes. For, to encrease the Powers of all Mankind, and to free them from the Bondage of Errors, is greater Glory than to enlarge Empire, or to put Chains on the Necks of Conquer'd Nations.

What Reverence all Antiquity had for the Authors of Natural Discoveries, is Evident by the Diviner sort of Honor they conferr'd on them. Their Founders of Philosophical Opinions were only admir'd by their own Sects. Their Valiant Men and Generals did seldom rise higher than to Demy-Gods and Heroes. But the Gods they worshipped with Temples and Altars, were those who instructed the world to Plow, to Sow, to Plant, to Spin, to build Houses, and to find out New Countries. This Zeal indeed, by which they express'd their Gratitude to such Benefactors, degenerated into Superstition: yet has it taught us, that an higher degree of Reputation is due to Discoverers, than to the Teachers of Speculative Doctrines, nay, even to Conquerors themselves.

Nor has the True God himself omitted to shew his value of Vulgar Arts. In the whole History of the First Monarchs of the world from Adam to Noah, there is no mention of their Wars, or their Victories: All that is recorded is this, they liv'd so many years, and taught their Posterity to keep Sheep, to till the Grounds, to plant Vineyards, to dwell in Tents, to build Cities, to play on the Harp and Organs, and to work in Brasse and Iron. And if they deserved a Sacred Remembrance for one Natural or Mechanical Invention, Your Majesty will certainly obtain Immortal Fame, for having established a perpetual Succession of Inventors.

I am, &c.

THO. SPRAT.

Animadversions upon the Epistle aforesaid.

IT is a sign that our *Virtuoso* is little acquainted with the condition of *Europe*, and that the Intelligence of these *Curious* is as bad or worse than ever deceived the *Man of Stagyra*, in that he says, that of all the *Kings of Europe* his Majesty was the first, who confirmed this Noble design of Experiments by his own example. — Had

not the Emperor *Rudolphus* a Colledge of Chymists to promote Natural and useful Experiments in Physick and Philosophy, did he not oftentimes work himself in those Laboratories where they had *Rulandus* and others for his assistants & take the testimony of one that was present with him. *Nec attinet superiorum annorum Imperatores, Principes, & totam Nobilium familiam citare; cum manifestissimum sit, multum studii, laboris, diligentiae atque sumptuum in nobilissimam hanc artem [Chemiae] collocasse Augustissimum nostrum Casarem Rudolphum adducere licebit, quem publica fama passim constat, artem hanc Alchemiae impense amare, artificiumque studiose de his exquirere, non raro ipsa Chymica aggredi, tractandaque nec dedignari.* — Did not *Alphonso* the last King of

that name in *Naples* try many Experiments in his Gardens & and when he poorly abandoned his Countrey and Riches to the *French*, did he not (admire him, O ye Comical Wits!) did he not with several choice Seeds remember to ship some excellent Bottles of Wine, and so retired to *Sicily*? Did not King *Charles* the First encourage and assist *Dr. Harvey* in the Disquisitions about the Circulation of the Blood, and Generation of Animals? Hath not there been at *Florence* an Academy for Experiments in all manner of Philosophy promoted and kept on foot by the Ducal Family? Is there not, by the encouragement of the Popes, a Laboratory and Colledge of Jesuits at *Rome*, whose great work

Mr. de Silhon in the second part of his *Minister of State*, disc. 7. observeth, but commends not the Emperor *Rudolphus*, in that he made a Shop and Forge of his Cabinet, and reduced all his Imperial thoughts into the search of the Philosophers-stone, and to make Watches and Dyals.

Martin. Ruland. in dedic. ad progymnasium. *Alchemiae.*

Read the life
of Nero in Suetonius, and reflect upon it.

hath been for many years to enquire into all *natural Curiosities*: is it not there that *Schoinnerus*, *Kircherus*, *Ricciolus* and others have flourished before ever this *Royal Society* was thought upon? How long hath the Duke of *Holstein* kept up his *Laboratory* and *Chymical Colledge* at *Gottorp*? If all these be not *Crowned heads*; yet there are enough of them to take off from the generality of the assertion made by our *Virtuoso*; and the rest serve to extenuate the complement: But if I had gone about to reckon the *Cyrenaic Academy* under *Aristippus* at *Sicily*, and the *Colledge of Virtuosi* under *Petronius Arbitrator* in *Rome*, as the establishments of *European Princes*; *Dionysius* and *Nero* had quite spoiled the flattery of this saying: yet any one that hath read *Plutarch*, *Suetonius*, or *Martial*, can tell the exploits of those *Mechanick Philosophers*, and how they depraved one of the best *Emperors* in the world.

As for the *publique Establishment* of these *experimental Philosophers*, I do grant that our *King* was the first that did such a thing: but the formality of a *Charter*, their *President* and *Mace*, and other such circumstances make more for their *Grandeur*, than the *King's glory*, except that the usefulness of the design appear: the *ignorance* and *solly* of these *Comical Wits*, the *Members* of it hath more of *disgrace* in it, than there is *honour* in the whole foundation; it being more for his *prejudice* that it should be proclaimed abroad (as 'tis by this *Historian* and *Mr. Glanvill's* writings) that our *Nation* are a generation of *illiterate fools* and *Coxcombs*, than 'tis for his *credit* that they have *inutile* and *insignificant desires* after knowledge.

"An enterprise equal to the most renowned actions of the best Princes. — I have oftentimes reflected upon those Actions whereby Princes have acquired the fame of great, and good, but I never found any that gained either of those *Elogies*, by any *knick-knacks* of *Experimental* or *Mechanical Philosophy* alone: there have been some that making some of these inquiries of their *innocent divertisement*, & by doing all those actions which gain a repute of *political wisdom*, *courage*, *justice*, *piety*, &c. have transmitted an *honorable memory* of themselves: but these *triflings* as they are *contra-distinct* to *sober* and *substantial* virtue,

virtue, are so far from being *Actions equal to the most renowned enterprises* of the best *Princes*, that they do not expiate for other *their faults*: as any man may learn from the lives of those *infortunate Princes*, *Dionysius* and *Nero*. What writer advanceth the *repute* of *Alphonso*, or justifies him for *murdering* and *oppressing* his *Subjects*, and losing his *own*, whilst he kept his *Garden*? Is *Dioeletian* more famous for those *ingenuities*, or infamous for his *persecution of the Christians*? I do not think that the *establishment of this Society*, (had all things answered *mens wishes*, and out-done *their hopes*.) would have been mentioned with so much honour as the most renowned *actions of the best Princes*: since the *actions* that relate to *goodness* and *piety* admit of *no comparison*, (being of different *Natures* and *kinds*) but when a fool, (as here a *Virtuoso*) holds the Scales. I should not pardon my self, should I oppose the *Heroicalness* of this *enterprise*, with the *actions of Constantine* raising *Christianity*; with those of *Justinian* or *Theodosius* in compiling their *Codes*: with the *actions of our Black Prince*, or *Henry the Fifth*: or with *Henry the Eighth* in *demolishing Abbies*, and rejecting the *Papal Authority*; or *Queen Elizabeths* exploits against *Spain*: or her restoring the *Protestant Religion*, putting the *Bible into English*, and supporting the *Protestants beyond Sea*: It is not for any man that pretends to be an *Aristotelian*, to make such *comparisons*; much less to infer as *Mr. Sprat* does. But the reason which he gives why the *establishment of the Royal Society of Experimentators* equalleth the most renowned *actions of the best Princes*, is such a pitiful one as *Guzman de Alfarache* never met with in the whole extent of the *Hospital of Fools*.

“For, to increase the Powers of Mankind, and to free them from the bondage of Errors, is greater glory than to enlarge Empire, or to put Chains on the necks of Conquered Nations. —

These Consequences are twisted like the cordage of Ocnus.

I Would fain know whether the making of a Golden-Chain of 43 Links to the chain, the Lock and Key being fastened and put about a fleas neck, she drew the same, all which, Lock, Key, and Chain weighed but one grain and an half; as *How* relates in his *Chronicles of Queen Elizabeth. Ann. Regn. 18. 1576*: yet whether did his invention (surpassing all ever heard of the R. S.) render *Mark Scalliot* (the author) equal in glory or renown to his *Sovereign Princess* and her best or most famed *actions*; neither is it voyced as the most important atchievement of her *Reign*, though it were an unusual improvement of the Powers of Mankind, over *Rebellious and vexatious Fleas*.

Ocnus (the God of sloth) in *Hell*, which are fit for nothing but to fodder *Asses* with. If our *Historian* mean by every little invention to encrease the Powers of all *Mankind*, as an enterprize of such renown; he is deceived: this glory is not due to such as go about with a dog and a hoop: not to them which keep dancing *Horses* and *Bears*; not to the practisers of *Leger-de-main*, or upon the high or low rope, not to every *Mountebank* and his man *Andrew*: all which with many other *Mechanical* and *Experimental* *Philosophers*, do in some sort encrease the Powers of *Mankind*; and differ no more from some of the *Virtuosi*, than a *Cat* in a hole doth from a *Cat* out of an hole; betwixt which that inquisitive person *Asdryas* dust *Tossoffacan*, found a very great resemblance. Neither is it worth the while to go about to dis-abuse *Man-kinde* about every little error: to rectifie every vulgar mistake about natural *Phænomena*, this is an enterprize God never delegated any man unto; *Moses* who was faithful in all his *Reiglement* omitted the contrivance of our illustrious *Society*: *Christ* and his *Apostles* mentioned it not, but were content by their Language to countenance those *Vulgar Locutions*, the Refutation whereof is now so Renowned and Important. It is the Utility of Inventions that acquires a Value to them. 'Tis not the encreasing of the Powers of *Man-kind* by the project of a *Diving-bell*, which our Nation holds Equivalent to the ending of a War, as the first Battle. 'Tis not a *Pendulum watch*, nor *Spectacles* whereby divers may see under water, nor the new *Ingenuity* of *Apple-Roasters*, nor every *Petty discovery* or *Instrument* of *Ingenious Luxury* must be put in comparison, much less be preferred before the *Protection*, and *Enlargement* of *Empires*.

“ That all Antiquity had such a Reverence for the Authors
 “ of Natural discoveries, as to bestow a Diviner sort of Honour
 “ upon them, that the Gods were worshipped with Temples and
 “ Altars, were those that instructed the world to Plow, to Sowe,
 “ to Plant, to Spin, to build Houses, and to find out New Coun-
 “ tries. — This is a tale hath so much of Ignorance in
 it, that I believe no School-boy ever uttered the like. The
 Task is difficult, if not impossible to state the several distinctions
 of

of the *Paynim Gods*, and to adjust unto them *their Honors*, according as they are distinguished into *Dii Longentes* or *Majorum Gentium* : and the *Semi-Dei* and *Heroes* and the *Semones* : It is true that amongst the *principal Gods* these are recounted,

Juno, Vesta, Minerva, Ceres, Diana, Venus, & Mercurius, Foris, Neptunus, Vulcanus, Apollo.

and although it be true that most of these were *Autors of Natural discoveries*, yet it is first observable how all *Antiquity* had such a *Reverence* for them that were eminent for *Moral vertue*, *civil Prudence*, and those *Qualifications* that inable a *Prince* to Govern well, that they made *Jupiter* to be the chief of all the Gods, and the most powerful of them all, whose *Fame* lay in the *Arts of Government*, in his Governing his Subjects in *Crete* with due admiration of *Justice*, in preserving his *Land* and *Naval-Forces*, in advancing of *Commerce* and all those *Sciences* that are useful in a *Society*. They made *Jove* the Father of *Pallas*, and *Mercury* the Deities of *Artisans* and *Mechanical Philosophers*. It is false that the Gods they worshipped with *Temples* and *Altars*, were those that instructed the world to plow, to sowe, &c. For it is evident that all these *Honors* were conferred on such as were not *Inventors*, so that he makes an *Antithesis* where there is none. For the deified *Emperors*, the *Heroes* and *Semi-Dei* shared all these *Honors* with the greatest Gods, and some of them in as eminent a manner as most of the others; which any man knows that understands what veneration *Hercules* was in, and what *Tenets* were vowed to him, and what *Priests* he had. Every *Writer* almost tells us of *Temples* or *Fanes*, called *Ἡρώα* erected for the Honor and the Worship of the *Heroes*; also of their *συνεοί*, & *ἱερῆα*, of their *Sacrifices* and Festivals; *ὡς ἡρώεσσιν ἱερῆα καὶ συνεοὶ δὲ δώματα ἔχοντες ἱεράς*. He was not deified for his *Natural Philosophy*, of whom *Virgil* saith,

The *Dii Majorum Gentium*, or those whom *Tully* reckons upon as having gained a worship generally before the world was aware, and he opposeth them to such as by their *merits* gained adoration: so that they were not worshipped as *Inventors*.

If you read the *Dedications* of *Altars* to *Augustus*, and other *Heroes*, you will see the *Laws* of them were the same with those of *Diana* in mount *Avinisse*. See *Resans Antiquit.* l. 2.

Thucid. l. 5. vid. Hen. Steph. in vocibus συνεοί, ἱερώα, ἱερά, &c. Nempe

Eclog. 1.

*Nempe erit ille mihi semper Deus; illius aram
Sæpe tener nostris ab ovilibus imbuet Agnus.*

It was the same person to whom Horace relates:

*Viventi tibi maturos largimur honores,
Jurandasque tuum per nomen ponimus aras.*

It was not for such curiosities that Julius Caesar had his place amongst the Gods, and how he was worshipped learn from Maro thus:

Eclog. 5.

*Ipsa sonant arbusta, Deus, Deus, ille, Menalca.
Sis bonus ô felixque tuis. En quatuor aras,
Ecce duas tibi, Daphni, duoque altaria Phœbo:
Pocula bina novo spumantia lacte quotannis,
Craterasque duos statuam tibi pinguis olivi.*

*Hæc tibi semper erunt, & cum solennia vota
Reddemus Nymphis, & cum lustrabimus agros.*

*ut Baccho, Cererique, tibi sic vota quotannis
Agricolæ facient? damnabis tu quoque votis.*

Refin. Antiq.
Rom. l. 2. c. 19.
Cicero de leg.
1. 2.

It is manifest then to any man of common reading, that the Gods, the Antients worshipped with Temples and Altars, were not only those that did teach them to plant, &c. And it is observable, that such as were deified upon any such account gained such Honors in the most ignorant times and Nations: the more prudent generations, which deified the vertuous, the wise, the valiant, conferred no such respects upon every trivial Inventor of Mechanisms. Even Rome did so contrive the Temples of Vertue and Honor, that there was no ingress for a Virtuoso there: no coming at the Temple of Honor but through that of Vertue. And Tully when he recites those merits which advanced men to Heaven, he names them thus. *Ast olla, præter quæ datur adscensus in cælum mentem, virtutem, pietatem, fidem, earumque laudum delubra sunt.* Even when the deifying humor possessed ignorant Mortals, I can frame no other judgment of things, than that there was much of chance in their advancement: for oftentimes the greatest Inventions did not gain one those Honors which

which were payed to inferior discoveries. I do not finde that *Tiphys* who first built a Ship, or *Triptolemus*, who was *unci monstrator* or *atri*, had the honors of *Demy Gods*: nor that *Péridix* who invented a Saw was deified, but when his Master cast him head-long from *Minervas* Tower in *Athens*, they feined that he

was turned into a *Partridge*, not a *God*: so that for ought I can perceive by this Story, had any man found out an *Ambling-Saddle*, he might have been thought converted into an *Owl*, in stead of being worshipped with *Temples* and *Altars*. Neither was *Dædalus* so deified for his ingenious way of *pimping* for *Pasiphaë*; nor *Perillus* for the *Mechanical contrivance* of the of the *Bull* of *Phalaris* the *Tyrant*. In fine, from the days that *Sparta* flourished to the Empire of the *Mancha* under the ingenious Author of the *Experimental History* of *Don Quixote*, I do not find that the little inventors of trivial and useless toys, though improvements of real knowledge, and of the powers of all mankind, have had that honor which *Mr. Sprat* intimates. I shall recommend unto my Reader the description of a most accomplished *Virtuoso* in *Maximus Tyrius*, his name was *Atithecus*, Serm. 8.

one not famous for ancient Learning, no Orator, Sophister, or notional Philosopher, but a man that was for the improvement of useful knowledge in Cookery, viz. *Hujus Sophista studium eo tendebat ut conficeret opus quod, quod voluptatem haberet una cum utilitate ipsa temperatum. Quippe qui concinnandis dapibus ita operam daret, ut escas acceptas ratione condimentorum temperamento, varietate, atque ignis ministerio vescientibus jucunditatem præbentes meliores multo quam pro natura propria efficeret.* None can deny

this person the repute of an eminent *Virtuoso*, an improver of the powers of man, and a discoverer of vulgar Errors, (I know a Member of the *Royal Society* who hath nothing in him but the skill to dress a *Carp* well) this man was admired by all *Greece* almost, but not deified: he met with no *Temples*, nor *Altars*, but coming to *Sparta*, he offered to reclaim them from their *Black Broth*, and wretched Cookery, and to instruct them in

These discoveries are greater than what our *Royal Society* have produced: so that they might have missed or *Temples* and *Altars* notwithstanding that they contrived the royal *Catherine's* first Model, and built the double keel Experiment; which how she carried her self upon a *tacque*, how she would bear up against the wind, how she would live in a great Sea, their *Historians* tell not, but puts us off with a *fib*.

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Maximus Tyrius
Serm. 8.
citante Jacob.
Mazonio de
comp. Arist.
Platon. Sect. 4.
pag. 256.

those dishes which might be called (in the phrase of our *Historian*) the *useful Arts of life*. But the Magistrates of *Lacedaemon* did summon *Mithecus* before them, and banished him immediately out of their Territories. I find in *Michael Cerrantes* in the Preface to the second part of the *Manchegal Experiments*, a narration concerning an ingenious person in *Spain*, who was esteemed as mad by his Neighbours, though he did those feats that that might have rendred him considerable to some of the *Society*, and gained him an immortal fame in *Philosophical* transactions. The passage runs thus: " There was a Mad-man in *Sevil* " which hit upon one of the prettiest absurd tricks that ever " Mad-man in the world lighted on ; which was : he made " him a Cane sharp at one end , and then catching a Dog in " the Street or elsewhere , he held fast one of the Dogs legs " under his Foot , and the other he held up with his hand. " Then fitting his Cane as well as he could behind , he fell a " blowing till he made the Dog as round as a Ball : and then , " holding him still in the same manner, he gave him two claps " with his hand on his Belly, and so let him go, saying to those " that stood by (which always were many) how think you " my Masters ? Is it a small matter to blow up a Dog like a " Bladder ? However in this the most Dull Members of the *Society* are redervable to their *Historian*. He hath shewed that the *Ancient Paynims* did worship such *Blocks* as some are now ; and that those heretofore would have passed for *Heathen Gods*, whom all sober and Serious *Protestants* look upon as *Heathens*. Their *Founders of Philosophical Opinion*, he says were only admired by their own *Sects*. But although Mr. *Sprat* say it, I am assured that *Plato*, *Pythagoras* and *Anacharsis* were admired by more than ever saw them, or were their particular *Scholars*, and followers. That *Aristotle* might admire his Master, and *Pythagoras*, and *Democritus*, and *Socrates* ; that a *Stoique* might pay very great respect to *Epicurus*, is as credible, as that *Tully* should esteem the Friendship of *Atticus* ; or *Brutus* revere *Cassius* ; or *Seneca* expatiate in commendation of the Tutor of *Metrodorus* : or that the *Seven Wise men* should so admire the wisdom of one another, as to transmit the *Golden Tripes* from themselves and

Preface to the
second part of
the History of
Don Quixote.

and followers, each to the other. But that those *Ancients* he so much talks of, did confer those *Diviner sort of Honors* upon the *Founders of Philosophical Opinions* and built some of them *Temples and Altars*, Mr. *Sprat* might have learned from *Tertullian*, who says, *Plerosque Autores etiam Deos existimavit Antiquitas, nedum Divos, ut Mercurium Aegyptium cui praeipue Plato adsuevit: ut Silenum Phrygium cui a pastoribus perducto ingentes aures suas Midas tradidit, ut Hermotimum, cui Clazomenii mortuo Templam contulerunt; ut Orpheum, ut Musæum, ut Pherecyden Pythagoræ Magistrum.* But it is too much to expect that our *Virtuoso* and *Divine* should have read *Tertullian*. These are not times wherein men have will or leisure to look into those *Antiquated Studies*; to be *Wits* and agreeable company, to be *Poets*, to see, and understand and write *Plays*; to talk of and pretend to certain *Toys* *Experiments*; these are *Cares* of such high concernment, that all *Philology* is but *Pedantry*; and *Polemical Divinity*, *Controversies* with which we are *Satiated*. Howsoever one would have thought the ordinary stock of *School-learning* might have instructed Mr. *Sprat* in the *Mythology* of the *Ancients*, better than to have ignored these things. He might there have learned that the *Thracians*, and particularly the *Getes* (the most *Just*, and most *Valiant* Nation amongst them) did deifie and offer *Sacrifice*, and pay all those *Honors*, which were held to be most *Divine* unto *Zamolxis*, who, whether the *Servant*, or *Predecessor* of *Pythagoras*, it matters not, since *Herodotus*, *Strabo*, *Laertius*, and the Author of the *Etymologicon*, all agree that he was reputed and worshipped for a God: *καὶ τὰς τοῖς ἑταῖς οὐκ.* So saith *Strabo* of him: *ὁ καὶ τῶν θεῶν, ὡς καὶ τῶν ἀνθρώπων.* saith *Laertius*; He was the *Founder of Philosophical Opinions*, if *Pythagoras* was a follower of his; and if *Pythagoras* taught him; he was the *Promulgator* of *Philosophical Opinions* in *Thrace*, and having taught them the *Immortality*, and *Transmigration of Souls*, and instructed them in their ways of worshipping God, without any mention of his *Experimental Philosophy*, it is averred that he gained the esteem and worship of a God. That *Hercules* was a *Philosopher* and disciple of *Atlas* who instructed him in the *Doctrine of the spheres*, and *Astronomy*, is as confidently

De An. 1. 1. 1.

Vid. Diogen.
Laert. lib. 8.
cum Notis
Casauboni,
Aldobrandini,
& Menagii.

Id. Schrevelius
in Virg.
Aeneid. l. 1.
v. 745.

dently avowed, as it is *He was Deified*. So *Schrevelius*. *Constat enim Herculem Philosophum fuisse. Et ratio est, cur omnia illa monstra vicisse dicatur.* It is manifest that *Hercules* was a *Philosopher*; and for that reason he is said to have overcome so many *Monsters* (which were but *Monstrous Opinions*) and it is as notorious that for the subduing of those *Monsters*, he was reckoned a *God*, honoured with *Tithes*, *Temples*, *Priests*, and *Sacrifices*; That *Plato* derived all his repute from the *Inventive* and *Experimental Philosophy*, is a thing I yet understand not, but that there wanted not such as reckon him amongst the *Demy-Gods*, in a time when men had given over the *Deifying of Ratchers*, is certain. *Hunc Platonem Labeo inter Semi-deos Commemorandum putavit: Semi-deos autem Heroibus anteponebat, & utrosque inter Numina collocat. Veruntamen istum quem Semi-deum appellat, non Heroibus tantum, sed etiam Diis ipsis praefereendum esse, non dubito, so saith August. de civit. Dei. l. 2. c. 14.* And that man of *Stagyra*, that *Idol of Disputers* is termed an *Heroe* by *Jul. Scaliger*, a man of as *inquisitive* and *Experimental* a *Spirit*, as any of this age or *Mechanical Society* ever produced. Read his *Character*, and despair of the like that it will ever be given to any of the *Virtuosi*, viz. *de subtil. exercit. 194. Sect. 4. Barbara ingenia levissimis momentis impelluntur ad Divini atque incomparabilis Herois Obrectationem. Duae namque sunt Aquila sola, in natura rerum: altera bellica laudis, altera literaria: Illa potentia, haec Sapientia: Caesar & Aristoteles.* I am ashamed to be put upon the *Proof* of those things, which their *Country School-Masters* should have taught them, and so should have prevented me this trouble, which I find not yet to be at an end.

"Their *Valiant men* and *Generals*, did seldom rise higher than to *Demy-Gods* and *Heroes*. But the *Gods* they worshipped with *Temples* and *Altars*, were those who instructed the world to *Plow*, &c. — By this *Antithesis*, any one will conjecture that the *Heroes* and *Demi-gods* had no *Temples* and *Altars*, which is a childish and unpardonable *Error*, as any *Boy* conversant in the *Roman Antiquities* will tell him, and I have shewed before: *Evander propter summam Sapientiam &*
Erudi-

*Eruditionem, pro Deo cultus est ab Aboriginibus: imo Romani Divinos ei honores tribuentes aram Condididerunt, & quotannis Sacrificia obtulerunt, sicut & alii Heroibus iidem fecerunt, ut testatur Dionysius Halicarnassaeus, lib. Primo. Ara Evandri erat in colle Aventino. No man ever took Hercules or Zamolxis, or Castor and Pollux and Quirinus, or those Roman Emperors that were Deified, as Julius Caesar, Augustus, and others for more than Demi-Gods and Heroes, yet had they Temples and Altars, Priests and Sacrifices, as every School-boy knows. Let any man enquire into the Ethnick Theology, and see if the Authors of Natural Discoveries either exceed in number or dignity the Heroes and Demi-Gods who gained an *ἀποθνήσκω* by their worth, by being Legislators, Generals, or Kings and Emperors: If they do not, (as 'tis certain they do not) what truth is there in what Mr. Sprat tells his Majesty, that a diviner sort of honor was conferred on them, than on the founders of Philosophical Opinions? And how far will they be to seek, that go to search Antiquity for proofs that an higher degree of Reputation is due to Discoverers, than to the Teachers of Speculative Doctrines, nay even to Conquerors themselves?*

"Nor hath the true God himself omitted to shew his value of
 "Vulgar Arts; In the whole History of the first Monarchs of the
 "World from Adam to Noah, there is no mention of their Wars,
 "or their Victories. All that is Recorded is this, they lived so many
 "years, and taught their Posterity to keep Sheep, to till the
 "Ground, to plant Vineyards, to dwell in Tents, to build Cities, to
 "play on the Harp and Organs, & to work in Brass & Iron, &c.
 I have already demonstrated the Ignorance of Mr. Sprat in
 Philology and humane Learning. Here he discovers himself to
 be as little acquainted with the Bible; and seems to have as
 little of Divinity, as other Scholar ship in him. It is more than
 the Text warrants him, to say, That God Almighty mentioned
 those Discoveries out of his Value of those Vulgar Arts. Who
 made him Privy to the Secret Counsels of Heaven? or who im-
 powred him to add to the Scripture? Doth he not fear lest God
 should add unto him the plagues that are written in that Book? Revel. 22. 18.
 It was good advice which Agur giveth, Add not to his words, lest
 Prov. 30. 6.

Such is the pulverising of Gold, when Moses burnt the Golden Calf to powder; A thing not to be performed in these days, without the help of Chymistry.

lest he reprove thee, and thou beest found a Lyar. Any man else who had considered how the thoughts of God are not as our thoughts; or have imagined that God took notice of those *Vulgar Arts*, out of a *Value* he placed on them, whereas he no where shews such an esteem for them, nor takes notice of more important discoveries, which happened within the compass of *Moses's* writing, and might have merited his regard, as well as these. He takes no notice who first discovered *Minerals*; whose Inventions were *Gold* and *Silver*, and *precious stones*; whose project it was to make *Linnen*, and *Silks*, and the like. If these *Vulgar Arts* deserved his sacred Remembrance, as they were *Arts*, it is certain then that all *Arts* deserved his Remembrance, and he would have been just unto them. I suppose him to have forgot his *Logick*, and therefore needs to have that old rule suggested to him, *A quatenus ad De omni valet consequentia*. But let us leave this *Secret* unto him to whom it appertains.

I desire to know by what right he calls those *Inventors* of the said *Vulgar Arts*, by the Title of *Monarchs*? Surely they were not such: for neither *paternal* right, nor *Primo-geniture* (if they create any *Sovereignty*, as I am confident they do not) could intervene here so as to justify him: for *Adam* lived to see *Lamech*, which was the *ninth Generation*: where then could be their *Monarchy*? or, who were their *Subjects*? Can any man imagine that *Abel* was ever a *Monarch*? or that *Cain*, at the time when he tilled the *Ground* (as his Brother kept *Sheep*) was capable of such a *Title*? or, that *Jabal*, *Jubal* and *Tubal-Cain* were *Monarchs* during the life of old *Lamech* their Father? this is not amongst the things Recorded of them. — “For there is no more said of them (if we believe “*Mr. Sprats* great Reading) than that they lived so many years, and taught their posterity to keep *sheep*, &c. But is this all that is recorded of them? Dare you avow the saying in *verbo Sacerdotis*? Is the *History* of the *Creation*, of *Paradise*, the fall of man, the punishments of his sin, the promise of a *Messiah*, the acceptableness of *Piety*, the odiousness of *impiety*, specified in the accounts of *Cain* and *Abel*, together with the examples of *God's* Vengeance pursuing sinners in this life, and the terrors of a guilty Conscience;

Conscience; Is the History of *Enoch's walking with God*, and his Translation; the Relation of the wickedness of the world, and of the Deluge ensuing thereupon; the severe prohibition of Murder; the preservation of Noah; the Sacrifice he offered at his coming forth; God's promise thereupon; His Covenant with Noah: Are all these insignificant passages not worth the regard, not so considerable as that Noah (subsequent to all these) planted a Vineyard? whereas he saith, there is no mention of their Wars or their Victories; How can he reconcile this with the Battle of those two mighty Monarchs Cain and Abel, in the which the one was slain, the other remained Victorious? Did not that puissant Prince Lamech kill a man to his wounding? But, above all, who could have imagined that a Virtuoso of this age should not have taken special notice of that part of the all which is recorded of those Monarchs, that relates to Lamech his having two wives? and that the rest begat Sons and Daughters most of them? As to the Discoverers of those useful Arts recorded in Scripture; it is usually observed by Divines upon the place, that the greatest Inventors, and the most ingenious at Experimental Philosophy, were the brood of Cain; and to pretend with so much ado to be the imitators of that wicked progeny, puts me in mind of a sort of Heretiques in Epiphanius, who derived their pedigree from Cain, and claimed Kin with Core, Dathan, and Abiram. Thus the Teufels a Family in Alman, are said to give as the Arms of their House, a Diabol Gules, in a Field Or. The conclusion of that Chapter in which God is pleased to Record those authors of Natural Discoveries, is very remarkable, intimating as if the rise of Experimental Philosophy, were the Ruine of Piety, and that whiles men were so busie about Earthly concerns they had forgot to worship God. Then began men to call upon the Name of the Lord. Which words admit of various Expositions, but such as all carry a reflexion upon the Inventors. Some read it to this purpose; Then profaneness began in calling on the Name of Jehowah. With which accords the Chaldee Paraphrase, Then the Sons of man left off praying (or, became profane, so that they prayed not) in the Name of the Lord. Others Expound it thus; that

Gen. c. 4. 26.

See Aysworth upon the place.

when

when the Holy Seed *Enoch, Mathuselah, Noah, &c.* saw impiety to encrease, and that men laid aside all fear and worship of God, to prosecute *Inventions* delightful and profitable, they began to be troubled, and to call upon God in a peculiar manner, and to preach *Repentance*. A third party thus senseth it, that when the Sons of *Cain* busied themselves in the discoveries of *Nature*, and the divertisements of *Luxury*, and were called perhaps, the *ingenious*, and the *Curieuse*, the *Saints* and Holy race did not seek to be denominated from their *Carvings* or their *Musique*; but the fear of the Lord, which is the beginning of all solid *Wisdom*: and by their calling upon the Name of *Jehovah* were contra distinguished from those *Experimentators*. Had I been as Mr. *Sprat*, I would have declined this part of the *Rhetorical Address*, by reason of this severe reflexion, which he must needs see was obvious to every Adversary.

“ And if they deserved a *Sacred Remembrance* for one *Natural* or *Mechanical Invention*, your Majesty will certainly obtain *Immortal Fame* for having Established a perpetual Succession of *Inventors*. — In the first place Mr. *Sprat*, I am to seek, How these persons could by their *Inventions* deserve at the hands of God? What *Doctrine of Merit* is this you would introduce? Is not the *Plowing* of the wicked, Sin? Are not the best of men to ask pardon for the defaults that attend their best actions? Is it not true, *Deus coronat in nobis sua opera*? What have we that we have not received? Where then is any desert or boasting? In the *Antapodosis* of this Period, I expected an inference, that God Almighty would have sent some new *Prophet* or Holy Pen-man to Record the *Natural* and *Mechanical Inventions* of this Age, to perpetuate their *Glory*, and the Establishing of the Succession of *Inventors*: But he promiseth no such thing: only he assures the King of *Immortal Fame* for Establishing this *Society of Inventors*: whether they invent any thing material or no.

When I consider the *Fallshood* of their *Natural Relations*, the many untruths which He and Mr. *Glanvil* and other *Virtuosi* obtrude upon us, as to the *Ancient Writers* and their *Ignorance*; and as to *Modern Writers* and their *Discoveries*; I fear the

testancy was introduced and *Communion* with *Papists* refused. The *Papists* themselves did avow it : they held that the *Church Catholick* could not Erre, and that *they*, that is the *Christians* in *Communion* with them were the *Church Catholick*. If the *Popes* *Infallibility* came to be asserted, it was by the *Canonicists* (*impious* and indeed *Blasphemous Parasites*) *Sic omnes Apostolica sedis Sanctiones accipiendæ sunt, tanquam ipsius Divini Petri voce firmatæ sint.* So saies *Gratian. Distinct: 19. Canon: 2.* But the *General Councils* of *Pisa*, *Constance* and *Basil* have sufficiently damn'd this *Doctrine*. *Leo* the Tenth in the *Lateran* Council said indeed, that none of his *Predecessors* had erred (but he evidently erred in saying so) yet henceither did nor durst say *they were infallible*. The *Jesuites* of late do (I confess) assert the *Popes* *infallibility*, but I well know the *Sorbon* and the (a) *Parliament* of *Paris*, and the (b) *French King* too have lately damn'd this *Doctrine* (of the *Popes* sworn *Janizaries*.) Nay so ridiculous is this assertion of theirs, that they neither tell us, nor know themselves, how he is *infallible*: whether by himself, or with his *Consistory* of *Cardinals* or a *General Council*? and then, what is a true *General Council*? who must call it? who have decisive *Votes*? and whether all or the *Major* part may be enough to make a *Canon*? Concerning these (and many such *Questions* more) they are not agreed, and so cannot assure us of what they are not assured themselves. If any *Pope* ever did assume a *personal infallibility* and *Soveraignty* in matters of *Faith*, any man might have rejected the bold *Affertor* without being an *Heretick*, or being guilty of *Apostasy* from the *Roman-Catholick Church*, for the *Gallican Church* keep *Communion*, and yet ever denied the *Popes* *infallibility*. In fine, the *Point of Infallibility* of the *Roman-Catholick Church* (I am not such a Fool as to say the *Infallibility* of the *Bishops* of *Rome*, for they are confessed to have Erred and that damnable some times) was not the occasion of the rupture betwixt the *Papists* and the *Protestants* at first; nor doth it now continue it otherwise then by accident, in as much as it hinders the *Reformation* of those

(a) Arrest de la Cour de Parlement portant que les propositions contenues en la Declaration de la Faculté de Theologie de Paris. &c. Da. 30. May. 1663.

(b) Declaration du Roy pour l'Enregistrement des six propositions de la Faculté de Sorbonne, &c. A Paris, 4. d'Aoust 1663.

Idolatrous Tenets and practises with which that *man of Sin* hath filled his adherents, and without the profession whereof no *Protestant* can be admitted to their *Church-membership* and *Communion*. Let any man but comply with them in these *Solemnities*, and I dare engage that he shall never be pressed *Authoritatively* to own that *personal Infallibility* of the *Pope* or his *Sovereign Dominion* in matters of *Faith*: So that there must be more *Important grounds* than Mr. *Sprat* intimates for that great *Action* of the *Reformed Churches*; or the imputation of *Malepertness* and horrid *Schisme* must be fixed on them: But the Truth is, they were *infallibly certain Certitudine fidei*, as assured as they were of the Truth of the *Bible*, and *Gods word*; and as *Morally* certain as *Metaphysicks*, natural (That is *Aristotelian*) *Phylosophy*, and *Skill of Tongues* could make them, that the *Papists* did hold such *Errors*, as none could know, and *Communicate* with, without hazard of damnation; Nor any *Ignorantly* profess and be saved, without the benefit of an hearty though *General* repentance, and the *boundless* (but not to be presumed upon) *Effects* of that mercy of *God* in *Christ*, which the *Antichristianisme* of that *Satanicall Synagogue* otherwise would frustrate. Tis not disputed betwixt *Church* and *Church* whether the *Pope* can add new *Articles* of *Faith*, or vary the old *Creed*: the current of *Popish* writers ascribe unto him no such *Dominion* over our *Faith*, nor to their *Counsels*. They are to enquire *Quid traditum est?* What there is of *Ecclesiasticall Tradition* in the *Scripture* and the *Church Doctrine* and *Practise*, and to determine *this* or *that* to be *de fide*, because it hath alwaies been *de fide*: Every *Point* that comes short of this *declaration*, is so far short of its *Catholicisme*, and the *Obligation* to believe it. And now let any man Judge whether Mr. *Sprat* were of the number of those that were *Satiated* (to use his own expression pag. 152) with *Religious disputes*, or of those that never looked into them; how necessary soever they be to the support of the *English Monarchy*, the *Church*, of which he is a *Member*, & the *Salvation* of his *Soul*, which is of more importance, then these *Natural Experiments*. I could have with

Nec modus ul-
lus esse debet
investi gaudi
veri: Et qua-
rendi turpis de-
fatigatio, cum
id ipsum quod
queritur sit pul-
cherrimum.

with more confidence cryed out, *How beautiful are his Feet and Hands*, had I found him employed in the *Gospel-work*, than in this *Society*. But he gives me no cause for this Exclamation: that which follows is of so pernicious consequence. — “Some of the *Reformed Churches* thought themselves obliged to forbear all communion with them, and would not give them that respect which possibly might belong to so *Antient & so Famous a Church*. — I am much to seek which of those that wear the name of *Reformed Churches* did ever hold it lawfull to hold Communion with the *Bishops of Rome*, and their adherents. For since the Question is not concerning *Civil Commerce* and Actions of *General humanity*, but concerning *Church-Worship*, and joyning with them in the *Sacrifices, Prayers, and Ceremonies* of their *most superstitious Mass* (to be present at and bear a part in the Service, and to receive the Sacrament are with them, as with the *Church of England*, tokens of the *Church-Communion*, and not the hearing of *Sermons*) and at other times owning them as a *Church of Christ*: Since this is the Question, I would willingly learn of our *Historian*, which of the *Reformed Churches* hath not forborn all Communion with them and taught it to be necessary to do so? It is true the *Church of England* hath upon very easy termes made way for the *Papist* to come to us, to communicate with us: The *Hierarchy*, the *Ceremonies* retained, the very *Liturgie* word for word being so framed, that whatever they hear or see at our Service is not repugnant to what their Church followeth; as *Mr. Hales* in one of his Sermons doth shew: And indeed they differ no more than a *Bible* with the *Apocrypha* from one which wants it. And this in great part is the foundation of our *Penal Lawes* against the *Papists*, because they do refuse to come to hear and assist in the same *Prayers* and service which their Church useth, or only condemns because it is not of the *Pontifical approbation*. If the *Papists*

Though Mr. Sprat teach us in this History that 'tis unci- vil to condemn the Religion of other Countries: Yet the Apo- stles were not bred up to that civility.

Mr. Chillingworth teacheth, that it is impossible for any to hold

External Communion with the Church of Rome and not to Communicate with her Errors: and declares he never met with any Protestant that held it lawfully, but he lived not to see our Inventors nor this History.

1 Cor: cap. 10.
ver. 20, 21.
1 Cor: cap. 6.
ver. 15, 16.

should comply in the manner demanded with the Church of England, it might then be said indeed that they Communicated with us; But not that we held Communion with them, except we likewise resorted to Mass, joyned with them in their prayers, and participated there; which is a thing our Homilies, the Articles of our Church, nor (I think) any of our Church-men ever taught, nor could it be done without danger of strengthening them in their Superstitious and Idolatrous waies, and the hazarding of the whole interest of the Kingdome of Christ as it is lodged in the Protestants, they being apt thereby to be ensnared, and from a mixing Fellowship with God and Belial come at last to fall into Popish Idolatry.

Certainly neither the Antiquity nor the Fame (Arguments so powerful with Mr. Sprat, but so ridiculous, so extrinsecal to truth, and Baffled by all Protestant Divines!) can warrant this procedure. This the Papists are aware of, who shew no such regard to the Ancient and Famous Church of England. And it is evident that Errors are not the more tolerable, but the more dangerous for being Ancient. Could antiquity or Fame give Credit to impious Communion or Civilities, how ought we to Reverence that old Serpent, whose Antiquity, whose renown, whose extent of Dominion is such, that all which Mr. Sprat so much admires, and Pleads for, is but a part of it. Mr. Sprat, Mr. Sprat let me tell you and some of your fellow-Virtuosi, that there is a tenderness for those without which is Cruelty to those within: and that you must have a care how you destroy those who profess the Gospel and for whom Christ dyed, to gratify such as live in opposition to him in all the Offices of his Mediatorship, & to whom he will say at the last day, I know you not, be gone you workers of iniquity. But I shew too much of the Divine, whilst our Historian shews so little: but I could not dispense with this Passage: and I wonder how it ever could be permitted in such a piece: lest it should be thought to be the Judgement of that Illustrious Society, and that they were making way for the Introducing of something else besides

besides a *New Philosophy*. It is a Caution which the *Apostle* suggests unto me, Take heed lest by any means this liberty of yours become a *Stumbling block* to them that are weak. For if any man see thee which hast knowledge, sit at meat in the *Idols Temple*: shall not the Conscience of him that is weak, be emboldned to eat those things which are offered to Idols? And through thy knowledge shall thy weak brother Perish, for whom *Christ* dyed? But when ye sin so against the brethren and wound their weak Conscience, ye sin against *Christ*, 1 Cor: cap. 8. ver. 9, 10, 11, 12.

"I can only apply my self to that good Nature, which
 "a Great Man has observ'd to be so peculiar to our Na-
 "tion, that there is scarce an Expression to signify it in
 "any other Language. — This Notion about Good Na-
 "ture hath so delighted Mr. Sprat that in his Discourse
 "against Mr. Sorbier, he thought fit to propose it to the
 "world, and here to repeat it again. In that Discourse he
 "makes this Observation to be an Instance of the pro-
 "found Criticisme of the Earl of Clarendon But cer-
 "tainly never was a great Minister of State so abused by
 "an ill defence as that Honorable person was, when such
 "poor things were alledged in his Commendation, he seem-
 "ed more depreciated by his Apologist, than by his Adver-
 "sary. I am apt to believe that the Great-man (yet whose Great-
 "ness, did scarce surpasse that of Sir. Tho. Moore, or the Lord
 "Bacon, to whom Mr. Sprat compares him) had other Ex-
 "cellencies then a Criticall knowledge of Ancient or Modern
 "Languages. But Mr. Sprat saies this of him — There
 "is Scarce any Language in the world, which can pro-
 "perly signify one English expression, and that is Good-
 "Nature. Though Monsieur Sorbier will not allow the
 "Noble Author of this Note to have any Skill in Grammer
 "learning, yet He must pardon me, if I still believe the ob-
 "servation to be true. — I know not how kind Monsieur
 "Sorbier may be unto him, and how he may practice a quali-
 "ty which is so hard to be Expressed: But I am sure, I cannot
 "indulge him in this Conceit: for if the French do not signify
 "the same by *un homme de bonne Nature et homme d'un bon*

Hist: of the
 R. S. Pag. 61.

naturel: I am sure that one shall find that the *Greeks* do equal the Emphasis of our *English* in that of *Ευθυς*, and transcend it in the word *καλεκαγυαθ*. What other Languages may do, it is for Mr. *Sprat*, and others to determine, without understanding them; I care not to render at present such testimony of my folly.

If any be not
so good a Gre-
cian as to be

convinced of the Signification of *Ευθυς* let him but read what *Hen. Stephanus* in his *Thesaurus Ling. Græc.* saith of it and he will no longer doubt.

Mistakes

"more drnk (neither hot, nor cold) then would mode-
 "rately quench and assuage his thirsty appetite: Thus
 "with luke-warm drink, temperate heat, and measurable
 "clothes *many Escaped*, Few which used this order (after
 "it was found out) dyed of the Sweat: marry, one point
 "diligently above all other in this Cure is to be observed,
 "that he never did put his hands or Feet out of the bed to refresh
 "or cool himself, which to do is no less jeopardy than
 "death.

Polydor. Virgil. Hist. l. 26. Henrici Septimi:

Eodem anno novum morbi genus pervasit totum regnum, sub
 primum Henrici in insulam descensum, dira quidem lues, &
 quam nulla sit ætas antea, quod constet, perpeffa: subito enim su-
 dor mortifer corpus tentabat, ac simul dolor caput Stomachum-
 que vehementi caloris ardore affectum angebat. Quo in mor-
 bo homines qui a principio erant, quia alii astus minus patien-
 tes, si in lecto erant, Stragula dimovebant, si vestiti, vestes de-
 ponebant; alii sitientes frigidum potum sumebant, alii demum
 patientes caloris fætorisq; nam sudor grave olebat, additis stra-
 gulis, sudorem provocabant, æquè omnes aut illico, aut non multo
 postquam sudare cœpissent, moriebantur, ita, ut ex omni agro-
 tantium numero, vix centesimus quisque evaderet. Neque
 ulla interim medicorum ars aut scientia quicquam opitulabatur,
 quin morbi novitas omnem illorum excluderet peritiam. Verùm
 post viginti quatuor horas (tanto temporis Spacio vis ejus
 morbi durabat) abeunte sudore, nonnulli confirmabantur: non
 eo tamen ita expurgati erant, quin iterùm atq; iterùm in
 morbum reciderent, multiq; inde perirent. Sed ea res reme-
 dium tanto malo ad ultimum monstravit: nam qui semel primo
 sudarant, cum deinde rursus ægrotarent, observabant ea quæ
 in primâ curatione, profuissent, et illis pro remedio utentes,
 addebant semper aliquid ad curationem utile. Item et illi iidem
 cum iterùm in idem valetudinis genus inciderent, ex priore
 observatione earum rerum, per quas se confirmassent, ita se cu-
 rare didicerunt, ut vim sudoris illius facile tolerarent. Quibus
 rebus ita usu venit, ut post ingentem mortalium stragem reme-
 dium

"dium unicuique promptissimum inventum sit, quod huiusmodi est,
 "Siquis interdiu sudore corripitur, cum vestitu protinus cubatum
 "eat: sin noctu, et in lecto, tum quiescat, nec se à loco moveat, usque
 "ad viginti quatuor horas exactas: interim ita se stragulis oneret,
 "quò non provocetur Sudor, sed sua sponte molliter stillet, cibi ni-
 "hil capiat, si tam diu famem tolerare possit, neque plus potionis
 "consuetæ ac calefactæ hauriat, quam modicè satis sit ad sitim ex-
 "tinguendam; inter hanc curationem inprimis caveat, ne manum
 "quidem aut pedem sui refrigerandi, recreandique causâ, extra
 "stragula proferat, quod facere letale est. Hoc remedium est
 "novò morbo inventum; qui tantum Angliam id temporis per-
 "vafit et posthac sæpè graviter afflixit.

Those of the R. S. that understand no more than Eng-
 lish may compare the account of *Hollinshed* (or *Hall* in his
Chronicles) with that of the Lord *Bacon*; the more learned
 may consult *Polydore Virgil*, and if they please *Fracastrorius*
de contag. l. 2. c. 5. *Pareus de pest.* l. 25. c. 5. *Hollerius de mor-*
bis intern. l. 2. c. de sudore. *Langius Ep.* l. 1. Ep. 19. *Beverovicus*
de. med. veter. part. 3. c. 3. pag: 222. *Tho. Cogan* haven of
 health, pag: 272. & *Senertus de Febr.* l. 4. c. 15. All of them
 will be presently satisfied how little the Physicians are be-
 holden to the Lord *Bacon*, as if he alone had recorded that
 Cure, which so many besides have committed to writing.
 Nay it will appear that the account he delivers of that
 Cure is very imperfect, and such as none but some such
 inconsiderate *Virtuoso*, would have acquiesced in,
 much less have recommended. For whereas the others
 direct that the sick party if dressed in his cloaths, should im-
 mediately lye downe, without so much as adventuring to
 put of his cloaths: This Circumstance, of how great im-
 portance soever is totally omitted: and I think that great
 caution of putting the Hand or Foot, or any part of the body
 out of bed, or into any cool place (which they all so severely
 inculcate) is not sufficiently intimated in that expression,
 of keeping themselves in an equal temper, both for clothes
 and fire. And whereas they say the Patient, must refrain
 from all meats, if possible, for 24 hours, which leaves the
 party at liberty, to comply with the vital indication, in
 case

They were
 not to sleep du-
 ring the twenty
 four hours, as
 Tho. Cogan ob-
 serves in the
 place aforeci-
 ted: and so
 doth *Caius*.

case of extremity, otherwise not; of this our renowned Lord makes no mention, nor that the same person might have it twice, or thrice; which is a material observation; nor mentions he the stench of the Sweat, and other Symptoms.

Some having
had it twice,
died the third
time of it, as
Cogan relates.

But concerning the *Nature* and times of the *encrease*, *State* and *decrease* of the *disease*: and the manner of feeding, and giving drink to the sick (they gave them *Beer*, *Ale*, *Wine*, as well as other *Juleps*) according to several exigencies and occasions (upon the observation whereof depended their *recovery*) it would be too long to transcribe the passages in *Caius*; and yet without the knowledge thereof this almost *Infallible medicine* would signifie nothing, or as little as we see good *medicaments* now do, when they fall into the Hands of a little dabler in *Physick*, who boasts himself a *Virtuoso*, or an admirer of them. But in those daies when *Caius* himself attended, and more particular directions were published in English for the instruction of the people, yet an infinite number of *Rich* (most of them) and poor were swept away. *Quoquò te vertisses, cadaver conspexisses. Continuus undiq; nolarum anearum pulsus, confusus sonus erat.* So *Caius*. Whose Book I do recommend to all inquisitive persons, as containing several *Curious* as well as *necessary* observations: nor will I doubt to say that if all that ever my Lord *Bacon* writ, were put into the Scales, (and the *History of the R. S.* and all their discoveries cast in) that single treatise of *Caius* for *Utility* would out-weigh them all, and deserves to be secured from Oblivion by *publick Authority*, least what afflicted this Nation so miserably at sundry times for fifty years space, should returne again, and produce as direfull effects as ever.

When I reflect upon this *remedy* as it is recommended to our admiration, and imitation by this *Historian*, methinks I begin to doubt that those persons will hardly be *punctual* in their own *Relations*, who have the confidence to obtrude upon us such an imperfect one from another. I question not but we are more secured by *Holinshed's* having set it down, than by its being inserted into the *History of the Lord*

Bacon, the works of the former will be so much more valued then the latter by our Nation, as long as they have any Judgment. The truth is the Lord *Bacon* is like great piles, when the Sun is not high, they cast an extraordinary shadow over the Earth, which lesseneth as the Sun grows vertical. In the account of the *Sweating-Sickness*, what understanding Physician can read without laughter the Character he gives of the disease. *It was a pestilent Fever, but* (as it seems) *not seated in the veins or humors, for that there followed, no Carbuncle, no purple or livid Spots, or the like, the masse of the body not being tainted: only a malignant vapour flew to the Heart, and seised the vital Spirits, which stirred nature to strive to send it forth by an extreame Sweat.* But *Polydor Virgil* and *Holinshed* prudently decline the controversy about the nature of a *Pestilential Fever*, and only tell us that *A deadly burning Sweat so assailed their bodies, and distemper'd their blood with a most ardent heat* (they being sick in head and stomach) *that scarce one amongst a hundred that sickned did escape with life.* He that tells me the disease is a *Pestilent Fever*, and the Sweat is an effect of nature endeavouring to expell the Malignity: puts me upon some thoughts that I should not have, if I took the Sweating to be the primary disease, or a Symptome consequential to its Malignity. And whereas our Lord saith *Nature did strive to send forth its virulency by an extreame Sweat*: I find not any such thing, for all that recovered were recovered by the continuance of a moderate Sweat: This experience and observation taught them; and the Physicians, imitating those operations of nature, did advise them unto it. All *Extream Sweats* either Spontaneously happening, or procured by Art, were Mortall. As to the Seat of the *pestilential venome*, it seemed not to that Lord to be in the Masse of blood and humors, but only in the vital Spirits. And why? because there followed no Carbuncle, no purple or livid Spots or the like. Is it then necessary that whensoever there is a *Pestilential Fever*, which affects the Masse of blood, that then there must be some cutaneous eruption, by *botch, Carbuncle or Spots*? No Physician will say it. *Nonnunquam evenit*

evenit, ut in febre manifeste Pestilenti, ac fortè cæteris maligniore, neque papulæ, neq; tumores, neq; ulla naturæ depulsio conspiciat. Massarius de febr. c. 24. But that the Seat of this disease was Principally or solely to be placed in the Masse of blood and humors appears, first from the occasionall external cause of it, a moist season preceding, which multiplied the like humors in the people; Next it is evident from the Symptomes that attended it, particularly the horrid stench of the Sweat, which issued from them that were sick of it: of which Polydor Virgil takes notice. *Sudor Britanicus est quidam Diarius, quia Spatio viginti quatuor*

horarum perficitur; ut tamen non ob id subverâ febre diariâ, quæ ex Spiritibus calfactis et putridis Fiat, collocari potest. Nam referunt Britanni medici, et proximi Belgæ, quod non solum ægotantes sudant, multoq; sudore perfundantur, verumetiam quod sudor iste est fetentissimus: ad hæc urina livida

apparent, ac valde corruptæ, sanguisq; aliàs per vesicam excernitur plurimus, alias effluit per nares, quin et per aures, quandoq; etiam per oculos stillat. Ex quibus colligitur putrefactionem esse in ipsis humoribus, alioqui laborantibus solis spiritibus urina non mutaretur, nec sanguis adeo copiosè efflueret. Septalius de peste l. 1. c. 21. I have have been thus particular about this disease, thereby to take of the repute a little of my Lord Bacon, as he fell in my way, whose steps our Society pretend to tread in; and that so exactly as even to mistake where he did. If any shall reply in behalf of that Lord, that He was no Physitian, and that in an History, we are not to expect an accurate relation of any disease and its Cure; I shall willingly allow of the Answer; but I must not allow Mr. Sprat that excuse, who (not owning the prescription to be any where else) remits us to the Lord Bacon for a Cure for the Sweating-Sickness, which is almost Infallible, and the preservation whereof in that book, secures the world from incurring the like hazard again: which it might have done, had the receipt fallen into the hands of some avaricious Doctor of Physick. Because

here is such adoe about a receipt, and that the *Society* promise us to record many more, (fully as good as this!) I shall inquire into the success of this *almost Infallible Medicine* a little further.

It is observed by Dr. Caius who lived and wrote during the last Sweating-Sickness, that it raged five times in this Nation. First in the year 1485. from the beginning of *August* to the last of *October*. This is the time Mr. Spyt relates unto. A second time in 1506. during the Summer. A third time in 1517. from *July* to the middle of *December*. A fourth time in 1528. during all the Summer. A fifth time in 1551. when it lasted above five months, beginning in *Shropshire* about *May*.

That the *Sweating Sickness* did rage again in the twenty second year of the Reign of *Henry* the seventh, I have already shewed out of *Hollinshead*, and of the success that *Method* had in curing it, which was indeed such as might give a reputation unto it, though not so great as our Historian fixeth on it. About nine years after. *An. D. 1517.* in the Reign of *Henry* the eighth, the *Sweating-Sickness* did much infect the Kingdome again: and since it cannot be imagined that in so short a time the people should have forgot a *Medicine*, which they are observed to have remembered *twice as long* before, let us see what effect this *almost Infallible Cure* produced.

Herbert in H. 8.
An. Dom.
1517.

“Truely the disease (notwithstanding this Course!) was of that malignity, as within the space of three hours it killed! This caused the King to leave London, and adjourning three Termes, 1517. to remove Trinity-Terme, 1518. to Oxford where it yet continued but one day and was adjourned again to Westminster. Nevertheless divers Knights, Gentlemen and Officers of the Kings Court died thereof, as the Lord Clinton, the Lord Grey of Wilton, and others of quality; the Vulgar sort so commonly perishing, as in some towns it took away half the people, in others the third part. The same disease again brake out under Ed. 6. 1550. It raged extreemly through the land, wherein died the two Sons of Charles Brandon, both of Dukes of Suffolk, besides an infinite number of men in their best strength; it followed only English men in Forreign Countries, no other people being infected therewith, whereby they were both feared and shunned in all places where they came.

Jo. Speed in
Ed. 6. Sect.
65.

What Speed saith concerning the *Sweating-Sickness*, that it at that time pursued the English abroad, without infecting the Forraigners where they sojourned; this is confirmed

firmed unto us by the learned and accurate Dr. Caius, who saith that it pursued (in the daies of Ed. 6.) the English every where, into Scotland, Holland and France. So that it was in vain for any of them to fly their Country. As to the Forraigners, even the Scots were not infected with it though living in England at that time: nor did the disease then spread abroad so as that the diseased English should infect the Nations they fled into, or conversed with. He observes also that in 1529. When the German ayre became infected with a peculiar sort of malignity (which yet did not difference the disease in its Symptoms or Cure) the same Sicknes did seise the Dutch, and not the English, viz. *Hi nostro aere & contagione non lœduntur, sed suo: nos non suis illorum sed nostri inficit.*

It were easy to prosecute this argument further, and to shew the vanity of this almost Infallible remedy (though amplified with all the circumstances any Physitian, except Dr. Caius, sets down) especially when it falls into the hands of Empiricks, and men of little reading; But I think such labour altogether needless to my present purpose; and it is a Supererogation of my kindness to the Vertuosi, that I give them this ensuing caution. He that would cure this disease as becomes a Physitian, must not rely upon one method alwaies especially in malignant diseases, but attend to the differences of humane bodies, different seasons of the years, and other accidents which alter mens bodies; and where humane search failes us in the discerning of the Causes of that sensible difference that is observed to be in the same disease at sundry times, he must, with Hypocrates, have recourse to the τὰ δεινὰ, in other cases to Dis-Syncrasies. Thus in some years the small Pox is fatall, notwithstanding the best Methods: In other times so gentle, that any Nurse can cure it. Some years the Plague and Pestilentiall Feavers are cured by Vomiting, bleeding, purging, and Sweating; In other years Vomiting, Purging, Bleeding, and Sweating, have proved pernicious: I shall Illustrate this out of the two great Plagues which happened at Leyden, in the Netherlands, one in 1624, the other in 1635. In the First Plague, all

that had *botches* behind their Eares, under their Armpits, or in their Groine, upon the applying of a vesicatory in a convenient place, and the botch being suppurated, and the matter evacuated by the adjoining vesicatory, the botches vanished without breaking, the malignity and matter contained in the botch venting it self by that other passage. In the latter Plague, although upon the applying of blisters, the sick amended, and the malignity seemed exhausted, yet did all the botches *suppurate* and *break*. In the *first* Plague all Women that during their being sick of the Plague, happened either *orderly* or *accidentally* to have their *Menstrua*, and all that had the Plague, and did *miscarry* there, these generally died: But in the second Plague, it was quite otherwise, many women recovered notwithstanding their *abortion*; and most women escaped that had those *Menstrua*, though it were *Symptomatically*. In the *First* Plague, all that had purple, livid, or black Spots dyed, almost. But in the *second*, many escaped who had those *Marks*. This *Henricus Florentius* relates upon his own knowledge in his additaments to *P. Paam. de peste. c. 2. pag. 47.* and with this passage I shall close up this Animadversion, referring all inquisitive persons to *Forrestus* and *Schenkius* in their observations upon this disease; whose *Cure* is so layed down by them out of *Caius*, *Tjengius*, *Vissenacus* and by *Tho. Cogan*, by *Pareus*, *Sennertus*, *Langius*, *Claudinus*, *Hollerius*, *Langham* in his *Garden of health* and others, that any one that is *Master of a General and diffused method of Physick*, acquainted with the *generall rules and cautions* and who by a *variety of reading* is acquainted with the *Multiplicity of malignant and Pestilential Feavers*, and that infinite discrepency that is observed in them, in their *Types, Beginning, Progress, Event, and Cure*, shall not be at any loss in that disease, should it return again, otherwise then what *human imbecillity* and the intricacy of the thing subjects him unto. But his *Method* I doubt will not be almost *Infallible*. But! what is all this to the *Historian*?

Hist. of the R.S.
Pag. 77.

"It was the fear of being circumvented, that made one
"of our wisest Kings delay *Columbus* too long, when he
came

(33)

“came with the promise of a *new world*: whereas a little
 “more confidence in his Art, and a small charge in furnish-
 “ing out some few ships would have yearly brought all
 “the Silver of the West-Indies to *London*, which now ar-
 “rives at *Sevill*,

I do not wonder that our *Historian* hath not read *Holin-
 shed* and *Polydor Virgil*; but how can he be excused for not
 being conversant in the Lord *Bacon*'s History of *H. 7.* whose
 words are these pag. 189. “It is certain that the Kings
 “fortune had a Tender of that great *Empire* of the *West-
 Indies*. Neither was it a *refusall* on the Kings part, but
 “a delay *by accident*, that put by so great an *Acquest*. For
 “*Christophorus Columbus* refused by the King of *Portugall*
 “(who would not embrace at once both *East* and *west*)
 “employed his Brother, *Bartholomæus Columbus* unto
 “King *Henry* to negotiate for his discovery. And it so
 “fortuned that he was taken by *Pirates* at Sea, by
 “which *accidentall impediment*, he was long ere he came to
 “the King; So long that before he had obtained a *Capitu-
 lation* with the King for his Brother, the enterprize by
 “him was atchieved, and so the *West-Indies* by *Providence*
 “were then reserved, for the Crown of *Castilia*. Yet this
 “sharpened the King so, that (not only in the voyage of
 “*Sebastian Gabato*, but) again in the Sixteenth and Eigh-
 “teenth year of his Reign he granted forth new *Com-
 missions* for the discovery and investing of unknown
 “Lands.

I do not find by this History that the King did suspect *Co-
 lumbus* for a Cheat, or put any *delayer* upon him because he
 was not satisfied with his Art. His Brother having been
 taken and detained by the *Pirates*, this *Columbus* applyed
 himself to the King of *Spain*, and had Transacted with him
 and finished his voyage, and first discoveries, before *Bar-
 tholomæus Columbus* could arrive and finish his *Capitulation*
 with *H. 7.* But had that prudent King doubted of his
 Art in a Case not yet tryed, where the *Discovery* seemed as
uncertain as were the length and *incommodities* of the
 voyage: and where the grounds upon which He went,
 F seemed

seemed meerly *conjectural*, how could he be blamed? For whatever private Intelligence *Columbus* had from a *Spanish* Pilot (that dyed in his house) or otherwise, he (being more desirous to make his Enterprize the *Child* of his *Science* and *Fortune*, then the *follower* of a former discovery) represented no other assurances that all was not Sea from the West of *Europe* and *Africk* unto *Asia* but *Seneca's* prophecy, or *Plato's* antiquity, or the nature of *Tides* and *Land winds* and the like. The Lord *Bacon* terms them only *Conjectures*, and these *Gentlemen* who hold that in those daies there was no Philosophy about the *Winds* and *Tides* whereupon one would rely, and those antiquities of *Seneca* and *Plato*, being but the dotages of two *Fooles* credulous and apt to conclude too soon, should not condemn the deliberate procedure of that King. Especially since the discovery of the *North-west* though grounded upon better *conjectures* (as my Lord *Bacon* saith) then those of *Columbus*, proved un-effectuall in the voyage of *Sebastian Gabato* whom the King did furnish out with a ship not long after: and so hath the prosecution of the *North-west* passage since that. I think I could evince further out of the condition that *England* was then in, not being so populous as of late years, the *Scots* being un-assured, *France*, *Spain* and the House of *Burgundy* emulating, if not hating him, and the *Fleets* and *Narvall* power of *England* being nothing to what it hath lately risen unto, that (considering our Scituation in comparison of *Spain*) it was not so easy a thing as he imagines, to have possessed the *West-Indies*, and effected that trade and commerce which the *Castilian* is now master of: but I shall not digress so farr.

Animad-

Animadversions upon the *History*
of making *SALT-PETRE*,
which was Penned by Mr. Hen-
shaw.

THis History of *Salt-Petre* hath so many defects in it, Hist. R. S.
Pag. 260.
that I wonder any one should offer such an ac-
count to them, and am more surpris'd to see it
approved by them and inserted into their *History* as a *Speci-*
men of their *Narrations* for the world to Judge how accurate
and inquisitive the *Society*, and its *Members* are. The *Nar-*
ration is not only imperfect; but in many parts false, so that
for ought I can discern, the *History* of *Nature* which they
propose to themselves, will not merit any more Credit (if
so much) then that of *Pliny*: and these *Experimentall Philo-*
sophers instead of undeceiving the age as to inveterate Errors
will multiply new ones. We are told in their *History* with Hist. R. S.
Pag. 99.
“ what caution they proceed in their Experiments, in
“ the making of them, and in the repeating them: they ob-
“ serve all the Chances and the regularities of the procee-
“ ding; what nature does willingly, what Constrained; what
“ with its own power, what by the succours of Art; what
“ in a Constant rode, and what with some kind of Sport and
“ extravagance; industriously marking all the various shapes
“ into which it turns it self when it is pursued, and by
“ how many secret passages it at last attaines its end; ne-
“ ver giving it over till the whole Company has been fully
“ certified of the certainty, & constancy, or on the other side
“ of the absolute impossibility of the effect. This Critical and
“ reiterated Scrutiny of those things which are the plaine ob-
“ ject of their Eyes, must needs put out of all reasonable dis-
“ pute the reality of those operations, which the *Society* shal
“ positively determine to have succeeded. — Nay, they Pag. 100.
“ tell us that there is not any one thing which is now appro-
“ ved and practis'd in the world, that is confirmed by

“stronger evidence than this which the Society requires; except only the *Holy Mysteries of our Religion*. Whether he intend to present the *Holy Mysteries of our Religion* as fabulous and ridiculous I cannot tell: but whosoever shall reflect upon this *Similitude* and examine the reality of their *Experiments*, and particularly of this concerning *Salt-Petre*, which is a common thing, and the *Instance* of their *care* and *exactness*, will hardly entertain any kind thoughts of these *Projectors*. Just as I was writing this, Mr. Bagnall had his workmen employed about the making *Salt-Petre* at *Warwick* and *Coventry*, whereupon I consulted with the Operators and received the subject of these following *Animadversions* from them.

De subtil. exercit. 104.
Sect 15.

Pharmacop.
Spagyric. l. 1. 7.

Epist. l. 2. Ep.
32.

As to that Question which he first proposeth, whether the *Salt-Petre* which we use now, and that of the *Ancients*, be of the same Species? He might have encreased the Catalogue of such as deny it, by adding *Quercetan* in his discourse of *Gunshot-wounds*, and *Brassavolus* in his Treatise of *Purging medicines*: *Ioel* in his discourse of *poysons*. As for *Scaliger*, he distinguisheth betwixt *Nitre* and *Salt-Petre*. He saith and proveth it that the *Nitre* of the *Ancients*, is not a thing lost totally, but common to be had in *Asia* and *Egypt* and even in *Tuscany*. And *Poterius* saith, he gathered it in several places about *Bononia*, and particularly in *Monte Paderna*. And if *Langius* be the Author Mr. Henshaw cites (I never heard of any writer called *Longius*, and am apt to believe it to be a mistake of the Printer) it is plain that he reckons our *Salt-Petre* as a distinct Species, and not as the same with that other of the *Ancients*. *Est et alia Nitri Species* (marke that!) *artis industriâ parata, quæ ex stirijs frigore in lapidibus parietum aut testudinum concretis, sensim distillantibus, saxis et cemento accrescit, aut ex putrida et salsuginosa in stabulis terra, veterinariorum urinâ conspersa decoquitur. Novum inventum, veteribus Medicis ignotum.* The distinction that *Scaliger* makes betwixt *Salt-Petre* and the *Nitre* consists in the *tenuity* of their parts, and upon the same ground he distinguisheth *Salt-Petre* from the number of *Salia Fossilia*, or *Salts* digged out of the Earth. *Tantum abest, ut sal petræ sit sal Fossile, ut*

et a Sale et a Nitro distet partium tenuitate. Tam enim sal quam ^{ubi supra.}

Nitrum ita uritur, ut cineris quippiam relinquantur. Sal petre

universum absimitur ab igni. What the judgment of Cardan may be, I know not; But *Nitzerus* doth give his reasons why our Nitre and theirs should not be of the same Species. Because that theirs was such as might be eaten with meats, and commonly drunk with wines; it was of a rosy colour, bitter, light, Spungy, and of an Earthy Nature. ^{de Sal. c. 18.}

Whereas our Salt-Petre hath none of these qualities. As for those that hold the Affirmative, their number is not so great as he represents them to be, nor is the general vote of learned men so favourable to that opinion. But the controverſie is laid aside, because we have none of that Nitre brought over unto us. Should it happen once to be so, or that we should meet with any Veins of it or Nitrous Waters in Europe where it were to be digged or made without Lixivating, it is not to be doubted but there would arise several disputes about the Mineral it self and the bodies, that separate from it upon refining. Since there is a great difference in the Salt-Petre of several grounds in England, and some having a greater proportion of Common Salt than others have, and some abounding much more with Sal

Armoniack than others, as the *Barbary-Petre*, or that which is cast out of the Earth in *Italy*, or hangs upon old Stone walls in *England*: whereas that which is made by boiling, participates not at all of the nature of *Sal Armoniack*. And that many little differences in the *Petre* besides these, might have been offered to the consideration of the Society, and found out by them in order to the improving of Gunpowder, is certain: but they are not so serious, as they pretend. And whereas Mr. *Henshaw* saith that the reason why the general vote of learned men hath been most favourable to that opinion of their being but one Species, was "because that in all Latine Relations and, prescrip-

<sup>Potius Phary-
mac. Spagir. l. 1.
c. 7.</sup>
The *Petre* of House-floors and the like which abounds with Common Salt, can never be so refined as to burn, or be so effectual, as that of better Soyl. The common Salt being in part inseparable.

"tions, the word *Nitrum*, or *Halinitrum* is most commonly used for Salt-Petre. I do not believe any man ever gave that reason: For the word *Nitrum* is of

Avicen con.
med. l. 2. ty.
2. edit. Plem-
peii p. 71.

Greekish original, *νίτρον & λίτρον*. The Greeks and Latines call that peculiar sort of Minerall, *Nitre*, which was in some places digged out of the *Earth*, in others made by the *Sun* operating upon little *Canales* made out of the *Nile*, and oftentimes it was cast up of it self out of the *Earth* (or bred there) in manner of a hoar frost, as it is now in the *Indies*, and *Barbary*; the *Arabians* called it *Baurakh* and mention two sorts, that of *Armenia*, and that of *Africk*. When

I here argue as if our *Salt-Petre* which is Extracted out of *Earth* by *Elixivation*, were unknown to the Ancients. And I confess that notwithstanding what *Tartaglia* and *Semionowicz* say (whose words I shall relate anon) I can not perswade my self but that if they had been acquainted with so strang a *Phenomeon* in nature, they would at one time or other have taken notice of this as well as of other waies of gaining *Nitre*. That none should either directly or casually let fall a word that might convince us that they knew it, is a strong presumption they were ignorant of it: and though there be no records that tell us when or by whom it was invented, yet it is more easy to comprehend how it should be a *moderne discovery*, and yet the Author unknown (a common accident!) then how it should have been known so long and yet never spoken of by those who have even in the making of *Salt* and *Nitre* taken notice of as minute circumstances.

the use of *Gun-powder* had rendred *Salt-Petre* so advantageous a commodity, and that modern Artists had found out this way of extracting it out of *Earth* by *Elixivating* it, they gave it the same appellation that the Ancients did to their *Nitre*, and came to use promiscuously the Names of *Nitre* and *Salt-Petre*, both sorts of *Nitre* being equally subservient to their ends, and being in a manner all one after refining; although *Curiosity* might be able to multiply distinctions from the different manner of productions, and different constitutive principles that occur daily in the making *Salt-Petre*. They were the more induced to give our

Salt-Petre the same name with the Ancient *Nitre*, because that they had continued the name of *Nitre* to the same sort of *Minerall*, though sometimes occurring in a white colour, sometimes *Black*, sometimes *red*: sometimes they had it naturally produced; sometimes it was artificially generated in their *Pooles* or *Canales*: Sometimes it was of so hard a consistence as not to dissolve easily in *water*; sometimes it was soft, of a loose texture, and as it were froathy. From this consideration the moderns thought it no incongruity if they gave the same name to their *Salt-Petre*, which the Ancients had given to a *Minerall* of so resembling a nature. So *Boetallus* saith, *Quaquam adhuc sub judice lis est, num hoc nostrum Nitrum*

Nitrum idem sit quod veterum, sensus tamen indicat hoc facultate illi haud absimile esse. Sed *Quercetan* saies, *Salpetra* nostrum a Nitro diversum est, nisi quod qualitatum communione forte quandam cum illo habet, quemadmodum sales omnes inter se communionem quandam habent. de vulner. Sclopet. Sect. 10.

We see in common Salt how great a variety is comprehended under the same appellation. Some is white, some black, some bay, some red, some purple, some digged out of the Earth, some made by the Sun; Some is bold to its consistence; in the taste there is great difference; some more pleasantly Salt than others, some bitter and ill tasted. Some Salt hath a rank smell; some none at all; and in the effects and uses to which Salt is applyed, there is so great a variety and discrepancy that we may justifie our calling the Common Salt-Petre by the name of Nitre. In the mean while it is apparent that the Latines could not use the word *Nitrum* or *Halinitrum* for that Salt-Petre which we commonly make; and they must be very ignorant persons that could avow our Salt-Petre and the Nitre of the Ancients to be of the same Species, because that in all Latine Relations and prescriptions the word *Nitrum* or *Halinitrum* is commonly used for (ours? or another kind?) Salt-Petre. If ever they had any such it was called *Aphronitrum* et *Spuma Nitri*; and not *Nitrum*.

But however Mr. Henshaw hath done less then one would have expected in the foregoing discourse; he would have done more than I, or any other, towards the determining the Question concerning Salt-Petre, whether it were the same or no, with that which the Ancients used and called Nitre. Let us listen to our *Vertuoso*, and marke how much the Members of the Royal Society surpass all others of the number of *Literati*. "If, saies he, I could have got any Egyptian Nitre at the Drugsters, I doubt not but I should have been able to have put an end to that Question, by a Demonstration, that is by turning the greatest part of it into Salt-Petre. Here I must first inform our Experimental Philosopher, that the Ancients had more sorts of Nitre besides that of Egypt, as the Armenian, African, Roman, Babylonian

vide Lauben-
bergium is aphor.
Sal, c. 18.

Hist. of the
R.S. Pag. 261.

Wattson, de
Sale, c. 18.

and *Macedonian*; and as to that of Egypt, perhaps besides that *fouleness* which is likely to adhere unto it by reason of the muddiness of the Nile, there might be so much of *common Salt* in it, as would render that part of his assertion false, wherein he seemes not to doubt but to turn the greatest part of it into *Salt-Petre*. His own Citation out of *Pliny* (pag. 263) evidenceth that the *Nitre* of Egypt was the worst, and most remote from our *Salt-Petre*. And when he should have done all this, Yet would his **DEMONSTRATION** be ridiculous, and be laughed at by every yong Sophister. I shall shape the Argument for him by which the Question is to be decided.

*Pliny and Kircher misad. sub-
terran. l. 6.
Sect. 2. c. 1.*

say that the Egyptian *Nitre* is so solid that it is cut out into Vessels. So the latter. *Nitrum juxta Cairum calore Solis tostum in lapidem, vasis conficiendis aptissimum convertitur.*

Egyptian

Egyptian Nitre may be turned into such Salt-Petre as ours is *Ergo*, That Salt-Petre which is now in use, and that which the Ancients used, is the same.

TO paralel this Argument ; is not this as good an inference, I can turn *Sublimate* into *Mercurius currens* or ; *Quicksilver* so as that the most part of it be such: *Ergo*, there is no difference betwixt *Mercurius Sublimatus* and *Quicksilver* ; and *Ergo*, whosoever makes use of crude *Quicksilver* makes use of *Sublimate*. Or, is not this as good a Demonstration, I can turn the greatest part of Salt-water into fresh: *Ergo*, Salt-water, and fresh are the same: and they that drink the former, and they that drink the latter, use one and the same drink. Or may I not demonstrate that the Ancients did season their wines, and Eat that which our workmen call their raw liquor, and put the Question out of doubt thus. I can turn Egyptian, Armenian, or Macedonian Nitre into Salt-Petre: I can turn the raw liquor into Salt-Petre: *Ergo*, the raw liquor and the other Nitre are all one, and they did eat (not drink!) this raw liquor. I am so well pleased with these kind of Demonstrations, that I cannot but suggest more of them viz. I can turn Gunpowder, the greatest part of it into Salt-Petre: *Ergo* Gunpowder is no new invention: & the Nitre of the ancients & our Gunpowder were the same. Or, I can turn native Cinnabar even farre the greatest part, 13 ounces of sixteen) into running Mercury or *Quicksilver*: *Ergo*, the Cinnabar and Mercury are all one, and whosoever useth or diggeth up the one, doth in Specie, use and dig up the other. But, what if Mr. Henshaw had lighted upon such impure Egyptian Nitre, as upon refining had yielded more of common Salt, then of Salt-Petre (which I shall shew to be possible enough) had he then Demonstrated the point ? Or would it not have been made evident that the Nitre of the An-

eients, and our *Common Salt*, had been all *one*; and that when they used the *one*, they used indeed, nay in *Specie* the other?

But Mr. *Henshaw* though he could not get any *Egyptian Nitre*, is apt to think that the Ancients did not understand the way of refining their *Nitre*, as we do: and that

To shew the differences betwixt these natural productions of *Nitre*, & what *Art* generates, consider that passage of *Kircher*: in *mund. subterr. l. 6. Sect. 2. c. 3.* Nitrum non purgatum continet ut plurimum tres substantias, *Alumen*, *Salem crepitantem*, et *Nitrum essentielle*, quæ ex ejus distillatione reperiuntur: *Alumen* quippe calcinatur cum fervore quodam et bullitione: *Nitrum purum* inflammatur consumiturque; *Sal* crepat, exilitque; probat id gustus *Aluminosus Salsus, nitrosus* — and a little after. Non est mineralium mixtorum fodina, aut vena metalli, cui nescio sane qua insita ambitione non associatur *Nitrum*. Inter cetera *Sali*, *Alumini Ammoniaci*, ceterisque *Salibus*, veluti, cognatione, proximis sibi non tantum adhaeretur, sed ea suis divitiis implet.

hence arise the different descriptions of their *Nitre* and our *Salt-Petre*: which I grant to be true; but yet those *accessionall Corpuscles* of so many different natures, participating of the natures of *Earth*, *common Salt*, *Allom*, and *Salt Armeniack* (and God knowes what else) make a very great difference betwixt the *one* and *other*, such, as in the common naming of things (even by *Philosophers*) may well serve to rank them as different. They will not have the same colour, nor the

same taste, nor burn in the same manner, nor appear in the same figures; they will not serve for the same uses, being Chymically Analysed, they will not yeild the same constituent principles. In fine, and upon which the controversie most depends, It will never appear that they were both made the same way. So that Mr. *Henshaw* by his *Demonstration*, had no way ended the controversie.

To shew his *Ignorance* a little more, I would have him to know that the Ancients had not only dark coloured and stony *Nitre* (which he informes us of out of *Pliny*) but white, and of those other colours I mentioned out of *Hofman*, and he out of *Galen*. And that the *Armenian* and *African Nitre* would have made more for his purpose, such as *Avicenna* and the *Moores* did use. And that the *Moores*, did either refine their *Nitre*, or Nature in *Barbary* was kind to them in producing better than yet we receive thence, will appear from the account of *Nitre* or *Baurakh*, which the *Prince* gives.

Nitrum

Nitrum probatissimum est Armeniacum, leve, crustosum, friabile, spongiosum, albo, aut roseo, aut purpureo colore, mordax: et Africanum quidem Nitrum cum ceteris Nitri generibus comparatum habet se veluti Nitrum ad Salem. Non estur autem Nitrum nisi magnam gravemq; ob causam. Nitri spuma est tenuior Nitro, ejusdemq; est potestatis. Laudatissima est vitrea (some read it molliuscula) ac fractu comminuitur; persacilis.

Avicenna: Canon
med. lib. 2. 67.
2. pag. 17.
Edit. Plemij.

Insigniter abstergit, et abluit, praesertim Africanum, et abradit, et purgat, crassos humores incidit. Atq; omnibus aliis Nitri speciebus modica inest astringentia vis simul et abstergentia, levis propter salsuginem, quam habent, praeterquam Africano, hoc enim nullius astringentiae est particeps, sed purum putam abstergens est et validum: Sali autem astringentia inest potestas, sed abstergentia non nisi levis et modica.

Out of which it is evident that the *African Nitre*, was free from the mixture of *common Salt*, and came very near to our *Salt-Petre* (especially the *Spuma Nitri*, which perhaps was *Cristalls of Nitre*) in resemblance and operation; but the *Armenian Nitre* was mixed with *common Salt*. But that they did Elixivate it out of the Earth I do not finde.

In the end of this page he tell us that in the refining of Salt-Petre there is besides *common-Salt*, a certain greasy Oil attending it, which doth by nature so wonderfully adhere to every part of the Petre, that the separation of it is the sole cause of the great charge and labour that is required to the refining of Petre. This is true, but I cannot find that our *Salt-Petre men* do call that Oil the *Mother of Salt-Petre*, but quite another thing, which I shall explaine hereafter.

Pag: 261.
262.
Hist. of the R.S.

In that other way which is followed by *Pietro Sardi Casimirus Semienowicz* and *Agricola* and other Forreigners, there is not that trouble in the making nor those Mothers that occurre in ours.

I cannot but take notice of that citation which *Mr. Henshaw* makes use of out of the *Exercitationes of Scaliger*. *Sublustris purpura quasi Splendor quidem in Salis-Petrae terris saepenumero est a nobis observatus.* This is perfect falsification of the text in *Scaliger*, & occasioned by *Mr. Henshaw* his not understanding well the *Latin-tongue*: *Scaliger* doth not hold that *Salt-Petre* is a *fossile Salt* as he repotes the *Nitre* of the

De subtil: exer
c. 104. Sect. 15.

Ancients to be; but to be a more *subtile* Efflorescence sticking upon the rocks, and dried by the Sun, and therefore called *Sal Petrae*, differing from the other in subtilty of parts, (as I related before) and hanging upon the stones like *Icicles* which are in Latin called *Stiria*, & *Cirri*: but Mr. Henshaw, not knowing how to English the word *Cirri*, nor having Patience to learn, Substitutes *terris* for *Cirris*, the text running thus. — *Sal fossile Sale marino Crassius est, tum propter coctionem, tum propter materiam: huic enim aquae, illi terrae plus. Utrunq; autem ipso est Sale-Petra minus tenue. Sudor enim est a Nitri quibusdam principiis secundum aliquam proportionem, sed adeo tenuis, totus ut Spuma sit, totusq; abeat in ignem.* — *Quod haeret rapibus, in quibus insolatur, ac propterea Sal petrae dicitur, analogiam habet, atq; affinitatis naturam cum ipso Nitro, sed aereum magis est, atq; ad Aphronitri potius veterum speciem vergens. Etenim sublustri purpure quasi splendor quidem in Salis Petrae Cirris saepenumero est a nobis observatus.* Out of which it is manifest that Mr. Henshaw altered the text grossly, and that Scaliger meant no more than to compare those *Cirri* or *Stiria* or *Icicles* of *Nitre* with the *Aphronitrum* of the Ancients. And however those *Crystalls* are *white* with us in our houses, yet to evince that they may be as well of another colour, as the *Aphronitrum* described by the Ancients, he saith, he had often observed in the *Salt-Petre* as it *Chrystallised* on the rocks a colour inclining to purple.

Hist. R S
Pag: 262.

“ And he that shall boyl a *Lixivium* past through a *Salt-Petre*-Earth, up to a consistence without filtering it through
“ ashes, or giving the Salt leave to Chrystalize, may perhaps
“ find something not unlike the *Nitre* of the Ancients.

I never thought highly of the observations of these men, and Mr. Henshaw here serves me with an instance so pregnant that I cannot pass it by. He pretended in the foregoing page to much converse with the makers and refiners of *Salt-Petre*, and to some curiosity in his own Experiments about it, but (alas) how vaine are his pretensions! how superficial his enquiries and observations! how little of accurateness is there in those *Scrutinies* which ought

ought to be so *Criticall* and *Severe*? where is that Certain-ty which we are to have from *them*, inferior to no *proofes*, but what convey unto us the *Holy Misteries of our Religion*! He observed before that there was a certain *greasie Oyl* in the *Minerall*; That Oyl is of such a nature, that if it be not separated from *Petre* it will never *Coagulate* into any *Cry-stalls*, or *imbody*: (I speak of our *Petre* to which he refers us) and it is his own own observation (*pag 273*) that after the *Salt-Petre* Liquor is *CrySTALLIZED*, there will remain some part of it that will not *coagulate*, being *greasie* and it must again pass the *ashes* before it be *boyled*, or it will never generate any *Salt*. The truth is *Salt-Petre* is one of the most odde *Concretes* in the world, exceeding *Sugar*: And howsoever Nature, and the Sun in the Earth, or *Nitre-panns* at *Nile*, may transcend our Art in the production of it, (the peculiar *Aire* of the *Climate* concurring) yet with us it is not made with that facility Mr. *Henshaw* here insinuates. After the Workmen have extracted their *Lixivium* out of the *Earth* in such manner as Mr. *Henshaw* describes afterwards; they boil that *raw Liquor* according to what he saies, two daies and a night: and when it is boiled to the height, though it stand never so long in the cool, it will not *ChrySTALLIZE* or *Coagulate* into any Lumps or Mass, notwithstanding that it is impregnated with a vast quantity of *Salt-Petre* and *common Salt*, by reason of that greasy Oyl: To evince this, there needs no more but this Experiment, which is well known to the *Salt-Petre-men*; if any one will cast a little grease, or tallow into the boiler, when the liquor is past the *ashes* and depurated, and boiled to the height, it will hinder the coagulation of it, nor will it ever become *Petre*. This *Liquor* thus boiled up, and as yet impure is kept by them for the *Mother of Salt-Petre*. Having prepared this impure Liquor and boiled it up as to a *proofe* as they call it, they put it into a *Tubb*, which they call the *Mother Tubb*. And this will never coagulate, nor *CrySTALLIZE*, but is called the *Mother of Salt-Petre*.

This Experiment of casting in the grease will not succeed in the refining, but in the first generating of the *Salt-Petre*. Besides it will boyl over with that violence that they know no way to allay it: This happens more if *Soap* be cast in.

And that for this reason, because that to make *Salt-Petre*, they boyl another Copper-full to the just heighth, and when it is come to *that*, they put into it some of *this Mother*, and (as soon as it begins to boil) they lade away as fast as they can the whole liquor into their Ash-tubbs, which when it is passed through, it will at the second boiling, let fall the *common Salt* and *Salt-Petre*, as he and I shall declare presently. At *Warwick* they boiled nine tun of *raw liquor* at once, and when this proportion was boiled to an heighth, they put in about half a tun of the *Mother*, and so made it. This is the way to produce the *Mother* when they are destitute: But when they have once made *Petre*, they keep that Liquor which remaines after the *Crystallizing* in the *panns*, that is kept in *Tubbs*, and is called the *Mother of Salt-Petre*, and this they carry about with them where-soever they go, thereby to save them the trouble of making *new* in the manner I described. Having declared thus much

This *Mother of Salt-Petre* is not so called, as if the Elixivated Liquor having been boiled and passed the ashes and after boiled to a *prooffe*, would not let fall the *common Salt* and coagulate into *Petre* at all: but because by these meanes it generateth a great quantity of *Petre* and the work is made much more easie. And it is observable that the *Mother* which remains after the generating of *Petre* is much more Efficacious then what is made otherwise. If the raw Liquor be, by negligence boiled too high it will become extream Oily or greasie: nor can it be cleared of it by ashes, except it be put in as *Mother*, to other boilings, and so pass the ashes. If the *Mother* be put in too soon it spoils the boiling; and if it beil in after tis at the height, it will over the furnace.

in order to the generating of *Salt-Petre* amongst us, I leave my reader to judge how much Mr. *Henshaw* clears up the matter by his imperfect accounts from *Barbary* and *Pegu* about the natural productions of *Nitre*. In which I observe that there is no account given of the nature of the soile, nor of those corpuscles that impregnate the Aire there, nor of the times of

the year in which it is generated, nor of the influence that change of winds and weather hath upon it. Nor how deep the veins of it lie, whether it be only generated in the surface of the Earth, and propagate downwards or whether it generate lower and propagate upwards. Whosoever shall make these reflections with me (and they are but necessary: I remember that where the Sun makes Salt in *Jamaica* at the *Salt-panns*, the times of the year and seasons of weather made

made a great alteration) he will think that it is not for this *Vertuoso* to blame the *Ancients* : And let any man consider the account which *Pliny* gives, as *Mr. Henshaw* cites him, and he will find even that *man* (as much, and as justly as he is condemned) was more accurate then our *Historian*. And if the learned *Theodorus Collado* passed this Censure upon his naturall History; viz. *Opus recreandis curiosorum animis, non Erudiendis Scientia cupidis, idoneum: nec Philosophicum, nec medicum, sed Historicum. Vir equidem fuit Studiosissimus; sed aliis in rebus occupatissimus* (*assiduitatem autem in Studiis artis requirit in medico Hypocrates*) *Aliquamdiu causas attitavit, ut de ipso Plinius alter ad Cæcilium* (*at necessaria est in medico,* *ait Hypocrates, παιδομαθὴν, didicisse artem à pueritiâ*) *tantum* 56. *Annos vixit, breve tempus: Junior Erat quum Scriberet;* (*at ars longa*) *Totum illud tempus dissentus impeditusq; quâ efficiis maximis, quâ amicitia principum egit, in Germania militavit. Itaq; horis succisissimis, ex variis collegit authoribus pulcherrima quaq; suo arbitrio, leuq; grata in unum digessit, per capita, nihil ex suo attulit: sed non potuit per otii angustias res exactè ponderare, et eliminare: Sæpè autores aut linguarum imperitiâ, aut sensus sermonum ignoratione, non intellexit, ut optimè in materiâ simplicium, Ruellius Dalechampiussq; annotarunt: in aliis partibus alii.* I say if this Character be Justly fixed on *Pliny*; what credit will some deserve who are farr inferiour in parts, in Judgment, in learning, and in curiosity to *Pliny*.

in append. adv.
Laurentium de
Error præfic.
c. 78 Sect. 6.

How will they be abused by *Artisans*, as *Pliny* by his authors? how much knowledge and Skill is requisite to enquire into the circumstances of *Mechanicall* productions? how much more to relate them? I could not avoid this digression, which any one will pardon, who considers what Just cause *Mr. Henshaw* gave me.

But I pray, which sort of the Ancient *Nitre* doth he think our *impure liquor* (if it were coagulated) would resemble? Since they had sundry sorts: as there be severall kinds of *Salt*, some digg'd out of the Earth; some made by the Sun out of Sea-water in the *Salt-panns*; some boiled out of *Salt-springs*; some made out of plants calcined: so there

were several sorts of *Petre* very much differenced in taste, colour, weight, shape; as I have shewed. The *African* was the best, and comes nearest of all to the *Aphronitrum* of the Ancients. Of this *Aphronitrum* I shall adde as little to what Mr. *Henshaw* saith, as he does to *Pliny*; they that have seen it can Judge better of it, then they who have not; but that which they found upon the rocks, and which *Scaliger* speaks of, was much different from what we observe in *England* in Vaults, and Arched Cellars or Walls. For that with us seems to be but the transudation of the *Saline* particles of the Lime and coagulating with some corpuscles in the aire, into an *hoare*, or *Chrystalls*; Nor did I ever see any but what was *White*: nor could I observe it to stick naturally to the Wall but in dry weather or when I made constant fires in my Chamber at *Oxford*, where it grew on the Walls near the ground, the Earth being higher much on the outer sides, then the floore within. At other times I supposed it too much diluted with moisture to stick on the Wall. But their *Aphronitrum* was of other colours, and grew out of naturall rocks and Vaults, and such was that which *Scaliger* saw. It is no strange news that Mr. *Henshaw* drew very good *Rock-Petre* out of those *Stiria*: nor is it any thing remarkable that a *Physitian* in *Shrop-shire* should frame a *Sal prunellæ* out of them, except he had given us an account of the differences betwixt that sort of *Petre*, and the common sort: As to the *Cures* he did with it, I would faine know whether they were such as could not have been done without it? and whether they were effected by that alone? or with the concurrence of other medicines? If the last, how comes the *Cure* to be ascribed to that *Sal prunellæ*? perhaps it was not Effected by it at all or in part only. If the *Cures* were such as might have been effected by other meanes, or by other preparations of common *Nitre*, what singular news did his *Shrop-shire* Physitian tell him? Every man of understanding knowes that crude *Petre* is as good, or better than that which is prepared by that calcination, with *Brim-stone*. And it is an usuall way of cheat with the Chymists by some little altera-

alteration in a Medicine, to pretend unto *Miraculous* discoveries in *Physick* and *such Cures* as never man performed besides, or before; and sometimes *their* medicines are but *old ones* though boasted for *new*. Such was that *Arcanum* of *Izzy berries* which was whispered into Mr. *Boyle's* Eare for a secret against the *Plague*: which yet was not only the secret of *Helmont* (as he observes) but was commonly used in *England* in a *Plague* which happened *Anno Domini. 1540.* As my *old receipts* say. It is in the *Garden of Health*, and other *English* receipt-books that are in *Print*. It is in *Alexius Pedemontini's secrets Lib. 1.* and out of him transcribed by *Antonius Schneebergerus* in his *Catalogue of Euporista* against the *Plague*. It is not easie to be imagined what a pudder some men make about a small matter; and certainly much learning and knowledg were a thing very desirable in this age, when a little goes so farr (being set off with impudence) and acquires a man so great repute.

“ In the torrid Zone and barren desarts of *Africa*, the sands
 “ are visibly full of *Nitre*, and those few Springs and Wells
 “ that are to be found there, are by that reason so bitter, that
 “ the *Moores* and their *Camells* are forced to make an hard
 “ shift with them in their long journies. — I do not
 understand the force of the Argument for the bitterness
 of the Springs from the *Nitrosity* of the ground; since Springs
 commonly participate not of the nature of the adjacent soile,
 nor have their Originall where they discover themselves:
 So *Salt-Springs*, and *Hot-springs* are found in places
 where the cause cannot be ascribed to the Soile, by reason
 of the many other Springs thereabouts that are of a different
 nature. And although *Baccius* be of his opinion, that
 the bitterness of these Springs is from *Nitre*: *plures inter Ru-*
brum mare et Nilum amara aqua inveniuntur, ob substantiam
Nitri quod in illis maxime partibus abundat, saporis exacte
amari. Yet I cannot assent to it, for this reason, that nei-
 ther the lake in *Macedonia*, nor *Nile* (in which *Nitre* doth
 naturally coagulate) neither of them are said to be bitter:
 particularly the *Nile* is esteemed the best water in the
 world *Suavissima illius fluminis aqua, quæ alijs omnibus vi-*
 detur

Hist. of the
 R. S. Pag. 264.

Gabr. Fallop.
de thermis c. 9.

detur preferenda. Alpin, de med. Ægypt. l. 1. c. 10. Yet this Nile, (Mr. Henshaw saith) washes the Nitre out of those deserts, and so becomes impregnated in such manner, as is related. Besides, Salt-Petre it self hath no such tast; nor the boiled liquor of it: and Fallopius saith, that Salt-Petre is rather to be discovered in waters by it's effects, than tast; For if it ever shew it self to the tast, it is by a certain Saline purging, and as it were a gently corroding acrimony, which affects the tongue, and with a quickness diffuseth the fresh sence of it, as Salt-Petre it self does. If Nitre ever makes water bitter, it is by reason of some heterogeneous mixture.

Hist. of the
R. S. Pag. 265.

“He observes that Lime doth strongly attract the corpuscles out of the aire, which either are Salt-Petre, or make it. — I wonder how this passage came to be approved of, since that when I made use of the like principles, in an account of some naturall Phenomena, relating to Jamaica, the publisher of the Philosophicall transactions, fixed a Marginal reflexion upon me as not solving the thing Mechanically.

He tells us that Salt-Peter is the life of Vegetables, and that the face of the Earth could not produce them, if it were not for this Salt. Yet (pag. 266.) he tells us that in clay, or Sandy Earth little of it is to be found: & it is certain that our clay-grounds (that are of a very Stiffe clay, as in Northampton-shire) yeild as good Corne as any in the world; and as good pasture ground, and feed as large sheep, and as large a breed of Horses, as this Nation boasts of. And I have seen in places in Jamaica, where there is nothing of Earth or mould, but immediate rocks under the sand, I have seen prickled peares, Mangroves, & other trees grow, and Melons also. So all grounds that are Gravelly, or full of Springs yeild no Sa't-Petre, yet do they abound in Plants: and even in pure water Mints will grow very ranke, in which the proportion of Salt-Petre is very small, as he confesses.

Hist. of the
R. S. Pag. 266.

“Husbandmen might make double or treble the profit they usually do of their muck, if they would lay it up under an Horrell or some covered place until they cary it out upon

“ upon their Land. — I would not have any man think that this improvement of a *muck heap* is the particular observation of a *Member* of the *Society*, for which all *Farmers* are redevable to hem. It was a thing known long agoe, and published by the *Writers* of *French* and *English* Husbandry. Not to mention others, take the words of *Sir Hugh Plat*, who lived in the daies of *Queen Elizabeth*, in his *Jewel House of Art and nature*, pag. 94. “ All those simple Sorts that leave their *muck-heaps* abroad, and subject to the weather, shew themselves to be but mean *Husbandmen*, and that they never tasted of any true natural Philosophy. For the Rain that falls upon those *Dung-hills* flowing down into the *Vallies*, doth also carry with it the Salt of the *Dung*, which dissolveth it self with the moisture : wherby the soil being afterwards laid abroad upon the land, doth little or no good upon it. But if thou wilt not give credite to my Speech, yet mark how the labouring Hind, when he carries his *Dung* to the Feild, how in discharging of his loads he leaves it in certain heaps together, and a while after he comes to spread it all over the ground, and layeth the same in equall level, and afterwards when the field happens to be sowed with Corn, thou shalt alwaies find the Corn to be more green and rank in those places where the same heaps were first laid, (after they have lain there some reasonable time) then in any other place in all the ground besides : and this comes to pass by reason that the Rain which fell upon them hath carried even the Salt through them, and conveyed it into the Earth that was under them.

“ I have been told by an experienced work man, that no place yeilds *Petre* so plentifully as the Earth in Churches. --- This was told Mr. *Henshaw*; but as *Experienced* a man told me, that it was false; & particularly at *Coventry* lately. *Pigeon-houses* yeild much more; and even here we must distinguish : for if a *Pigeon-house* be built on *Springs* or *Gravel*, either

the Eye in great-plenty: and the men came to desire the *Salt Petre*-men to work it, because he found it prejudiciall to his *Mault* which was not so good as when the Earth was less *Nitrous*.

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there

Hist. of the
R. S. Pag. 266.
At *Coventry* in
a Floor where
they couched
Mault, there
was so much
Petre that it
was visible to

there will be none at all, or little *Petre*: The like distinction is to be used in reference to the Scituation of *Churches*: *Salt-Petre* is begot in the Earth by a kind of *fermentation*. Stiffe *Clay* hinders that, and *gravell* is either of nature that *imbibes*, and *destroies* *Salt*, or else it is too open, and so gives a *vent* for those particles to *exhale*, that should *ferment*, and by *fermentation* transmute or Combine themselves into *Petre*, as also derive some principles out of the *ayre*, which contribute thereunto.

Hist of the A.S.
Pag. 266

“ Let the Earth be never so good, if it be laid on a brick Floor, or that is boarded, it will not be so rich in *Petre* as if it have free communication with the Exhalations of the lower parts of the Earth. — I am not satisfied that the streams arising from beneath concur to the production of it, because that the generation of *Salt-Petre* begins at the top, and from the surface of the Earth multiplies it self by *fermentation downwards*, which is the reason that the lower you descend, the less you find; Mr. *Henshaw* confesseth that if the ground be good, it seldome exceeds ten Foot in depth; commonly but six, or eight Foot: In *Warwick* (which stands on a *gravell*) it descends not above one Foot, as they assured me, though it be rich in *Minerall* at the surface. Besides in *Warwick-shire* there were Pigeon-houses that were floored with stone and with pebbles which yeilded as much *Petre* in proportion as any others.

He might have observed that the more Southward you work for *Petre*, and upon the Sun (as they Phrase it) the richer the ground is in *Petre*. And how old Mud-walls gather so much *Petre*, that it hath countervaild the cost to pull some of them down, and after rebuild them. The Elixivated *Asbes* laid in the Sun impregnated with the *Oile* and *filth* only, will in a short time breed *Petre* in the top, if no *Rain* fall.

“ If the Earth tast bitter, he is sure to have good store of *Minerall*. — This is not true, for the Earth hath not any bitter tast, but *Saltish* and pungent, with a quickness, such as is in *Salt-Petre*, Especially if you imagine in it a mixture of *common Salt* more or less, according as the Earth is, He

" He that shall cast Water upon a Ground fit to dig for
 " *Petre*, will only sink the Mineral deeper into the Earth; but
 " he that throwes Soap-suds on it, will quite destroy the
 " *Petre* (as the Workmen have a Tradition) and it very well
 " deserves a further enquiry. — It is impossible for Mr.
Henshaw to minde what he saies, I think. If any man cast on
 much water into a rich Earth, the water will not wash it only
 deep (water descends not very deep) but dissolves the *Petre*,
 and Soaks quite away with it, for that time. As for the
 casting Soap-Suds on the ground, that it destroys the *Petre*
 either for ever, or for that time, any more then much water
 Spilled would doe; it is but a foolish surmise: for should
 one cast Soap-Suds into the *Tubbs* as the *raw liquor* is ex-
 tracting, it would do no harm; the grease thereof not descen-
 ding with the liquor, but lodging in the remaining Earth.
 But should any one cast Soap or the *Suds* into the boiling li-
 quor, it would not only boile over irresistably, but never
 coagulate. So Soap (or Sugar) cast into the *Churme* is obser-
 ved by Mr. *Scot* to hinder the *butter* to come.

Hist. of the R. S.
 Pag. 267.

" That *Salt-Petre*, and the way of drawing it out of the
 " Earth, now in use, was a moderne invention, is generally
 " concluded by all Authors; but whether we owe it to
 " chance, or the sagacity of some great Witt, is as un-
 " known, as the time when it was first discovered.

Hist. of the R. S.
 Pag. 267. 268.

" It seems to have many years preceded the Invention
 " of Gunpowder, which by the *Germans* is ascribed to
 " *Constantine Aulitzer*, or *Berthold Schwertz* a Monk of
 " *Friburgh*, and was, in all probability, not long discovered,
 " when the Inventor (as *Polydor Virgil* tells us) taught the
 " use of Guns to the *Venetians*, at the Battail of *Fossa Claudia*,
 " when they obtained that notable Victory over the *Geno-*
 " *veses* Anno 1380. For there is mention made, both of
 " *Salt-Petre* and *Aqua fortis*, in the writings of *Geber*, a
 " *Spanish Moore*, and an *Alchymist*; but at what time he
 " lived, is unknown, though it be certain, some hundreds
 " of years before *Raymund Lully*, who lived about the year
 " 1333 and published some of his Books wherein he treats
 " of *Salt-Petre* and *Aqua fortis*.

Vide Casimirus
Semienowicz
Art: m. g. n.
Artell, l. 2. c. 1.
Pag. 61

It is apparently false even out of Mr. Henshaw, that Salt-Petre is no modern Invention. Nor can any man say so who knows that it is mentioned in the Scripture, in Pliny, Aristotle, Seneca, Dioscorides, Galen, Vitruvius, Philostratus in the life of Appollonius Tyaneus, Avicenna and many others, too tedious to recount. Nor is it less impertinent, that a Witt should speak it as a strange thing that Geber (who by the way, was no Spanish Moor, but an Apostate Grecian, as I shew Mr. Glanvill, and I believe never in Spain, but in the Kingdome of Fez; and living one hundred years after Mahomet, could not precede Raymund Lully but by very few hundreds of years) that He should mention Salt-Petre: though the mention of Aqua-fortis in him carry something of remarque. I demand of our Vertuoso whether Geber saith that the Salt-Petre in his daies was extracted and made as now? If he do not (as I am confident He used the African Nitre mention'd by Avicenna and others) what needed he tell us that Salt-Petre is spoken of by Geber, whereas he had before demonstrated it out of Pliny, and shewed himself inclined to their Judgment who taught that our Nitre and that of the Ancients were all one?

A more Logicall head would have thus delivered the thing here proposed by Mr. Henshaw.

There are several Mineralls that are called by the name of Nitre, or Salt-Petre: betwixt which the more accurate (that is the Ancients) did distinguish; so that one, the more impure was called Nitrum and Halinitrum; the more pure Aphronitrum; the most pure Spuma Nitri, or *ἀφρός νίτρου*, as Dalechampius observes. The Nitre or Halinitre was in Lapidious bodies sometimes digged out of the Earth, sometimes made by the Sun in the Nitraria or Canals of Nitrous waters. Of this last some being a better sort than others was called Aphronitrum, and was more freed from common Salt, and was gathered (as I may say) in the Nitre pannes, as it shor there in Lumps. Besides this there was a third sort of Spuma Nitri, which was the best of all: *Quae maxime laudatur: antiqui negabant fieri, nisi cum ros cecidisset pregnantibus nitrariis, sed nondum parientibus.* So that it seems

Plin. l. 31. c. 10.
lit. H.

Vide Galen. de
Simpl. medic.
l. 9.

Pliny l. 31. c.
10.

seemes they took the first small loose concretions for the *Spuma Nitri* before they came to larger *Chrystalls*, or lumps & stones: upon which account *Galen* saith it is like to *Wheat Flower*. Of this fine *Spuma Nitri* (which I confess is sometimes *Aphronitrum*; but not with *Acribology*) it was found afterwards that it might be had in *Vaults*, distilling from the stones in *Ice-icks*. And from hence, as also because it was found transfuding and coagulating on rocks, it came to be called by the Barbarous *Latines* after the *Moore*s had taught them *Physick*, and the *Materia Medica*, by the name of *Salt-Petre*. Besides these waies of finding *Nitre* there is another way of making *Nitre* out of *Elixiriated Earth*, which upon refining is brought to that purity as to equall the best *Spuma Nitri* and *Salpetra*, the Earthy particles and heterogeneous mixtures of common Salt, and other corpuscles that diversified the tast and colour and qualities of the former *Nitres*, being generally seperated from this: *Art equalizing*, if not exceeding the productions herein of Nature. How much the *Salt-Petre* of the *Ancients* differed from ours, is not now to be discussed anew: certain it is that the Invention of *Salt-Petre* (in it self) nor of any of those natural productions of the *Spuma Nitri*, is not *moderne*. Nor did any Author in the world, till these appeared, conclude so. But as to this *Elixiriated Salt-Petre* whether it be the same with that which the *Ancients* commonly speak of, hath been questioned; and I have already illustrated the point. And whether the *Ancients* were acquainted with the present manner of *Extracting* and *refining* it out of the Earth? this hath been disputed by many; and it is affirmed by most to be a *moderne Invention*, yet so as that *Tartaglia* saith they knew it as plainly as they did *Betony*. And the already mentioned and most diligent writer about Gunpowder saith, *Quod autem existiment nonnulli hunc Salem nostrum Pyrotechnicum esse recenter adinventum illud maxime falsum esse, vel hoc unicum argumento est, quod historici fide digni inventorem Pyrii pulveris vel summis laudum deprædicent encomiis, vel tot convitiis execrationumq; nominibus proscindant, non quod Salis Nitri novam aliquam inven-*

H 4

venerit

vide Semion-
wicz, ubi supra
Pag 63.

See his judg-
ment hereaf-
ter, in his dis-
course.

Casimir. Se-
mionwicz art.
magn. artiller.
part. 1. l. 2. c. 1.
pag. 63.

venerit Speciem ad perniciem Extirpationemq; humani generis, sed quod novum, necdum antehac usitatum pulveris nitri, ex certis Nitri (jam tunc optimè noti) Sulphuris carbonumq; portionibus mixti commentus fuerit compositionem. This Book was Printed at Leyden in 1650. and from hence any man may Judge how true that generall expression of Mr. Hershawe's is, that generally all Authors conclude it to be a modern Invention: and how impertinent that allegation of his out of Geber, and that ostentation of learning, is, in computing the time of Geber and Lullie's lives: wherein he mistakes too, for if we abstract from the authority of Leo Afer (to which I submit) it is not certain (or rather it is manifest to the contrary) that there did scarce intercede two Centuries betwixt Geber and Lully, if so much.

As to that he saith about the Invention of Gunpowder, it might have become our Vertuoso to have compleated his History, by taking notice of what our Country-man Dr. Read saith of it before that German Monk. I will endeavour herein to supply his omission of a passage that hath something of curiosity in it.

“ Bertholdus Niger, Schwarzh, or Black by Sirname. Anno 1380. a Franciscan Frier, and an Alchymist, found out the making of Gunpowder, and Ordnance which are now in use: He only perfected this mischief: for the use of Guns, although rude, was before: For in the time of Carolus Magnus, Gamoscus, King of Frisland, killed the Count of Holland, and two of his Sons with a piece, and Roger Bacon who died about the year of our Lord 1284. maketh mention of Gunpowder. Naclerus affirmeth powder and Ordnance, to have been Invented in the daies of Otbo the Fourth, Innocentius the third, in the year of the Redemption of mankind, 1213. Froissard Anno 1340 and 1353. maketh mention of Guns. Petrarcha who died Anno 1374. doth the like. (a) You may read in the History of Alphonfus King of Castile, when he besieged Algezira, a famous town of the Moors, 3 Aug. Anno 1342. that they in the town shot out of it bullets of Iron out of Ordnance according to Mariana. Yea Petrus Matterus affirmeth that
Bra's

vide Erastum
de metall. Pag.
111.

Dr. Alexander
Read of wounds
Sect. 15 Pag.
107.

(a) Sethus
Calvisius Chrono-
nolog. Pag. 752.
66. 2.

Brass Ordnance have been used by the *Chinoies* many ages ago. So that the Frier was not the *Inventor*, but *Perfector* of Guns and Powder. I have not opportunity to inquire into the citations of Dr. Read, but if I had been to write the History of Salt-Petre and of Gun-powder, I should have thought my self obliged to this inquiry, as much as to that which Mr. Henshaw begins with concerning the Nitre of the *Ancients*.

Here I must make a Protestation about the making of Salt-Petre, that I will not be understood to oppose Mr. Henshaw in any way, but such as is commonly followed in England; there is another manner of ordering it in *Agricola de Re metallica lib. 12. page 454.* which if it produce any *Phænomena* different from my observations, I do transfer all the discrepancies upon the variety of the process, and profess my own integrity and Candour in what I suggest. It ought to suffice that the men Mr. Henshaw converted with all, and those that made it at *Warwick* did take the same course.

Pag. 268.

That of *Agricola* doth agree with that of *Petro Sardi*, which I have added in the end of this discourse.

Hist. of the

R. S. Pag. 269

"If you are curious to know how rich your Liquor is before boiling, you may take a glass-vial, containing a quart, fill it with the common Water you use, then weigh it exactly; next fill the same glass with your liquor, and find the difference of weight which compared with the quantity of all your liquors, will give you a very near guess, how much Salt-Petre you are like to make by that boiling. — This is a very vain Experiment, and at best can hold true only in the richest mould that is found in Pigeon-houses in which there is little of the Cubique or Common-Salt. It seldom happens that their raw liquor contains nothing but Petre. They have oftentimes as much of common Salt as Petre, sometimes more, as in the raw liquor drawn from the floors of some houses. But besides the common Salt there is the mixture of other filth; and the greasy Oile, which will render the weight uncertain: except we think that the Salt in the Ashes supplies all that is lost in the percolation. It had certainly become our *Vertuoso* to en-

If the raw liquor be made with the two parts extracted from Pigeons Earth, and one

out of floors and the last contain much common Salt, the Pigeon-houses liquor cuts out (as they call it) or transmutes even that Salt, so as that there will be little or none in the end.

I

quire

quire what became of that *greasy Oile*; and what happens to the *Alcalifate Salt* in the *ashes*, since it is turned into *Salt-Petre* in the operation; at least it is certain that as it is *totally* drawn out in the *percolation*, so it doth not turn into *Cubique Salt* except the *raw liquor* be of a *peculiar* sort; as I have said.

Hist. of the R. S.
Pag. 270.

“When you have boiled it up to that height, that a little of it flirts off the finger upon a live Charcoal, will flash like *Gun-powder* (which for the most part falls out to be after two daies, and a nights boyling.) — It is strange that any man should write such a thing as this: first, let the *liquor* be never so rich of the *Mineral* which seldom happens, and void of *common Salt*, yet will not that (no nor the most refined *Petre*) flash like to *Gun-Powder*. Secondly, where the *Cubique* or *common Salt* abounds in it (be it more, or be it less) it burns more slowly, and will certainly *Sputter* in the burning. In fine, *this* onely *Sparcles*, being flirtd into the fire: the other tryall, by seeing that it is boiled high enough, if it hang like *Oile* on the sides of the *brassen Skummer*, is false: for if it be boiled so high, it is too fat to be recovered by passing the *Ashes*, and must be used as *Mothers*.

“At what time upon triall an hundred weight the of liquor contains about thirty five pound weight of *Petre*. — This is often times false, if ever true: for if the *liquor* hath more or less of *common Salt*, the product of *Salt-Petre* varies accordingly. And I say, it is seldom (if ever) true, because that in *Warwick*, they seldom had two hundred weight of *Petre*, out of Nine Tunne of *raw liquor*, yet did they never boile it near to that proportion in the *copper* which would agree with his computation.

“Fill up your Tubs with any sort of wood ashes. — He forgets here the putting in of the *Mother of Salt-Petre*: of which I have spoken already. And in his prescription of any sort of wood ashes, there is an omission of a considerable circumstance: for those ashes are best which abound most in *Salt*, of which there is a great difference: I remember in *Jamaica* to have tasted the ashes of several woods, and found scarce

scarce any Salt in them; and the *Ashes* of oak only the *Petre-*
men term'd a dead *ashes*: and *Chymists* generally observe
 that *Lignum-vitæ* yeilds little of the fixed Salt. If the
 places where the *Salt-Petre-men* do work, do not yeild them
ashes of wood that may serve their turne; they use then ei-
 ther the *ashes* of *Broom* burnt as it is green; or (which is
 no wood!) the *ashes* of green *ferne*, or *bean-straw* or *pease-straw*,
 which need not be burnt green; the older the better: they
 are better then *wood-ashes*: Concerning

Zwelfer. in
 Pharmacop:
 Augustan: de
 Sale Ligni
 Sancti.

the reason of their burning the *Broom*,
 and *Fern* green, I could suggest some
 remarkable observations, as to the differ-
 ent quantities of Salt, (and consequent-
 ly of vertues) in plants before their
 coming to maturity, or full growth; but
 I shall Satisfie my self now with shewing
 the mistakes and omissions of Mr. Hen-
 shaw, whereof this is one, of which I
 should have spoken (living in a place where the much
 use of the *ashes* of green *Ferne*, in washing, gives people
 occasion to observe the difference of *Ferne* at several
 growths, and the difference betwixt those *ashes* and others)
 but he gives me no occasion.

All woods say our *Petre-men* if burned
 green, yeild a *Salter ashes* then other-
 wise. But for *ashes*, the *Ash* is best, the
 young *thorn*, Second; the *Elm*, third;
Firrs and *Fern* burnt green (the younger
 the better) yeild a *Salt-ashes*; if dry,
 not so. Hence those *ashes* are not used
 in bucking of Linnen. The *Salter* the *ashes*,
 the lighter. If they lye dry a while, or
 till they be old they are the better for
Petre. They gather *Saltnefs* by lying.

“ Note that toward the end of your boiling, there will
 “ arise great store of Scumme and froth, which must care-
 fully be taken off. — He might have told us what use
 this is good for: if this *scummē*, and the *ashes* through which
 the *liquor* is percolated (insipid, but impregnated with the
 greasy *Oile*) be put into any convenient ground, they will
 generate there *Salt-Petre* in a shorter time, and much greater
 quantity then otherwise would be found there. Be-
 sides, if there rise such great store of *Scumme* and *Froth*,
 (which must needs vary as the raw *liquor* is more or less
 fowle) how shall any man conjecture, by weighing his raw
liquor against common water, at the quantity of *Salt-Petre* he
 is to receive?

Hist. of the A.S.
 Pag. 271.

“ Usually about that time it lets fall some common Salt to
 “ the bottom which you must take up with the said *Scum-*
mer

mer. — If there be a great quantity of *common Salt* in it, it falls almost all to the bottom, during the boiling: what remains of *common Salt* in it, granulates against the sides as it cooles, which at *Warwick* they suffered to be done in the *Cauldron*, without any distinct *Tubb*; what an observation did our *Vertuoso* loose here concerning the discovery of two so different *Salts*, at first swimming and mixing indiscernably in the *liquor*; and afterwards parting in this manner,

When the liquor is suffered to coole in the Copper, and begins to granulate, my artists laded it out into the shooting-pannes, leaving the turbid and seculent settling at the bottom; which (though Mr. Henshaw omit it) they put in again to the raw liquor, at any time, as it boiles: and it is their Judgment, that it increaseth the *Petre* though much of it be *common Salt*; the liquor yeilding a sensible quantity of *Petre* thereupon more then otherwise.

Hist. of the R.S.
Pag. 272.

the one *Chrystallizing* whilst the liquor is hot and boiling and remaining in great quantities: the other coagulating into *Sexangular*, not *Cubique* shapes, and that when it is cold and divided into *Shallow pannes*? Here are *Twenty* pages lost, that might have been *Expended* in *Luciferous Experiments*.

“When the Liquor is brought to this pass, every hundred weight of it containeth about threescore and ten pound weight of *Petre*. — Any one may Judge how true this is by what I have said before: it may happen that half of it is *common Salt*.

“When you find the *Cubique Salt* to granulate and stick to the sides. — Why did not he disgresse to tell us why it granulates at the sides when it cooles, and falls to the bottom when hot?

“Draw of your Liquor into deep wooden Traies. — Which if you do, it is ten to one but the weight of the Liquor will break out the sides of them: wherefore our men think it good Husbandry to use *Brass-pannes*.

Hist. of the R.S.
Pag. 273.

“That part of the Liquor which is not coagulated but swims upon the *Petre*, must be carefully powred off, and being mingled with new liquors, must again pass the ashes, before it be boiled, else it will grow so greasy it will never generate any Salt. — This is the *Mother of Salt-Petre*, of which I spake before. And if it (or the raw liquor, being boiled too long) grow so greasy, as not to

to be able to *coagulate* by any means; what must we think of his designe to counterfeite the *Nitre* of the Ancients?

“Then cast in by degrees a pint of the strongest Wine-vinegar, or else four ounces of Allom beaten to powder (some choose burt Allom and you shall observe a black Scumme to rise on the top of the liquor. — I saw as good *Petre* made at *Warwick* as any in the world, without this *cautelous* refining: they cast in nothing but good *Scouring* water, such as would bear *Soap* well, and continued the pouring of it, as long as any *Scumme* would arise. Nor did they lade the *Liquor* out into any *Setling Tub*, (as he proposeth) but suffered it to stand in the *Copper* till it began to *Chrystall* against the sides in such manner as the common *Salt* doth *Chrystallize* in the first boiling: then did they take out the liquor, leaving the *faces* and all that is foule at the bottome.

Here I must take notice of an omission of Mr. *Henshaw's*, in that having brought his refined *Petre* to *chrystall* & *rock* in the *pannes*, He then slightly transfers it into a *Tub* with an hole in the bottome to drain, and when it is dry, it is fit for use. But I found that our workmen took more care: For they took the large fragments of the *Nitrous rocks* and placed them in *Live-ashes* upright, and so the ashes did drain from the rocks that greasy and *Motherish* substance which adheres to the *Petre* extrinsically as it shootes, and which (if not separated this way) vitiates the colour, and takes of so much from the Efficacy and goodness of the *Petre* as there adheres of *Grease*. As for the smaller *Chrystalls* and *pieces*, which are too little to be so ranked, they are placed upon a sheet spread upon the said *ashes*, and so that *Motherish* humidity drains from them, and they become clear and white as *Snow*. The ashes being impregnated with this *Oile* are enriched in order to the generating of more *Petre*, when the liquor comes to be passed through them.

“The Figure of the *Chrystalls* is Sexangular, and if it hath rightly shot, is fistulous and hollow like a Pipe. —

Hist. of the R.S.
Pag. 273.

Hist. of the R.S.
Pag. 374.

This discourse concerning the figures of Nitre Crystallized proceeds upon the supposition that the Crystals are of that shape, which is a thing I never yet saw, at the making of Salt-Petre, nor Glauber de Signat Sal: nor I believe Mr. Henshaw. The shapes of the Crystals are very irregular. I found none fistulous: and the Rocks of Petre do not seem to be made up of sexangular concretions at all. I have seen else-where some shaped sexangularly, but not fistulous, no

more did Glauber. I observed, and so do the workmen, that in the coagulation in the pans there is commonly some protuberant concretions, which with the Crystals distinctly composing them have some resemblance of a rose, and were so called by our Artists. Why did not our Mechanic take notice and Explain that? The Crystals are the worst Petre, and shoot last, they burn as if there were resuscitated Allom in them; they make worse powder, and leave more scæ upon burning; and our workmen will not allow them to be the best sort of Petre: whether there be some interceptions of Aïre and water incorporating with the Nitre in shooting; or whether there be any resuscitation of Allom, which makes them burn with that Spumeous Ebullition, let such consider as magnify Crystals of Nitre in Physick; for my part I am satisfied that all preparations (how laborious and curious soever) are not improvements. Upon a solution of Petre in water, where the Liquor is not impregnated so high, as at the works, one may see such Crystals as Mr. Henshaw speaks of, if he proceeds carefully, and (as my workmen say) I have not had leisure to try since the intimation I use Barbary Petre, which is that which is usually sold. But I never visited the works, but I thought of a passage some where Mr. Boyle hath, that he could never observe such a regularity in the Crystals of Nitre, as is spoken of: inso much as he seems to doubt the assertion; if my Memory deceive me not. But that sometimes it happens, is certain; and that there are alwaies beautifull figures and complications above Mechanisme.

He should have done well to have told us, how this Mineral comes to be thus figured? and evidenced it unto us that it was performed Mechanically: This had been a much more generous undertaking, then the suggestion of an impertinent conceit of his, which I shall speak of presently; He should have shewed the configuration of the particles, what it is that gives them Motion; what it is that Sizeth them, and preserves them fistulous: This had been a curiosity worthy a Philosopher, that understands something more than common Formes. To tell us that nature acts the Geometrician, or that it is done by the agitation of any subtile Spirits, or matter, acting in a determinate manner upon particles of one configuration, whilest the others are agitated and cast off by a different Motion: I say this is no satisfactory discourse, nor very comprehensible, when we reflect upon the Liquor of the Salt-Petre how thick it is crowded, and into what fistulous Crystals it coagulates. For all this while, a man does not understand how Ingenious nature doth particularly and distinctly figure out those Crystals, nor the manner of that Speciall Geometry which she practiseth in this case. Should an Indian or other Ignorant person, ask concerning the making of a watch, or other piece of Clock-work, what was the reason that the hand did so exactly discriminate the houres; what was the reason of its so flow and equable motion

bearing

bearing such an unerring correspondence with that great revolution of the Sun ? and should any man answer that it was a peculiar conformation of parts (which consist of several mettalls) differently shaped, and placed in order to the composing of that *machine*, which the ingenious *Artist* had achieved: though this answer carry much of truth in it, yet doth it not solve the *doubt*, or satisfy a speculative *inquirer* : Nor if he continue his question further, will he be satisfied with a narration that those very materialls are apparently *Sand, Lead, Steel, Iron, Brass, &c.* differently agitated according to determinate *rules of motion*, whereby it happens that it keeps so *certain and constant* a course, in declaring of *Time*. This kind of *general knowledge* may content such as have not leisure to engage in more *accurate Theories*; but he deserves not the name of a *Mechanick Philosopher*, who doth not perspicuously declare the *matter*, and *configuration* of each part, the *Size and Use* of each *wheel*, the effect of each *Spring and weight*, and this either *Mathematically* to the understanding, or by *ocular demonstration* to the Eye. This had been an undertaking that would have ennobled Mr. *Henshaw*, had he gone through with it : and if he and his fellows despair of bringing things to this perspicuity, they had as good suffer us to be content, with our old *Formes*, and combinations of *Elements*, with which the world hath subsisted so long, and *Mechanicall ingenuity* been so far advanced, that whosoever is acquainted with the *delicious Luxury* of *Asia, Greece, and Rome*, will easily think all our *performances*, nay, *pretenses* not to equall their *reall Enjoyments*; and if there be any *one thing* in the improvement whereof our present *Artists* (I must not say *Philosophers*; the *Inventions* we boast of, being not theirs, but the discoveries of more *common and thick Skulls*) *Glory*, it is overballanced by the multitude of excellent things in which they surpassed us.

Mr *Henshaw* declines all these Speculations, to acquaint us with some other that he hath of this *Salt*, " Which
" if he could clearly make out, would lead us into the
" knowledg of many noble secrets in nature; as also to

"a great improvement in the Art of making *Salt-Petre*.—
I am so great a well-wisher to the *publick good*, that I shall
be willing to enquire into any thing, that may advance so
great & *Staple a commodity* as *Salt-Petre* is, and alwaies will be
as long as the use of *Guns* continues: and since it is the most
plausible pretense for the establishment of the *Royall Society*,
that they may and will meliorate and improve the *Manu-*
factures and *trading* of our *Nation*, let us with some heedful-
ness observe this *publick Essay* and tryall of their *Skill* and
Utility.

Mist. of the R. S.
Page. 275.

"First then you are to observe, that though *Petre* go all
away in *Gun-powder* yet if you fulminate it in a *Crucible*,
and burn of the *volatile part* with powder of *Coal*, *Brim-*
stone, *Antimony* or *Meal*, there will remain a *Salt*, and yet so
fixed (very unlike *common-Salt*) that it will endure the
force of almost the strongest *Fire* you can give it; which
being dissolved into water and *Spirit of Nitre* dropped
into it, till it give over hissing (which is the same with
the *volatile part* that was separated from it in the fulmi-
nation) it will be again reduced to *Crytalls of Petre*, as
it was at first.

De ferment. c. 3.

Anatom. Vi-
triosi tract. 1.
c. 10.

This *Curiosity* was the *Invention* of that *Honourable*
personage *Mr. Robert Boyle*, & a treatise writ upon the sub-
ject, which he was pleased to impart unto me long before
Glauber writ any thing of that nature, and I translated it into
Latine: It hath been made use of by *Dr. Willis* as an instance
whereby to shew that *Chymicall Fires* do not generate *new*
substances, but only divide asunder the first *constitutive parts*,
and exhibit them. *Angelus Sala* did reproduce *Vitriol* out of
the parts which he had separated *Chymically*, by remixing
them together. But neither do these few instances in the
behalf of the *Chymists* out of *Materialls* of a *Slight texture*,
serve to any other purpose then to make us more doubtfull,
not more intelligent: For there are so many *demonstrations*, that
those *furnaces* do generate *new substances* & that according
to the different regimen of the *Fire*, and the difference of it,
(being open or close) and the different *Vessels* and the diffe-
rent processes: it being also evident that by other meanes
quite

quite discrepant parts are disclosed, than what those vexatious Fires could ever reveal. that I think it impossible for any to submit his Judgment to such Convictions: And that the observations which Mr. Boyle raised from that Experiment were of such importance as Mr. Henshaw thinks, is a point which such as measure speculations by their Utility, will hardly grant.

"First you are to observe that though Petre go all away in Gun-powder, yet if you fulminate it in a Crucible, and burn off the volatile part with powder of Coal.——

"There will remain a Salt, and yet so fixed, that it will endure the force of almost the strongest fire &c.——

This same to me doth not seem so extraordinary a phenomenon, so as to merit an unusuall regard: for that Gold is as fixed a body as this Salt, is undeniable; and yet in the defla-

gration of Aurum fulminans, its particles fly away, though they may be caught under the forme of a purple powder, if the fulmination be performed in a close Vessell, as Dr. Willis observes, De fermentat. c. 10. so in Salt Armoniac, the common Salt will undergo many sublimations, without deserting the concrete: and yet it is an easy thing to reduce it to such a state of fixedness as amazeth our Virtuoso. Many other instances might be alledged: and therefore I proceed to tell the world, that though Mr. Henshaw entitle Mr. Boyle to this Noble Experiment, yet what he repeats of it, is taken from Glauber out of a book of his printed in 1659. de signaturâ Salium &c.—— pag. 28. whom yet he names not.

This is manifest from this that Mr. Boyle useth live pieces of coal to calcine the Nitre with: Glauber in his Pharmacop: Spagyric. part. 2. p. 28 & Mr. Henshaw cast in the powder of coal, Mr. Boyle Speaks nothing of calcining it with Brimstone, or Antimony, which Glauber doth: and so doth Dr. Willis: But the former prescribes the Regulus Antimonij Stellatus concerning the Experiment as it is performed with coale, I have this Scruple; That I am not satisfied by any observations

K

I can

In this reproduction of Petre, it is observable which Glauber suggests: viz. that though the acid and alcalisate Salts mortify Each other presently; non tamen e vestigio fit Sal Hermaphroditicus, sed necesse est ut aliquamdiu in aere collocati vitam et naturam ardentem quidam ipsos nudavit, recipiant. Hæc illis indicamus qui sales sine artis opera, animari posse forsas opinarentur. Prosp. Germ. par. 1 Pag. 101.

determent, c.
10.

De subtil. ex-
creit. 104. 15.

See the proof
of this in the
account of Pie-
tro Sardi
which follows.

If the coal be
not broad the
Petre as it
burns will run
over it.

Mr. Thibaut in his Art of Chymistry ob-
serves, that a spoonfull of Nitre cast into a
pot red-hot, will presently be in a flame and
vanish all away in Smoak Pag. 58. See him
also Pag. 53. Where he prepares Salt of Tar-
tar. So Glauber. Nitrum prae ardenti im-
positum totum conflagrat et in auras evanescit.
Pharmac. Spag. p. 2. p. 95.

* Dr. Ed: Jorden of naturall Bathes. c. 7.
pag. 35. edit. in 40.

† Jo: Roberts in his compleat Canonier, pag.
49.

I can make, that Salt-Petre, if it be rightly purified, will up-
on deflagration leave any such Salt behind it at all. But that
wheresoever any such thing remains, it is the product of a
common Salt, and other heterogeneous mixtures incorporated
with the Petre: I am moved to this doubt, by the saying of
Scaliger concerning the best sort of Nitre which he
terms Sal-Petre: viz. *Tam enim Sal quam Nitrum ita uritur,*
ut cineris quippiam relinquatur: Sal-Petre universum absimitur
ab igni. And in the tryalls of Salt-Petre which are made by
the best Artists Pietro Sardi & Casimirus Semienowicz, it is requi-
red of good Salt-Petre, that it burn all away upon the Table,
leaving no impurity or sculency behind. I have taken of the
best Salt-Petre at Warwick oftentimes to make this Essay, and
also to compare the Crystals, and white-rock-nitre: I put the
pieces upon a broad Pit-coal red-hot, and could see a differ-
ence in the burning of Each; and a different quantity of that
incombustible matter remain according to the different pu-
rifications; insomuch that as farr as my Eye could guide my
Judgment, out of an ounce of the best Rock-Petre there could
not remain half a dram if a scruple of that fixed Salt which
Mr. Henshaw speaks of. In the Crucible indeed upon burn-
ing with coal there did remain about a third part, when I

burned the best Petre: and more, ac-
cording as it is more impure. * Dr.
Jorden observes that the difference
betwixt Salt-Petre and the Ancient
Nitre, appears in this, that a pound
of Nitre being burn'd, will leave
four ounces of Ashes; Salt-Petre
will leave None. † And the common as-
sertion of our English Gunners about
the Goodness of Petre, is, If it be laid
on a board, and a coal put to it, and
it burne into the board, and leave
nothing but a black colour, and rise with a long flamed
ventosity and exhalation, it is well refin'd. But since the ob-
servations of Scaliger, & those other Artists of unquestiona-
ble credit, and my own Experience teach me that the quan-
tity

tity of what remains after the deflagration of *Nitre* depends upon its *impure* and *Saline mixtures*; and that pure *Nitre* Mr. Thibaut saith that in a Crucible it consumes almost quite away. pag. 34. burnt *openly* leaves *nothing* behind it; I am apt to believe that either there is something in the nature of the *Crucible*, Crucible it consumes almost quite away. pag. 34. or in the manner of burning *in it* in those Vessells, that causeth that *Phænomenon*. And perhaps there is not so much of untruth (*upon this ground*) in that saying of *Beguius*, Tyroc. Chym. l. 2. c. 4. that he that operates well shall draw a pound of Spirit from a pound of *Nitre*.

But let us suppose that there doth remain, otherwise than by accident, this fixed Salt, our Philosopher saith it is very unlike common Salt. A doughty *remarque*! It is very like any *Alcali*; if it be not common Salt reduced to an *Alcali*: though the mixtures of *Allom* and *Vitriol* may give it a little diversification sometimes. But where is the improvement he promised us all this while of *Manufacture* of *Salt-Petre*? Why it amounts to this! Take a pound of the best purified *Nitre* that you can buy, such as is already fit to make *Gun-powder*, distill it with three, four or five times as much potters Earth prepared in a Glass retort well luted in a close reverberatory furnace; giving fire by degrees till you come to the highest, which continue twenty four houres. Out of one pound of *Nitre* thus distilled, you may have four ounces of Spirit saith Mr. * *Thibaut*. But Mr. † *Hartman* upon *Crollius*, * Art of Chymistry. pag. 33. † De Spirit. Sal. Nitri pag. 133. saith there will come out of those red Spirits, but an ounce and an half or two ounces at most. Having gained this Spirit, let him take a pound more of as good *Petre* and burn it with a Coal in a *Crucible* according to the process of Mr. *Boyle*, or *Glauber*: and let him get as much fixed Salt as he can: breaking his *Crucible* into the bargain. I find that Mr. *Boyle* in his account of the redintegration of *Nitre* saith not what quantity of fixed Salt he had: only that he reproduced the *Petre* by pouring the Spirit upon the *Alcali*; and that he did not affuse so much of Spirit upon it, as the *Alcali* seemed to have lost in the burning: and yet not much less. In another place about *subordinate formes* pag. 350 he saith that *Nitre* upon calcination leaves only a third part, or perhaps more. But let him get what he can (I assure him that the fowler his

See Mr. Boyle's Experiment About the parts of Nitre Sect. 4.

Glauber de fig.
nat. Sal. p. 28.
29.

ubi supra Sect.
17.

D: signate, Sal.
ubi supra.

Petre is, the more he will get) and having dissolved it in raine-water, and filtrated it, let him powre upon it the Spirit of Nitre drop by drop untill the abullition cease: Then let him with patience expect for some daies, the redintegration of the Nitre: or if he be hasty, let him evaporate the liquor away till it come to a cuticle, then place it in a cool place, and in one night he shall find his Petre to Crystallize: Then powre off the liquor, and evaporate it to a Cuticle again, and to a third time till he have gotten all the Petre. Having allowed this Experiment all the advantages imaginable, which is, that our Operatour shall have such a quantity of fixed Salt as will redintegrate exactly his Petre (which may not happen, as I have demonstrated) so that having calcined one pound: and distilled another into Spirit he hath reproduced now one compleat pound of Petre: And that this Petre is as effectually for Gunpowder, as our common Salt-Petre: (which yet is an Experiment our Inventors and Improvers give no account of: Mr, Boyle saith his was more acid, then Salt-Petre is usually; and what alteration that Superfluous Spirit adhering is to the Crystals may produce, I know not. Glauber proceeds to dissolve again and filtrate his regenerate Nitre: and then saith *Quicquid post operationem Superfuerit in arenâ per evaporationem, donec cuticula appareat, rursus distillandum, et in frigore in Crystallum redigendum est, quæ, ut vulgaris Sal-Petre in usum adhiberi possunt.* And saith that if you will again calcine one part, and distill another, and reproduce Petre, you shall have more pure Petre than ever, and which will perform admirable effects in Physick and Alchymistry.) Granting, I say, our Operator all this happiness, I desire to know where is the great improvement in the Art of making Salt-Petre? How much Cheaper will this be afforded, then that which is usually sold? How much more Effectually will the powder be which is to be made out of it? Will a Thimble-full serve to charge a Culverin? Or, if there be requisite as much to the charge as of common powder: will the force be such that Each Bullet of a Culverin, or Canon shall do execution at the Texel, Algiers or Candia? Can you dispatch with a pocket-pistol from Arundell house the boldest pyrate within

within the *Straights*? Or, in fine, will this *Powder* last for ever without any decay, and by its *durableness* countervail the charge and Extraordinary trouble in the making? I cannot find a word of *all this*; nor any thing but what will convince any man that to make *Salt-Petre*, is but to loose his time instead of improving the *Manufacture*. I heard that Some of the *Society* had agreed mind to work *Silk* into *Hats*: which project though the *Hatters* laughed at, yet to satisfy them, tryall was made: and for twenty *Shillings* they had a *Hat* made but it proved so bad, that any one might have bought a better for *Eighteen pence*. I shall do Mr. *Henshaw* a courtesy, and tell people (besides the pretty curiosities observed by Mr. *Boyle*) that with all this trouble, and cost, though they got never the better *Petre*, yet *Glauber* tells you, this is the only way for any man to see the true signature and rightly-shaped crystals of *Nitre*: they will be all as white as Snow, long, slender, *Sexangular*, and so smooth that nothing can seeme more polished: and so discover that signature which God and Nature endowed *Salt-Petre* with. Si rectè operatus fueris, omnes Crystalli nullis exceptis erunt in longitudinem aequalem directæ, et Sexangula sine ullâ asperitate et Scabritie, quæ vera et genuina Salispetræ rectè et probè purgati Signatura existit. And is not this a considerable improvement in the Art of making *Salt-Petre*, to produce such beautiful Crystals, to shew the true figure into which that Salt naturally doth Crystallize? Some have represented the natural figure of that Salt to be *Cylindricall*: and I have by me some exact and large *Cylinders* into which it did Crystallize, but not from the *Salt-Petre* works: some have ascribed to it other shapes; Mr. *Boyle* found it to be *Sexangular*, but the sides not of equall breadth, and, each two whereof as they were opposite to each other, seemed paralell. *Glauber* saith that their shape will be such as I have described in *English* above, if you follow his way in making them. And is not this a notable discovery for such men as raise their Glory upon the shewing of *Sights*? Especially, if Mr. *Henshaw* Exhibit them also *fistulous*! which neither *Glauber* nor Mr. *Boyle* did!

de signat. Sal.
Pag. 29 30.

Experiment of
Nitre Sect. 5.

Senert. de conf.
Chym. c. 19. Mr.
Thibaut Pag.
59.

The other way of burning *Salt-Petre* to an *Alkali* with *Brimstone* is ridiculous, and such as any man that ever made *Salprunella* will laugh at. For the *Brimstone* doth not burn the *Nitre* to any *Alcaly* at all, nor inflames it at all, but serves to purifie it by consuming the *Sal-Armoniac* all parts or greasy heterogeneities, and precipitating its feces to the bottom of the pots till it become so transparent, that after those projections, and flagrations you may see the bottom of the pot though the melted *Nitre*. And this is so evident a thing that *Senertus* and Monsieur *Thibaut* are positive therein. *Pietro Sardi* (as you may see hereafter) and *Casimirus Semienowicz* in his *Ars mag. Artiller.* p. 1. l. 2. c. 3. do prescribe this very way of burning it with *Sulphur*, instead of the more tedious refining which is usually practised, in order to the making of *Gun-powder*. "*Imponatur Sal-nitri in*
"*vas aliquod cupreum vel ferreum, aut fistile vitreum, et*
"*igne vasi supposito, perq. solitos gradus aucto exuratur, donec*
"*Sal liquefiat et fervendo bulliat. Iam sumatur aliquantu-*
"*lum Sulphuris communis subtilissime pulverisari, et Salnitri*
"*liquefacto superinspergatur: et concipiet subito flammam, et quic-*
"*quid pinguedinis vel noxij terrestris Salis non sufficienter pur-*
"*gatus Sal-Nitri habuerit, exuret et multum clarificabit: in-*
"*jectio autem Sulphuris aliquoties reiterari poterit. Deniq. li-*
"*quefactum et purificatum Salemnitri Effundito in marmor poli-*
"*tum vel laminas ferreas aut cupreas, vel vascula aliqua*
"*metallica vel sigulnea vitreata, et frigesce ibidem finito. Ha-*
"*bebis jam Salemnitri congelatum, parium lapidem vel Alaba-*
"*stritem colore et duritie quam proximè referentem.* If that excellent *Lithuanian* found this to be as good a way to refine the *Nitre*, as that other by new solution, affusion of *Lixiviated liquors*, and new coagulation: If it be evident that *Salprunella* will *Crystallize*, and burn as other *Petre*: if it be certain that *Brimstone* cannot burn *Salt-Petre* (as *Senertus*, *Tartaglia* and *Semienowicz* avow) How shall we do for this fixed *Salt* or *Alkali* wherewith to make *Nitre* by affusion of the *Spirit*?

His calcining of it with *Antimony* hath as little of sence as the former: for besides that there is more trouble in the process

process, because that the *Alcalisate Salt* must be washed from the *Antimony*: which takes off from the *improvement*. If there be any *Alkali* in those preparations of *Diaphoretick Antimony* (wherein every Apothecary tries the Experiment) it is from the *common* or other *Salts* mixed with the *Nitre*, and not from the *Nitre*, part of which flies away with the *Sulphur* of *Antimony* as it *desflagrates*: the rest stais behind, and may be extracted with water, and reduced into *Crytalls* of *Nitre*, as a friend of mine tried, of which he keeps some by him. This *Schroder* and *Rolfincius* speaking of *Diaphoretick Antimony*, and its *edulcoration* confess, "*Aqua post primam*
 "*edulcorationem nitro graviora ad medietatem evaporata prabet*
 "*egregiam Aquam Anodynā. Eadem jussu evaporatione prae*
 "*in cellā subterraneā locata concrevit in Crytallōs, qui Nitrum*
 "*Anodinū vocatur. A Schrodero* LAPIS PRUNEL-
 "*LÆ ANTIMONIALIS indigitatur.*

Ralsine c. Chym.
in art. red. act.
l. 5. Sect. 7.
c. 2. pag. 377.

The vanity of Some men not knowing when they are well must be trying new conclusions although it be for the worse: and obtruding them upon others. What (if at all,) was to be done with plain coal, must for *Ostentation-sake*, be tried with *Brimstone* and *Antimony*. And it had been a more genuine observation to have acquainted the world how; after *Mr. Boyl* had found out a way to reproduce *Nitre* by affusing the *Spirit* to the *Alkali* of *Nitre* burnt with coal: *Mr. Henshaw* had found out a method how to reduce the *Alkali* of *Nitre* burnt with *Brimstone* and *Antimony* to *Nitre* without any new *Spirit* affused. Had he pretended this, it had been but an *ingenious imposture* for vulgar capacities: but now there is more of *weakness* than of *knavery* in the performance.

Had he told us out of *Mr. Boyle's Essay*, and especially out of *Glauber*, that the manufacture of *Salt-Petre* might be improved by affunding *Aqua Fortis* or the *Spirit of Nitre* upon the solution of *Pot-ashes*, or any *Alcalisate-Salt*; Nay upon *Sal Gemma*, *Bay-Salt*, common table Salt, or *Lyme water*, and that thereby any one might gaine *Crytalls* of *Nitre*, proceeding according to *Glauber. Prosper: German. part. 2. pag. 66. Et habebis purum putum Salempetra, instar alius Salis-*

bid pag. 65.

Petre ex pecorum aut pecudum Stabulis petiti, flammam concipientem. If he had hold us this, though the advantage would have been greater than by the *Alcali* of *Nitre*; yet would it not have been considerable, because of the *expense* and *Trouble*, and that it must be performed with the *brittle* materials of *Glasses*, as *Glauber* observes. But it would have illustrated a little what I mentioned about the *Lixivate Salt* in the *Ashes* through which the *Salt-Petre-liquor* is filtrated, shewing how the *Alcali* and *common Salt* are turned into *Petre* by vertue of that *Liquor*, which yet hath nothing of the *Acid Spirit*, whereby the *Chymists* generate theirs. Let us learn from thence how obscure the procedures of Nature are! and how different from those of *Art*! And let us leave off to say, that things are alwaies generated of those principles into which they are *Anali-fed*.

Hist. of the
R. S. Pag. 275.
276.

“That which I aim at then is, that if the *Spirit of the vo-*
“*latile Salt of Soot*, or of the *Urine, blood, hooves, hair, excre-*
“*ments* or indeed any part of *Animals* (for all abound with
“such a *volatile Salt* fixed and *Oile*, as *Petre* doth) could by
“the same way, or any like it, be reduced to *Petre* or some
“*Nitrous Salt*, not much differing it from it: it would excel-
“lently make out a *Theory* that I am much delighted with till
“I am convinced in it; which is, that the *Salt* which is found
“in *vegetables* and *Animals*, is but the *Nitre* which is so uni-
“versally diffused through all the *Elements* (and must
“therefore make a *chief ingredient* in their *nutriment*, and
“by consequence of their *Generation*) a little altered from its
“first complexion. And that the reason why *Animals* that
“feed on *Vegetables* are obliged by nature, to longer meales,
“than those that feed on other *Animals*; is, because *Animals*
“are fuller of that *Salt* than *Vegetables*: And indeed, such
“*Animals* are but *Caterers* of it for Man; and others whom
“nature’s bounty gratifies with a more *delicious* and *lusty*
“*Diet*.

“I confess I have been the more confirmed in this *fancy*,
“since I have often seen a friend of mine with a natural and
“*facile* *χρῆμα* convert the greater part of *Petre* into a
Salt

"Salt so like the *volatile Salt of Urine*, that they are scarcely
 "to be distinguish'd in smell or taste; and yet he adds no-
 "thing to it that can possibly be suspected to participate of
 "that nature. But indeed all *volatile Salts* are so alike, that
 "it is not easy to distinguish them in any respect.

I have been carefull not to dismember this last *Paragraph*,
 that the *Reader* might with one view survey this *strange*
fancy: and Judge better how little I impose upon him
 in the sequell of my discourse.

And first I ask our *Orator*—how he applies this *Speculation*
 to what he promised us in the introduction to it? *How does*
this improve the Art of making Salt-Petre? If an *ill Memory*,
 and a proportionate mixture of something else, be demonstra-
 tions of a great *Witt*, no man hath given greater testimonies
 of his abilities than Mr. *Henshaw*. Secondly, I demand why
 He is so *Solicitous* to transform the *Spirit of the volatile Salt of*
Soot or Urine &c into Petre: whereas any man that consid-
 ered what he went about would employ his care rather to
 coagulate the *volatile Salt with which the Spirit of Soot and*
Urine abounds with Spirit of Nitre, Aqua-fortis or the like
into Petre; or some such *Nitrous Salt*? But, behold the
Happiness of Mr. *Henshaw's* *Fansy* and the *unhappiness* of
 his judgment: That which he *Fancied* possible about the
 coagulation of the *volatile Salt* abounding in *Spirit of*
Urine with Spirit of Nitre into a kind of *Petre*, this *Experi-*
ment hath happily succeeded under the tryall of the Ho-
 nourable and inquisitive Mr. *Boyle*: but yet that *Theory* which
 he goes about to deduce thence is as far from being esta-
 blished thereby, as the *Artifice of Salt-Petre-making* is from
 being thereby advanced! From *Spirit of Urine* (saith Mr.
R. B.) and *Spirit of Nitre*, when I have suffered them to re-
 main long together before coagulation, and freed the mixture from
 the *Superfluous moisture* very slowly, I have sometimes obtained
 fine long *Crystals*, so shaped, that most beholders took them for *Cry-*
stals of Salt-Petre. But whosoever shal consider how much
 more trouble and cost there is in distilling those other *vola-*
tile Spirits than there is in the drawing of the *Spirit of Ni-*
tre: and how small quantities are like to be made this way,

L

and

Mr. R. B. Ori-
 gine of formee
 Pag. 125.

and those perhaps not serviceable in Gun-powder, will easily see that this project is as inutile as the former was in order to the improvement of the making Salt-Petre.

Oh! But it will excellently make out a Theory, that the Salt which is found in vegetables and Animals, is but the Nitre which is so universally diffused through all the Elements, a little altered from its first complexion. I remember that Scaliger taking occasion to complain of Cardan for some illogickall inferences, useth these words: *Dij benefecerunt, quod te feminam non fecerunt. Ad primam quamq; speciem promissorum exiluisse.* I must apply this *Sarcasme* to Mr. Henshaw, who could be deluded by such weak appearances of reason. Let us but shape an Hypotheticall Syllogisme for him, and consider the consequence.

De subtil. Exerc. 153 Sect. 9.

If the Spirit of Nitre being poured upon the Spirit of the Volatile Salt of Urine, Soot &c. doth reduce the Volatile Salt to Petre or some Nitrous Salt not much differing from it; then doth it follow that the Salt which is found in Vegetables and Animals, is but the Nitre, which is so universally diffused through all Elements (and must therefore make a chiefe ingredient in their nutrition and generation) a little altered from its first complexion. But the Antecedent is true Ergo,

Origine of
Formes Pag.
216,

In the first place it is evident by the Experiment of Mr. Boyle, that even Sea-Salt by the affusion of Spirit of Nitre may be turned into Petre. Nay Glauber teacheth us how Allom, Vitriol, Mineralls and Stones may be with more or less trouble converted into Nitre; why did not he extend his consideration about the Nitre in all the Elements, to them? Is it because that they abound not in Oile and volatile Salt, upon which he so wisely builds his Argument?

22 Append. ad
quint. part.
Prosper. Ger-
man. Pag. 20.
23, 25, 49.
46.

Secondly since it is made evident by Glauber in many places of his works, that the Spirit of Nitre is as it were the Seed of Nitre by which it propagates it self and assumes a body, as plants do, where it finds one agreeable: and such are not only

only (nay not principally : which he should have noted) the volatile but fixed Salts of any Creature? *Aqua fortis*, aut *Spiritus Nitri*, est quasi *Semen Salis-Petræ*, atq; hanc naturam habet, quando alijs Salibus, sicut semen aliquod vegetabile terra, mandatur, ut ex ipsis augmentum capiendo, multiplicetur, quemadmodum herbarum semina faciunt. This Seminall principle in Nitre seemes to have the approbation of Mr. Boyle : and if it be thus, as undoubtedly it is, and that those Salts (whither volatile or fixed) are but the materiall principle, I do not see any more validity in the consequence, than if I should say, because sundry plants grow in the Earth or Water, therefore the Earth or Water were but those plants a little disguised in their complexion.

Chymista Scep-
ticus, p. 249.

In fine, it is so farr from following hereupon, that Salt-Petre disguised is the Chief ingredient of the nutrition and generation of Animals ; that it doth not follow, that it is any ingredient at all ; but that there is something in those substances mentioned that may be converted into Petre, and is, as an Aristotelian would say, disposed fitly to be the Subject matter of that Forme. For as this Argument is shaped, what I say is as manifest, as that the constitutive parts of the Nitre, are to be the volatile Salt & the Spirit of Nitre: The one thing indifferant to sundry combinations and transmutations, and which hath nothing of the nature of Salt-Petre ; but is palpably transmuted ; since in the distillation of good Nitre there appears no such thing as volatile Salt : The other it is, that Specificates the predisposed matter, and generates Petre out of it ; so much altering the complexion, that the affinity betwixt that volatile Salt and Salt-Petre is no more than betwixt a man and a pumpkin. He talks of the complexion of the Nitre being a little altered : but I would faine know how little that is. Let me see the like Crystalls : a resembling flame, and other effects that result from the being and Specification of Salt-Petre. If Salt-petre be a chief ingredient in the generation and nutrition of vegetables, 'Tis either because of its bulke or Efficacy that it is chief ; but neither of these is true : For the quantity is not so great in vegetables or Animals, should we allow the volatile Salt and Nitre to be all

one. Not for Efficacy, because it is not made out that there is Nitre in the Sea, in clay-grounds or Springs, or in Countries remote from the Sun, yet here fishes and other Creatures feed, and plants grow: and consequently that cannot be a chief ingredient in nutrition, which may be wanting.

There is something else in Mr Henshaw that lookes like an Argument by the introduction F O R. ——— For all abound with such a volatile Salt fixed, and Oil, as Petre doth. I cannot tell how to forme this Argument, and yet convince the world that I do not injure him, this passage is so extremely ridiculous. Yet I will endeavour it, if it be but to shew the Logick of Anti-Aristotelians, and how much we owe to that providence which hath educated us better than to argue so. The proposition he aims at, and would prove is, That the Salt which is in vegetables, and Animals, is but the Nitre which is universally diffused through the Elements. The medium or Argument by which he would prove it is — is — is — harder to be found out than the meaning of Aristotle in his *Acromaticks*. Let us consider it again.

“That which I aim at then is, That if the Spirit of the
“volatile Salt of Soot, or of the Urin, blood, hornes, hooves,
“haire, excrements, or indeed any part of Animals (for
“all abound with such a volatile Salt fixed, and Oile as
“Petre doth) could by the same way (viz: as the redintegrated Nitre) be reduced to Petre, or some Nitrous Salt,
“it would Excellently make out a Theory that I am much
“delighted with, till I am convinced in it: which is, that
“the Salt which is found in vegetables and Animals, is but
“the Nitre which is so universally diffused through all the
“Elements (and must therefore make a chief ingredient in
“their nutrition, and by consequence of their generation)
“a little altered from its first complexion.

By his Favour
there is no
consequence in
that passage:
if it be the
chief ingredient
in nutrition, 'tis
so in generation:
for though nu-
trition be com-
monly by a new
generation of

Here is the Spirit of the volatile Salt of the parts of vegetables and Animals, to be coagulated and transformed into Petre by the Spirit of Nitre. — Here is a volatile Salt fixed, and Oile such as is in Petre! mentioned to what purpose

parts: yet in that which is properly generation, the Seminall principles and active are chief in nutrition; the materiall and passive principles are more regarded.

purpose

purpose! — Here is a *Salt* spoken of to be found in *Vegetables*, and *Animals*: yet 'tis not expressed whether it be the *volatile* or *fixed Salt*: yet these two are different, and those that abound with *volatile Salt* are more the *Physick*, than the *food* of man. — Well I have spent half an hour to frame a *Sorites*, or any tolerable *Argument* out of these words: but I cannot do it: but I will adventure to give our *Philosophers* this advise that they would take our *English* word *FOR* into their serious consideration, and abolish the use of it, as the *French Academy* at *Paris* did *Car*. Before I have done with this *History*, I shall shew that this *Intimation* was but necessary for them.

To proceed: How doth it appear that *Salt-Petre* abounds with a *volatile Salt* fixed and *Oile*? In the regenerated *Nitre* (which *Glauber* makes to be the best) there is nothing but *Alkali* and the *Spirit of Nitre*: in the *Nitre* which is generated by the mixture of the *Spirit of Urin* and *Spirit of Nitre* there is no such thing. In the distillation of *Nitre* there is nothing but *Spirit* (inseparate from *Phlegme*) and its *Alkali*: and as there is no *Oile* there, so I hope he would not have us take the *Alkali* for a *volatile Salt* fixed. In the making of *Salt-Petre* there is found indeed something that seems *Oily* and *greasy*: but that is *Excrementitious*, and so farr from being a constitutive part of it, that it must be Separated from it (as *Mr. Henshaw* knowes) before *Salt-Petre* can be made: and the great contrivance is how to separate it. So *Glauber* in *Prosper German.* part. 3. pag. 43. *alias enim pinguedinem nimiam contrahit lixivium, nec ullum Sal generabitur.*

From the mention of this *Oile*, I must take an occasion to tell the world how superficially our *Virtuoso* writes the *History of Nitre*: I could suggest many *curiosities* from the severall liquors in the making of *Salt-Petre*: But I have not time to discourse of the *Mothers of Petre*, nor how that *grease* being lodged in the *ashes*, those *ashes* being exposed to the Sun at *Warwick* did in one or two daies produce visible *Nitre* on the top of the *ashes*, so that in few daies those *ashes* become fit to be *Elixiriated* into raw liquors, which were before but to make a *Lixivium* to

purge the *liquors* that had boiled. I shall only touch at an Experiment which may not be unwelcome to the Honourable Mr. Boyle. I took of the *Mothers* that had stood long and were exceeding *Oily*: I powred four spoonfulls of them into a large *Venice-glass*, half full of water: This *greasy liquor* sunke to the bottom instantly without altering the *tast* or *colour* of the *water* at all: so that the top was *clear water*; the bottom of a *reddish colour* as *bilious Urin*: only on the surface of the *water*, and in the middle, there did float several very small *bubbles* of the *colour* of *water*: having let this stand a day: I took a Solution of the *Alcali* of *Salt-Petre* (which, though of a *greenish blew*, yeilded a *lympid liquor* upon *filtration*) and poured two or three spoonfulls into the mixture of *Mothers* and *water*: immediately the whole liquor turn'd *Lacteous* or *white*; but the colour presently contracted it self into a *white enaorema*, or *suspensum*, such as is to be seen in *healthfull Urin*, and so floated above the surface of the *Mothers*: the next morning I found as it were a *powder* fallen to the bottom, which I stirred up to the top, whereupon the whole liquor up to the top of the *water* was *turbid*. * I let it stand all night, and this morning the whole liquor from top to bottom is of one colour; and that exactly of a *Limon-colour*,

* After the *Glass* had stood some daies, the liquor lost its *Oiliness*, no *Crystals* did shoot at all, but it became a little *turbid* on the top there floated something here and there, like to a thin *cremor*, and on every side of the *Glass* from the top to the bottom thereof fixed themselves certain *molecules* which a credulous *Chymist* would as firmly have beleived to have been the rudiments of some plants, as that the *Salt* of *Harts-hornes* in distillation represents the *hornes* of *Staggs*; If you will imagine any Plant growing on the side of a wall, and that instead of the leaves of the plant, there were nothing but white filaments issuing from a root, such were these: all of them were of one bigness, and were ranked in some order. A chance hindered me from making further inquiries: nor indeed am I sollicitous about them.

The Phenomenon appears not if you look down right on it, but standing on one side at a distance.

or like old *Hoccomar-wine*; on the top there seems to float thin *coagulations* of fat with some variety of colours, such as one may often see on small waters that stand in *Moorish* grounds: the liquor is nothing nigh so *acrimonious* and *purigent* as the *Mothers* were: and all of it is as *greasy* as the *Mothers* were, when *Separate*: hanging on the finger, as *Oile*, and not like *water* at all; at the bottom of the *Glass* there lies a *Yellow-sediment* as 'twere *powder*, which upon agitation will not rise of it self, but must be stirred up with something, and

and then resembles the white *Hypostasis* of *Urin*, with *capillary filaments* interweaving each other.

And, How doth it appear that *urin* doth abound with a *volatile Salt fixed*, and *Oile*? I do not understand what he means by his *volatile Salt fixed*: by what is it fixed? to what degree? *volatile Salts* are sometimes so fixed, as only to abate, not alter the *volatility*: as the *volatile Salt* of *vipers*, in *Zwelfer*: and the *volatile Salt* of *Harts-horn* (of which I keep some) with rectified *Spirit of Salt*: Sometimes they are so fixed as to loose the nature of *Salt* and to become *insipid*, and *indissoluble*: as when *volatile Salts* are mixed with *Lime-water*: There are a sort of *Salts* which *Zwelfer* calls *Salia Essentia*, which are not to be called properly *fixed*, nor *volatile*, being *media quasi natura inter utraq;* *Salia*, *volatilia Scilicet*, (*quæ instar Spirituum levi ignis calore concitata sublimè petunt*) *et fixa*.

*Zwelfer. in
Pharmacop:
Aug: pag. 486.
Edit. in 8.*

Ibid. pag. 234.

And there are *Salts* so fixed naturally that they will endure the *Fire* without evaporating: such are *Alcalifate Salts*, being purely *Salt fixed*: other *fixed Salts* having of *acidity* in them, and upon *distillation* yeild an *acid Spirit*: how farr these may be *volatilised*, is not the question; but whether there be in *Urina* a *volatile Salt fixed* which any man will deny, who considers with how much ease the *volatile Salt* of *Urin* is procured. As for the *Oile* wherewith *Urin* is said to abound, surely *Mr Henshaw* converses with men of a strange kidney that make such water; Or that feed much upon green *Tortoyse*s. In some morbid persons Physicians Speak of *Urines* that are *oleaginous*, *ἐλαίωχροναι, ἐλαίωφάνηται αἰδοῦν*. But I shall favour the *Virtuoso* so much as to understand what he saies about *Urin*, as relating to persons in health, and not sick; least I should be to seek as much for the *volatile Salt* as I am for the *Oile*, which is not to be distilled from it by any *Chymicall* process, that I meet with in *Dr. willis*, or any else: nor to be seen, but in such as feed on green *Turtle* in the *West Indies*: or are not well in their bodies: not be spoken of, but by such as are not well in their wits. If by *Oile* he means that which gives a colour to the *Urin*, and is by *Dr. willis* called the *Sulphureous* part of the *Urin*: I shall not now dispute

*Zwelfer. in
Append. pag.
99. Salia purè
Salsa fixa. S.
lia, acido- Sal-
sa fixa.*

*Ibid. Zwelfer
in Append. pag.
99.*

whether that be *Oile*: or, no since that same learned and in-
 quisitive person assures us he found no great quantity of it in his
Analysis. Urinae Anatome ostendit quod Elementa e quibus liquor
eius constatur sunt plurimum aquae et Salis, aliquantulum Sulphuris
et terrae, atq; Spiritus tantillum.

Willis de uri-
 nis &c. l.

Yet a word, or two: How doth it appear that *Nitre* is so
 universally diffused through all the Elements? If he mean the
 Aristotelian Elements, did he ever find it so universally lod-
 ged in that *Fire*: is it so diffused through *Water*? how many
 foot deep is it found in the *Earth*? How doth it appear to be
 in the *Aire*? Let Mr. Henshaw recollect himself. Let him
 give what *Notion* he will to his Elements, the Assertion is
 false: although it be true that in this *Terr-aqueous Globe* of
 ours there is nothing occurs but what contains in it *Salt-*
Petre, or somewhat that may first or last, after greater or

Glauber. Prof-
 per. Geyman.
 part. 1. Pag.
 98. 99.

lesser pains and time be Animated into *Salt-Petre* viz. "Ex-
 "emplum hoc esto. *Sal Vegetabilium, Animalium, et Minera-*
 "lium Essentialis vel Universalis sua natura quidem nitrosus
 "est, sed prius flammam non concipit, quam ex aere vitam et
 "flammam attraxerit. *Salium autem etiam unus citius et libentius*
 "altero, vitam illam attrahit, prout a Natura formatus est.
 "Quo fugaciores et magis urinosi sunt sales, eo citius in *Nitrum*
 "se commutant: quo mordaciores et magis corrosivi, eo difficilius
 "et tardius *Salispetrae* naturam induunt. Sed quia *Nitrum*
 "Sal est utriusq; naturae particeps, urinosae nimirum et corrosivae,
 "et quasi ex utroq; Sale urinoso nempe et corrosivo compositus,
 "ejus ope peritus Natura *Salibus* facile succurret, et ex iis faciet
 "quicquid voluerit. Nec Sal ullus est in rerum natura qui
 "artis adjumento in *Nitrum* mutari nequeat: Inprimis vero
 "sales illi, qui igne sublimantur et ejus vi elevati ascendunt:
 "ut illi qui in urina et excrementis animalium omnium sunt:
 "Imo animalia, vegetabilia, et Mineralia ipsa, facile ad-
 "modum *Nitri* naturam arripiunt. Hic primus *Salium* gradus
 "esto. Alter gradus est *Salium*, qui aliquanto fixiores sunt, ut artis
 "filii nuncupant, et in igne a vegetabilibus, animalibus et mine-
 "ralibus relinquuntur. Hi difficilius in *Nitri* naturam transseunt.

It is to be no-
 ted, that al-
 though he say
Sea-Salt and
 some others do
 require much
 time to be con-
 verted into *Pet-*
re: he means
 when it is to
 be as it were so-
 wed & planted,
 & generated by
 a *Seminall* fer-
 mentation;
 otherwise, he

knew, and teacheth speedy waies of generating *Nitre* out of the fixed-Salt of *Lyme-stone* as doth Mr.
 Boyle out of *Br-Salt* in his *Origine of formes* pag: 216.

Omnia

"Omniū difficillimē illi, qui intertio gradu sunt, ut Sal commu-
 "nis, marinus, montanus seu fossilis, alumen et vitriolum. Nam
 "hos ars etiam eō deducit, ut in verum Nitrum abeant, sed diffi-
 "cilis, cum longiore ad eos mutandos tempore indigeat, quam
 "ad supranominatos Sales fugaces, volatiles et urinosos. Quare
 "nemo eā opinione esio, quando in Scriptis meis dico quod hic
 "aut ille Sal, in Salem-petræ converti queat; quamprimum lixi-
 "vio extractus, aut saltem ignis calcinatione elicitus fuerit,
 "quod Sal-petræ verus et ardens futurus sit: Tempus adhuc
 "requiritur, quo ex aere vitam et animam, alliciat et ardens
 "evadat.

Lippis et tonsoribus notum est, maximam Salis-petræ antehac
 confecti partem, ex lixivio terræ, ex ovilibus, aliarumq; bestia-
 rum Stabulis antiquis petita, excoctam fuisse. Quare ex antiquis
 jumentorum, pecudum et pecorum Stabulis, et non etiam novis &
 Ideo quia non solum vetera Stabula longo temporis progressu plus
 ex excrementis et urinâ Salis imbibunt, eâq; de causâ plus Salis-
 Petræ conferre possunt. Sed etiam Sales ipsi Excrementorum
 ex animalibus, quod potissimum est, longo temporis progressu
 exaere animam suam acceperunt, quâ recentes nondum im-
 butisunt. Nam, coquat quis, torreat et vexet stercora, et
 urinam animalium, ut voluerit, Nitrum nunquam evadent, nisi
 ex aere vitam suam hauserint.

Whereas he saies, "That the reason why Animals
 "that feed on Vegetables are obliged by Nature to longer
 "meales than those that feed on other Animalls; is because
 "that Animals are fuller of that Salt than Vegetables: and
 "indeed such Animals are but Caterers of it for man and
 "others whom nature gratifies with a more lusty and de-
 "licious dyet. — To begin with the last passage, I ob-
 serve that our Inventor hath such a Pique against Antiquity,
 that he transgresseth the old proverbe *De gustibus non est dis-
 putandum*. It doth not appear to me certain that the feeding
 upon *Flesh*, as most do now: or on *Fish*, as most did hereto-
 fore; is more delicious than to feed on vegetables, and some
 of their productions. Nor yet that it is the more lusty food, *Zacchias* in
 give the word what sence you will. The story of *Daniel's* *quest. medico-le-*
 pulse: of *St John Baptist*, of the *Negro's* in the *West-Indies*, of *gal. l. 5. Tit. 1.*
 M *qu. 2.*
 the *Daniel. l. v. 51*

the *Bannians* in the *East-Indies*. They will not grant it who hold (I think most truly) that before the flood men lived on *Vegetables*: In the *Golden age* they are not fancies to have had this delicious and lusty food.

Quid, metamorph. l. 15.

*At vetus illa ætas cui fecimus Aurea nomen
Fætibus arboreis, et quas humus educat herbis
Fortunata fuit, nec polluit ora cruore.*

*Renatus Mortuus
in animadu. ad-
Schol. Salernit.
pag. 590.*

*Arn: de villar.
Nova de usu
carnium pro
Sustent ord.
Cartusienf.*

*1 Sam: 30. 11.
12.*

*Zacchias, quest.
medico-legal. l.
5, tit 1, qu. 2.*

How many of the *Ancient Philosophers* did decline & deprecate this admired diet? but our *Virtuoso* will as little approve of their *Palats*, as their judgments. How many of the primitive *Christians* were of the same judgment, and liv'd accordingly? They were so universally inclined to it (I do not mention the *Tatiani* and *Encratites*, and other *Hereticks*) that in the Examination of such as were to be admitted into *Holy Orders* it was one Query, *Si nuptias Secundas non improbarent, et carnes non haberent Execratas. Quin cogebantur prægustare carnes, alioquin Excommunicabantur, et de ordine sui Clericatus deponebantur, ut habes expositum in Can: 50 51. Apostolorum. 1 Can. 14. Carthaginensi, canone primo. Bracharense primo, et refertur de consecrati dist. 23. cap. qui Episcop.* The order of the *Carthusian Monks* at present eat no *Flesh*: yet doth *Arnoldus Villanovanus* demand, *Quis audeat asserere quod nemo vitæ longitudinem consequatur sine carnum usu, cum in Monasteriis Cartusienses octogenarii et centenarii mundorum sensuum crebro inveniuntur.* When *David* found the *Egyptian* in the field, who had eaten no bread, nor drank any water three daies and three nights: they gave him bread and he did eat, and they made him drink water: And they gave him a piece of a cake of *Figs*, and two clusters of *Raysins*: and when he had eaten, his Spirit came again unto him. And it seemes as if the general food of the *Romans* had been *Herbs*: So *Zacchias* imagineth, *Quibus ego addam Claudii Edictum, de quo apud Suetonium in ejus vita cap. 22. quo cavebatur ne in propinis quicquam cocti veniret, præter olera et legumina: quæ quidem non contemnendam conjecturam præbent antiquiores, hæc præ cæteris cibariis in familiarissimo usu habuisse; Est et apud Horatium locus*

locus ex quo similis conjectura desumi potest, cum suum victum familiarem ac quotidianum narrat: l. 1. Sermon. Sat. 6.

— — — — — *Inde domum me
Ad Porri, et Ciceris refero, Lagamq, catinum.*

I neither find that these people *disrelished their dyet*, or wanted of that *lustiness* which the eaters of flesh pretend unto. That such as feed on *Vegetables* should be *Caterers of Nitre* for those that feed upon *Animals*, it is either false, or they are very bad *Caterers*, since they seldom do their duty in procuring that *Salt*: and when by chance they may have fed upon any, I am confident it is transmuted into an *Urinous Salt* in their bodies, so that those other *Animals* never get any other than that *universall Salt* which is the *radix Nitri* as *Glauber* calls it, but is really no more *Salt-Petre* than it is *Salt Armoniack*; *Salt of wormwood*, or *Salt of Scurvy-grass*. No complexion was ever so altered by being *Sunburnt*, or by the *Small Pox*, as the complexion of *Salt-Petre* is in *Plants* and *Animals*, from what it is at the *Work-house*.

“The reason why *Animals* that feed on *Vegetables* are obliged by Nature to longer meals than those that feed on other *Animals*; is because *Animals* are fuller of that *Salt* than *Vegetables*. — This Reason puts me in mind of a problem in *Aristotle*, Why *Colts* that have seen a *Wolf*, are *Swifter* than those that have not? (I think it is to that purpose.) After sundry reasons given, he adds; But perhaps there is no such thing. I profess I do imagine it is so in this case. And waving the question How nature obligeth them to it? I never heard that those *Encratites* and such as *Daniel*, or *St. John Baptist* &c. had *Stomachs* and did eat like *Horses*: I never read of the long meals of the *Bannians*, or *Pythagoreans*. Any planter in *Barbados*, will assure you that a pint of a kind of bean which they call *Bonarvis* with a little *Salt*, boyld, will nourish and support a servant more than flesh. The like we observe with *Cacao* in *Jamaica*. The *Hunters* in *Jamaica* that live on *Flesh* and *Salt* when they are abroad in the *Woods*, eat much more in quantity than when they

eat bread, Cassavi, or Patata's with their meat. Besides, there is a bird in *Jamaica*, and the adjacent *Islands* almost as big as a *Turkey* and like one, they call it a *Carrion Crow*, these devour all the offal of the beasts that are slain by the *Hunters*: they are never fat, nor satiated: I have seen some of them feed on *Carrion* from morning to night without any considerable intermission.

That facile *Ευχρησ* by which his friend did convert the greatest part of *Petre* into a Salt so like the volatile Salt of *Urine* that they are scarce to be distinguished by smell or taste: yet adding nothing that can possibly be suspected of that nature. If it be true, and that *Mr. Henshaw* was not imposed upon; if this *Nitre* was so changed as that it lost its inflammability and way of burning, its way of Crystallising and those other qualities which are proper to *Nitre*: how facile soever the Operation were, it was a transmutation, and the change was greater than when the Complexion of Salt-*Petre* is only altered a little.

I am tyred with multiplying reflexions upon such a discourse: any one will apprehend that this great and usefull Speculation of *Mr. Henshaw's* amounts to no more than waste Paper. All that I have benefited by it, is to remember a proposition made in *Mr. Hartlib's* concerning the improvement of Houses of Office, which I will set down as being more materiall to the publick, and indeed more conducing to illustrate his Speculations than any thing he hath alledged.

I have seen Fifty pounds worth of Salt *Petre* extracted out of a vault at *Dowgate*, not very Spacious, which was formerly an House of Office, and not emptied till the matter was throug'hly rotten. Why may not the same thing be done by Art, which was formerly done by Nature and Accident? I have been credibly informed that such a work is ordinarily done in the Kingdom of *China* and also at the City of *Paris* in *France*: and I see no reason why *English-men* should not have as much wit as they. If any man hath convenient Room to build two Houses of Office, and to close up the one whilest he useth the other, then there can be no question but that instead of the charge of emptying, and noysomeness of smell, he may have it emptied for nothing, and
feel

feel the sweet smell of money very gratefull to most men, and that in as great or greater quantity than he receiveth for his ordinary edifices: besides that, he will shew himself to be a good member of the body politick in which he lives: but he must beware that the matter lye dry, and that no adventitious moisture come to it from beneath or above; which will be something more chargeable in moist grounds than where the Earth is very dry by its own nature. Agreeable to this is the practise of our Salt-Petre-men, who as often as they meet with any old vault of this kind, they make use of it to extract their Minerall, as being inferior to no Earths. And Baccius relates that near a certain town, which he calls *Oppidum Fabrianum*, there was a deep and close Grott under the Appennine, in which Millions of Owles did lodge themselves, their dung had been accumulated there for many centuries of years: out of this the Salt-Petre-men extracted so much of Nitre as amounted to an inestimable summe of money.

Andreas Baccius de therm. l. 5 cap. 7.

So Kircher. Mund. Subter. l. 6. Sect. 2. cap. 4.

And not long agoe, whereas in the Vvarrs betwixt the Crim Tartar and Polonians towards Muscovy, great numbers of people being slain in battails were buried for hast together in great cavernes in the Mountains, & so rotted there: out of that Earth in the Cavernes there was extracted a great quantity of Salt-Petre. From these premises, and from the consideration of the dung of Kine, Horses, Goates, Swine, Sheep; out of all which Salt-Petre is extracted in great quantities, it seems as if one might with some Speciousness argue, that the Salt in Animals (which is a great ingredient in their nutrition) were nothing but Nitre altered a little from its first complexion. But whosoever shall consider with Glauber that circumstance of a long putrifaction, and how necessary it is the Earth be Animated and impregnated by the Aire (so that in Churches where it is paved, they look not for Petre but in open floores or Seats that are loosely boarded) and by what degrees and rudiments it proceeds to common Salt (as I suppose in this case the immature Earth abounds with that which is afterwards turn'd into Nitre, and the Northern Countries that yeild little Petre are impregnated with that Salt) to common Salt first (except a powerfull Seminality intervene

Glauber. P. oper. Germ. part. per. pag. 96.

Casimir Semicznowicz. art mag. artiller. p. 1. l. 2. c. 2.

as in ashes impregnated with *Mothers*; in Earth mixed with the *Scumme* or *ashes* aforesaid) and after into *Salt-Petre*. Whosoever shall consider this will be apt to reject that *conclusion*, and think that since no *Chymistry*, nor other *Artifice* can discover any *Petre* in *Animals* at first, that whatever *Salt* there is in *Animals* and their *excrements*, it more differs from *Salt-Petre* than the change of its *Complexion* amounts unto, and that it is a kind of *Seminall principle* derived from the *Aire*, or some other way, that generates by *real transmutation* the *Salt-Petre* out of the *volatile* and *fixed Salts*, and (perhaps) other *particles* of their *bodies* and *Excrements*.

I should here conclude my *Animadversions* upon this *History of Salt-Petre*, but that I think it necessary to shew the world what a *Plagiary* this *Virtuoso* is: This *Theory* of his with which he seems so much delighted, is but a disguise of what *Glauber* hath published in his works, and inculcated more than once. That *inquisitive* person tell us, that there is a certain *universall Salt* diffused through all parts of our *Globe*, and that the three *Kingdoms*, *Vegetable*, *Animal*, and *Mineral* are impregnated *therewith*: and that this *Universal Salt* is of such a nature that if it be *animated* ('tis his own word) by a certain *Nitrous principle*, *Spirit* or *Seminality*, it will become *true* and *inflameable Petre*. That this *Nitrous Spirit* can never be *incorporated* or *coagulated* of it self: but that it must be *Sociated* with some *Saline bodies* and then it becomes perfect *Nitre*. And however he allows a regard to the *volatile* and *urinous Salts* as things most facile to *impregnate* with and *transmute* into *Salt-Petre*; yet doth he ascribe as much to the *fixed* (though the progress be sometimes slower) as to the *volatile Salts* in this case. *Equidem lubens fateor, quod Spiritus Nitri ex omnibus fixis Salibus sibi corpus assumendo, ad pristinam Salis-Petra naturam reverti possit.* From this opinion of *Glauber* (who sometimes speaks loosely, and calls the *Salt* in *Vegetables*, and *Animals*, and *Minerals Nitrous*, and even *Nitre*) did Mr. *Henshaw* borrow his *Notion* of this *Nitre* that is diffused through all the *Elements*, and disguised in *Vegetables*, and

Glauber. appen.
qu. part. Prof-
fer. German.
Pag. 23.

and *Animals* and *Minerals*, which he omits; foolishly.)

Animalia nulla sibi alia quarunt alimenta, quam quae terra ipsa

suppeditat, quibus Sal-petræ omnino adesse debet. Salpetrae

itaq; est omnium vegetabilium Mineralium et Animalium

Unicus Servator. — *Sal essentielle vel natura nihil aliud est quam*

Salpetrae, non tamen ardens nisi animatus fuerit per aërem, et ex

eodem vitam aut esse suum hauserit. — Cuncta haec in omni-

bus rebus nitrum OCCULTUM latere satis superq;

arguunt. Sal enim mundi, siue Sal universale et essentielle ni-

hil est aliud quam Nitrum postquam Vitam ex aëre extraxit.

What Glauber's Opinion is may be guessed out of what I

have already alledged out of him, where he particularly ex-

plains himself. How — our *Virtuoso* hath disguised and de-

clared his, I have also shewed. But perhaps you will say

that Mr. Henshaw never read Glauber, at least he never takes

notice of him: I answer, that in not mentioning of him he

shews his *disingenuity*: but Glauber's treatises relating to

Salt-Petre were published in the years 1656, and 1659.

And that Mr. Henshaw did read him it seems evident from

this, that his *History of Salt-Petre* seems rather to be tran-

scribed from out of Glauber's third part of the *Prosperity of*

Germany (who transcribed it out of *Lazarus Ercker* overseer

of the *Emperor's Mines*) than from any *Experiments* or *obser-*

vations of his own and other *Salt-Petre-men*, (with whom

perhaps he lightly discoursed) whatever he pretended the

beginning of his *History*: pag. 261. For had he minded the

work, he could not have committed so many *Errours*. I

believe that I ought to rectify Mr. Henshaw's computation

of what *Petre* the liquor holds by computation before it be

put into the *Asb-tubs* pag: 270. and that for thirty five pound

it ought to be twenty five pound: for so 'tis in *Ercker*; who

followes that way of calculating, which I believe our

Petre-men do not. Sure I am, that whereas Mr. Henshaw

saith that the liquor of the second boyling when it is ready to

Crystallize contains in every hundred-weight about threescore and

ten pounds of *Petre*. That *Ercker* saith: *Liquore sic perfecte*

parato, ex centenaria ejus plus quam 70 l. Salis-Petrae proveni-

ent. That Signe also of second boyling being boyld to a

Prosper. Ger-
man. part. 3.
pag. 112.

prosper. Germ.
part. 2 p. 66.

just height, by hanging like Oile on the Scummer, as false as it is, is out of Ercker, viz. *Ligula ipsa liquoris bonitatem denotat, ubi liquori immissa et iterum extracta ipsum instar olei sibi adherentem exhibet.* Several other passages there are, which seeme taken out of Ercker, about the colour of the Un-refined Petre, and the mistake about the Mother, or liquor which remains after coagulation how it is to be disposed of. The casting in of Vinegar, a pint at a time, and the rising of the black Scumme (pag 273) is the one a direction, the other an observation of Erckers. The Casting in of quick-lime to make the Petre whiter, and rock the better; the injecting of burnt Allom before that: are the documents of Ercker, but not that I hear the practice of England. The covering the Traves with cloaths, to make the Petre begin to shoot at the bottom and Rock into fairer Crystals; These and many other circumstances convince me that Mr. Henshaw stole his narrative, and then certainly fetcht his ——— from no other place. Onely he Spoiles a plausible Theory, and tells us he is much delighted with it: and no doubt thereof: So were some of the Society, and it was an Extraordinary apprehension they had of the worth of this History that they inserted it into Mr. Sprat's Book: and truly I was as much pleased thereat, as They could be.

Animad-

Animadversions upon the History
of making of Gun-powder, written
also by Mr. Henshaw. Pag. 277.

IF some of our Wits were not such Enemies to Logic (a part whereof is Method) I should have expected to have found in the continuation of the History of Gun-powder some mention of Brimston, and its refining. And I should have expected a discourse concerning *mate powder*, which however it be not efficacious, yet is it a sort of Gun-powder, and a noble experiment. And perhaps it might not have been unworthy the curiosity of an accurate Historian to have treated of those preparations of Gold and Steel, which are called *Au-*

rum fulminans et tonitruans or *crepitans*, *Ceraunochrysos*; *Mars tonans*: and that other made with common Sulphur, and published by Rolfincius Chym. in art. red. l. 5. Sect. 2. c. 28. These he might very well have inserted, and neither have Invented over again (a thing usual with our Virtuosi) or have related them as secrets imparted unto him by an Ingenious friend or Member of the Royal Society: which is agreeable to their practice: thus particularly Mr. Hooke suggests unto us the usual Study of the Signatures of Plants upon the observation of an able Physician, a friend of his whereas that discovery is as old as Paracelsus and Crollius and in reference to his insinuation of the vertue of Poppyes from the Signature, I shall add this digressing passage out of Conringius in addend. ad. med. Hermet. pag. 400. *Nec verò capiti prodest vel nymphææ flos uel papaveris caput, quòd imaginem aliquam capitis præbeant: omnibus enim ejus affectibus deberent prodesse et solis, siquidem agant Specificà quadam, ut loquuntur, facultate, et capiti propriè sint dicata. Sed et illa capitis effigiem non aliter præse-*

This is a particular way of clarifying the Brimstone and fortifying it so as to be much more servicable: which any one may read in *Cassimirus Semenovici* p. 1. l. 2. c. 9. There is an account of *mate Powder* (though not tried by him) in the same Author and a way to take of the crack of Gun-powder, in *Margerus de Sal.* c. 29. of which we heare not a word.

Vide Chrysoscion Caspavis.

Ambour cap. 5. Scenart. de coaf. et dist. chym. c. 19.

enierograph. observe. 30. pag. 155.

ferunt quam poma omnia imo omnes seminum folliculi, quæ tamen nemo duxerit capiti singulariter prodesse. In finitis exemplis vanitatem doctrinæ ostendere est, si opus fuerit.

But these are not his only omissions; for it became him in the first place to have represented unto us the facile and less artificiall waies of making Gun-powder, & then the more elaborate procedure at the Powder-mills. But our Virtuoso is above those pedanticall rules of Logick and History, by which vulgar Wits are regulated. Because I think it no unnecessary instruction, I shall set down a Method of making Gun-powder without any Mill at all, as Casimirus Semienowicz reports it. "many of our Country-peasants know how to make Gun-powder without the use of any artifice or machines. For we have seen many of the inhabitants of Podolia and Ukraïn, who are termed Cossacs making Gun-powder after another manner then is commonly practised. They take certain proportions of Salt-Petre, Brimstone, and Coal, (which proportions they have learned by long practise) & put them into an earthen vessel, adding thereto some fresh water, they boile it over a slow fire for two or three houres, till the water be evaporated, and the materials grow thick and Stiffe. Then they take the mess out of the pot, and drying it a little more in a Stove or in the Sun, they pass it through an haire sieve, and so granulate it very small. Others take the materials designed for Gun-powder & either upon a plain polished Stone, or in any Earthen Vessel grind them and mixe them well together and incorporate them: then they moisten it, and so granulate it. Betwixt this way of the Cossacs, and that of Vannuccio Biringoccia there is a little difference, which makes me set his down apart. "Having weighed the materials, each by it self, and having beat and searfed them each apart, in the end (as the best and speediest way) to compose them together, take the quantity of Nitre you are to use, and put into a Caldron with so much water as, putting it on the fire to heat, you think will dissolve it; then take off the Caldron and set it on the ground in a firme place, and then put in the quantity of

in Art. mayr.
Artiller. part.
S. l. 2. c. 14.

“of the Coal by little and little, stirring it about untill it
 “is well incorporated with the dissolved *Nitre*: then take
 “your *Sulphur* finely powdered and searfed, and stir it in,
 “stirring it continually about with a wooden pestell, un-
 “till you have well incorporated all together, and made
 “the Coal fine and impalpable, if you can: then dry it from
 “all moisture and searse it very well thorough a fit searse;
 “and then wet it with a little common water, or a little
 “Vinegar, and lastly thorough a sieve or searse grain it,
 “and then again dry it well for your use.

“To pass by his defects it is a notorious untruth with
 “which he begins his History. The materials of Gun-
 “powder are Salt-Petre, Brimstone, and Coal. — The Coal
 “MUST be Withy and Alder equal parts: for Withy
 “alone is counted too soft, and some do commend
 “Hazle to be as good as the other two. — I find that

those that made Gun-powder at Coventry during the late
 Warrs used any light-wood-coal, as Maple and Aspe: and
 thought their powder as good as any could be. Some have told
 me that they have known Birch-coal very good. I find *Botallus*
 to reckon up as ingredients promiscuously used in the ma-
 king of Gunpowder, *Carbones Cannabinos, saliceos, vel juglandeos.*
 and *Semienowicz* saith that if you cannot get enough of
 Withy, or Hazle to charre: “*Si Salicis et coryli sufficiens non*
 “*detur copia ad urendos carbones, vices horum tilia sicca sup-*
 “*plere poterit. Si exiguum aliquam carbonum portionem præ-*
 “*parare cupis, virgulia ex coryla et salice, vel lignum tilia aut*
 “*janiperi in parva frustula secta, et optimè siccata vasi alicui*
 “*testaceo includito, et operculo sigillatâ cretâ ad orificium vasis*
 “*firmato, postea candentibus undique stipatum prunis, per unius*
 “*horæ spatium ibidem in uno continuo et æquali semper calor*
 “*gradu manere finito. Frigescat tandem sua sponte, et usti eximan-*
 “*tur carbones. Sunt qui mappas et lineam telam vetustam bene*
 “*et siccata hoc modo in carbonem redigant; cujus etiam non*
 “*spernenda virtus in re Pyrotechnica.* I find another excel-
 lent writer of Pyrotechny one Signior *Vannuccio Biringoccio*
 a Nobleman of Sienna Printed at Venice the third time in
 1559. to use other materials for his Coal then our *Virtuoso*

de vulner: sclo-
pet 911.

Dr. Read also
 reckons them
 coals as made
 indifferently of
 willow, or stalks
 of Hemp: of
 wounds lit. 15.
Art. mag. or
till. p. 1. l. 2.
 c. 13.

propounds. " To make the *Coal* some besides *Willowes* use
 " the branches of vine : some make it of *Noccido* a Nut tree
 " *Hazel*, *bay-tree*, of the bark of the fruit of the *pine*, and
 " some of those twigs they make *Baskets* with, some of
 " young *Elder*, and some of *Cane* or *Reed* : and in fine, those
 " coales that are made of *gentle*, *pliable* and *flexile* wood
 " with pith enough, and that be fine and young and with-
 " out hard knots, are fit for this use, and it is made in divers
 " manners in great quantities. It is made after the fashion of
 " *common coal*. Those *Virtuosi* that have little to do, use to put
 " twigs split into a large pot or other Vessel of Earth, Iron,
 " or Brass, and cover or lute it well about that nothing may
 " respire; and then make a fire upon it, continuing it so long
 " that they beleive the twigs are sufficiently burnt without
 " flame; and then they let them coole, and take the *coal* for
 " their use. When I have had present need I have done it
 " without all this adoe I have taken a quantity of clear
 " dry twigs, and broke them to pieces and laid them on an
 " heap close, and set them on fire, and let them burn well:
 " then with a Scoop or a ladle I have sprinkled water on
 " them, and then gently scatterd the fire and quenched
 " them.

But whatever the common practice be, the addition of
coal is not so necessary, but some other things may be substi-
 tuted instead of it, which practice is usual with those that
 make *Gun-powder* of sundry other colours besides black.

De pulvere pyrio variis coloribus colorato.

Cas. Semien-
 wicz, art. mag.
 art. p. 1. l. 2.
 s. 15.

*Pulveris communis pyrii nigredo ex carbonum atro colore re-
 sultat. Possibile tamen eundem alio quoq; colore tingere, si carbo-
 num loco vel lignum putridum, vel papyrus alba humefacta prius
 postea in furno calido siccata et in pulverem trita, vel aliud quid-
 piam simile, facile ignem arripiens et combustibile (ut in sequenti-
 bus patebit) sumatur, varijque colores addantur. Proponemus igitur
 hoc capite mixturas aliquot ex quibus ipsimet propriis manibus
 saepius variis coloribus coloratos confecimus pulveres.*

Pulvis

Pulvis albus.

1.

Salisnitri lb. 6. Sulphuris lb. j. medulla sambuci exiccata lb. j.

2.

Salisnitri lb. 10. Sulphuris lb. j. corticum vel partis lignosae Cannabi decussa lb. j.

3.

Salisnitri lb. 6. Sulphuris lb. j. Taratri ad albedinem calcinati, dein in aqua communi in olla non vitreata ad evaporationem totius aquae cocti unc.

Pulvis rubicundus.

1.

Salisnitri lb. 6. Sulphuris lb. j. Ambra lb. sc. sandali rubri lb. j.

2.

Salisnitri lb. 8. Sulphuris lb. j. papyri exiccata et in pulverem trita, et in aqua cinnanobaris aut ligni Brasiliani cocta et iterum exiccata lb. j.

Pulvis luteus.

Salispetre lb. 8. Sulphuris lb. j. Croci sylvestris cum vino adusto prius cocti, dein optime exiccati et pulverisati lb. j.

pulvis viridis.

Salisnitri lb. 10. Sulphuris lb. j. ligni putridi cum arugine aris et aqua vita cocti, dein exiccati lb. 2.

N 3

Pulvis

Pulvis caruleus

Salisnitri lib. 8. Sulphuris lib. i. Scobis ex ligno tilie cum indigo et vino adusto coctæ, dein exiccata et pulveris ata lb. j.

It might have become our *Virtuoso* in an *History of Gunpowder* not only to have declined these *Errors* and *Mistakes*, but to have treated of these sundry sorts of powder, thus coloured: as also to have taken notice of the difference betwixt *Cannon-powder* and that which is used for *Musquets* & *Pistolls*, which distinction, as observable as it is to every ordinary person, is not taken notice of by our *Historian* further than that out of the same mass the great cornes serve for *Cannon powder*, the less for *musquet and pistoll*. whereas great *Artillery* requires other powder than the small; & the materials of *Gunpowder* are differently proportioned to make up the several powders as appears by the *pyrotechny* of *Vannuccio Biringuccio*.

To make common powder for great *Artillery*.

Take of Nitre refined three parts.
of Sulphur 1 part.
of Coal of Willow 2 parts.

To make that for the middle sort of *Artillery*.

Take Nitre refined 5 parts.
Coal 1 part and an half.
Sulphur one part,
Let it be well incorporated, granulated and dried.

To make that for *Arquebusses* and *Pistolls*.

Take Nitre refined 10 parts.
Coal of Hazell-twigs cleansed 1. part:
Sulphur 1 part.

Some to make it better.

Take

Take Nitre, 13 parts and an half.
Coal two parts.
Sulphur one part and an half.

Let them be well beaten and incorporated &c.

I find also the accurate *Casimirus Semienowicz* to make a treble distinction of Powder which I shall set down, as being the best and most approved in the world. which when I have done we shall not much lament the concealment of that cheat or secret Mr. *Henshaw* could well learn, but with promise not to divulge it: it not being other then to subtract from the Petre, and make up the weight in coal whilest (by this improvement of Gun-powder by the *Virtuosi*) his Majesty payes as if there were the proportion of Salt-Petre,

Mixtura ad triplicem pulverem consiciendum optima probatissimaq;.

*Mixtura pulveris
ad tormenta Majo-
ra.*

*Mixtura pulveris
ad Sclopetata majora
vulgo musquetas.*

*Mixtura pulveris
ad Sclopetata mino-
ra, vulgo pistolos et
alia.*

I

I

I

Salisnitri lb. 100.
Sulphuris lb. 25.
Carbonum lb. 25.

Salisnitri lb. 100.
Sulphuris lb. 18.
Carbonum lb. 20.

Salisnitri lb. 100.
Sulphuris lb. 12.
Carbonum lb. 15.

2

2

2

Salisnitri lb. 100.
Sulphuris lb. 20.
Carbonum lb. 24.

Salisnitri lb. 100.
Sulphuris lb. 15.
Carbonum lb. 18.

Salisnitri lb. 100.
Sulphuris lb. 10.
Carbonum lb. 8.

*Mixtura pulverum ad Tormenta & Majora Sclopetata, inter-
pinsendum vel Simpliciter aqua tantum, vel aceto, vel urina, vel
vino adusto humectari et inspergi possunt. Sin autem ad Sclopetata
N. 4. minora,*

minora fortiore & vegetiore, exoptamus pulverem, superiores due mixturae sequenti liquore, vel aqua ex corticibus, malorum Aurantium, et Citrinorum, et Limoniorum recentium Chymicis organis distillata inspergantur saepius, pnsenturq; per Horas 24 deiq; in minutissima granulentur.

Liquor autem componitur ex vini austeri mensuris 20. Spiritus aceti ex vino albo distillati mensuris 12. Spiritus Nitri mensuris 4. Aquae simplicis ex Sale Armeniaco mensuris 2. Camphorae ex vino adusto subactae, vel cum Sulphure trito pulveri satae, vel deniq; cum oleo Amygdalarum dulcium in oleum redactae, mensura 1.

Aqua ex Sale Ammoniaco.

Rec. Salis Ammoniaci 3 drach. Salis-Nitri unc. 1. redigantur in pulverem tenuissimum et probe misceantur: postea in Alembicum imponantur, et aceto fortissimo infuso, distillantur igne lento

I have oftentimes wondered with my self how it was possible for Mr. Henshaw to penne, and for the Royal Society to approve so pitiful an History of Salt-Petre and Gun-Powder. They are certainly a lamentable sort of Scriblers, that write so ill, having so good Copies before them! That noble Siennois whom I have already cited; Nicolo Tartaglia in his *Questi et invenioni diverse*: and Pietro Sardi in his book *L'Artiglieria* have written excellently well of this subject: and in the year 1650 Casimirus Semienowicz a Lithuanian Knight and formerly Lieutenent of the Ordnance to the King of Poland, published a most Elaborate discourse about the use of the great Artillery; He was a man that made those studies his business & having signalized himself by his skill in the management of all manner of Artillery, he was employed & H noured by Uladislau the 4th. King of Poland & Sweden, by him encouraged to that work, & to accomplish it the better at his charge sent into Holland there to perfect his knowledge. This Eminent personage in the second book of his first part hath handled all that appertaines to the making of Salt-Petre and Gun-powder, to the tryall, and to the keeping of it: And were not the discourse too long, I had inserted it here but because I have already made use of several passages out of him, I shall here adde the discourses onely of Pietro Sardi and Nicolo Tartaglia; where they are defective or need

need amendment I shall supply all out of *Cas. Semienowicz*, whom *Kircher* calls *Semienovius*, in his *Mundus Subterraneus*, and out of him transcribes most that he hath about this subject there.

The Discourse of *Pietro Sardi* about Salt-petre, & Gun-powder, in his book *L' Artigleria lib. 3. Cap. 49, 50, 51, 52, 53, 54.* printed in *Venice*, in folio.

Sal Nitri, being the Ground-work, strength and Spirit of the Powder which by the *Quantity* and *Perfections* of the *Nitre*, is said to be more or less *fine* and *effectual*, it seems good here to discourse somewhat concerning it, whence it is *Generated*, how *made* and *Reduc'd* to perfection; to the end the *Gunner* in every occasion, (wanting *Powder*, *Powder-makers* and *Saltpetre-men*,) may know how to make it, if not in that *perfection* which the *Saltpetre-men* do by their *Art*, yet at least such as may serve in time of *Necessity*.

Sal Nitri is Extracted from the Earth in great quantities; and from *walls* in small; to wit, from that Salt, which some walls of *Cellars* and *vaults* under Ground, exposed to *Humidity* do spue forth.

It is drawn from the Earth, but not in all places, but such as are *Proper*, as those are, that are *obscure* and *Cavernous*, whete the rain falls not, as in the *stalls* of *Animals* great and small, and Particularly *Goats*, *Sheep* and *Hogs*. In *Gascoigne* in umbrosis, & cavernosis, ad quæ tam radijs Solaribus, quam pluviz et omni dulci aquæ aditus præclusus est. Tum etiam in equilibus, & aliis claustris non Subdialibus, sed rectis, ubi omnis generis pecora: ut sunt boves, capræ, sues, oves, et his similia alia locari et concludi: necnon ubi homines ipsi urinam reddere solent. Tum denique in illis locis in quibus post campe stria commissa prælia, plurima cæorum militum corpora in foveas coniecta, et super his immensæ terræ moles superstructæ sunt. Ex his post multa annorum intervalla, plurimum materiæ Salnitrosæ erui vidimus in *Valachia* et *Podolizæ* desertis inter *Bohem*, et *Boristhenem*. *Cas. Semienowicz* p. 1. l. 2. c. 2. yet in *England* I cannot hear that they digge for it in places dunged with *Sheep* although the *Cover*, and time may have seemed to have concurred apparently to generate it.

Terra et materia Salnitrosa plerumque reperitur in maxima copia in locis obscuris,

France,

These three
ways are appro-
ved by *Cas. Se-*
mienowicz; but
if he say that
Salt-petre-earth
bites a little
to the tast. *lin-*
guum mordacius
corrodit, he doth
not say it is bit-
ter, as *Mr.*
Henshaw doth. p.
266:

Si citrei et ad
albedinem verg-
entis aliquant-
ulum coloris in
ferro frige facto
signa inveneris
de valor et bo-
intatet erre non
dubites. Cas.
Semienowicz. p.
1. 1. 2. c. 2.

Si strepitum
aliquem edere et
lucidos in altum
furgere favillos
observaveris,
multo sale ni-tri
terram ejusmo-
di abundare ju-
dicabis, id. ib.
Cineris usti ex
robore, fraxino,
ulmo, acere vel
aliis fortibus et
duris ligni s. ib.
** Cerro.*

** Sarmeni fig-*
nifies also flags,
fegs, or Reed
growing by the
waterside,
Hujus cineris
sumantur
partes due, et
calcis viva tres
ac una bene
miceantur. id. ib.
** Tinaccio, a tun-*
Bagida.

France, I went in the company of the Commissary of the *Ar-*
tillery of the City of *Burdeaux*, through the *Caverns*
of the little hills and Mountains, that are situated on the
River Garonne, drawing and digging in many places, Great
quantities of this *Salt-petre-Earth*; and in *Brussels* I have seen
them draw *Sal-Nitre* from *Rubbish* and *Dust* of old walls.

And in *France* there is Commission given to the Principal of-
ficers of the *Artillery*, dispersed through that vast Kingdom,
to enter into all houses *private* and *publique*, to find out such
Salt-Petre-Earth; and the private persons are forced to be
patient because it is for the service of the *King*.

There are *Three* ways to know if the *Earth* be *Pregnant* of
Salt-Petre. 1. with the *Mouth*, putting a little on the tongue,
if there be sense of a biting tast. 2. with a *Burning Iron*, thrust
into a hole made with a Sharpe wooden Stick, and suffering it
to Coole there; and if upon drawing it out it appears of a
yellow whitish Colour, it is a signe there is *Nitre* there,
but if it remains of the natural colour, it is unprofitable.

3. It is proved likewise, taking a handful and sprinkling it
lightly on burning Coales, if there be perceived any crackling
noise, and any sparkles issues forth speedily, it shall be a sign of
Salt-petre-Earth, otherwise of none.

Having got great quantity of this pregnant *Earth*, you
ought also to have Ready a good quantity of *Ashes* made of
Oake, * *holme Oake*, or * *Vine-branches* or some other Strong
wood, with a sufficient quantity of *Quick-lime*, which things
being thus prepared, take two parts of the said *Lime* and three
of *Ashes* and let them be well mingled together.

Let there be also prepared a *Great* * *vessel*, placed on high,
in such manner that under it may stand another vessel to Re-
ceive the water, that shall be strained from that above.

In the *upper Vessel* shall be put *broom* or *straw* in the Bottom
or plain, and over the hole where the water is to issue out,
shall be placed a Piece of a *Tile*, or some such thing as the
women do in their *Bucks*, and the Hole must be shut very
well.

Afterward take the *Sal-nitrous Earth* moderately dried,
and put it into the vessell a handfull thick, and upon that a
ground

Ground (of two or three fingers high) of that *Ashes* and *Lime* mingled together, and then a ground of *Earth*, and againe of *Ashes* and *Lime*, continuing this Course untill the vessell be full within a handfull and an half.

This being thus managed, let it be filled up with common water sweet and clear in which is not the least salt, and because the *Earth* will quickly suck up the water, let it be put in so by degrees till the *Earth* will admit no more, and the vessell be filled equal to the *Earth*, and not higher.

It being thus filled, let it stand twenty four hours, or more, after which time open the tap-hole, and let the water strain into the vessell underneath, which being all strain'd, let that water be emptied into another vessell or Tun and reserved, and then put in some fresh water into the *Earth-vessel* as before, letting it stand for the space of twelve hours, then opening the *tap-hole* again let it strain into the vessell, which done, put apart into another vessell this liquor, and not in the first: Do this a third time and empty it into a third Vessel.

This being done, make proof of these three waters by putting some few drops on your tongue, and tasting it you shall find the first *very biting*, the second lesse, and the third least of all, for the first draws more of the substance of the *Salt-peter*, then the second, and the second then the third.

But there may be the fourth operation, for sometimes the *Earth* doth retain so much *Nitrous* substance therein, that it may prove advantageous even to the fift and sixt time; and all the waters are to be reserved apart, with the distillations of the first, second, third &c. as many as there shall be.

By this operation of one vessell or tun, may be apprehended the manner of making an hundred or as many as you please, according to the Quantity of the Prepared *Earth*, observing always that the first waters strain'd be put in one vessell, or in what will contain them, and all the other waters (*Carelessly*) in one or more vessels that will hold them.

These last waters shall be taken and forced to pass over *New Earth*, operating as before, and so many times shall they

gustu sic acris, et gutta super aramento concrecant unde iterum expectandi crystalli. et sic per-
genius donec totum coagulaverit. untzer: de sale c. 18.

*Paululum exsic-
cata. Cas. Semi-
wicz, ubi supra*

*Infundatur re-
centis et dulcis
aquâ tantum,
quantum sat
esse videbitur
atque duos tres-
ve digitos, terræ
super extet. id.
ib.*

*untzerus pre-
sents us with
another way of
making Salt-
Peter, which
because our
Historian hath
omitted, I shall
set down: Ter-*

*ra nitrosa aqua
multa diluatur,
diinde ad purum
colatur. rotatur
si non satis di-
ves halinitro est,
denuo apponitur
materiis et iterum
cocta. facto se-
dimento per laci-
nias transfertur
in vas purum*

*ibique coquitur,
ad iustam con-
sistentiam deco-
ctum infertur
in Ollam, diges-
tum per dolia et
alveolos, crystal-
li congelati eximun-
tur, residuum li-*

*quor recoquitur
ad medietatem
tertias donec*

Pass over new earth untill you find the water sufficiently impregnated with *Nitre*, which you shall easily know by the tast; for the tongue will be hardly able to indure it for the great heat, and the waters will bear almost a new layd Egge without sinking to the bottom.

igne lento pri-
us, dein fortio-
ri decoquatur
ad consumpti-
onem unius
tertiæ, id. ibid.

Having Collected a sufficient quantity of this *Nitrous* water you must put it into one or more Great *Brazen* or *Copper* caldron (like those of the *dyers* accommodated to a fornace) which being filled of two thirds of such liquor (i. e.) in such manner that a third part of the caldron be yet empty, give fire to it at first gently, afterwards more strongly, by degrees, untill the boyling be well advanced, and so continue untill the caldron be but one third part full of liquor, or to say better untill but half of what was put in do Remain.

Coque ad con-
sumptionem
medietatis,
vel quousque
spissior et densi-
or-evadat, id.
ibid.

The waters of one or more Caldrons being boyled and reduced to such a Quantity, let them be gently taken out, and put in a Capacious Tun, or Tuns, well hooped with hoops of Iron, and let them be covered with hempen cloath and tables upon them very diligently, and so let them be left untill they coole, and that they be settled very well in such manner that all the Earthy substance and naughty *Salt*, be fallen to the bottom.

3 Congeli.

Effundatur in
ligneos canales,
vel vasa alveata
oblonga et lata
magis quam
profunda: nec
tamen plus hu-
jus aquæ sit in
uno vase, quam
ut spatium uni-
us palmi in al-
titudine occupet,
deinde vasa si-
neis vel laneis
pannis crassio-
ribus contexta
in frigido lo-
co ponantur.
id. ib.

These waters being thus purified let them again be gently (that they be not troubled but the common *Salt* and earthiness left in the bottom) Returned in to the cleansed caldrons, and they being boyled as at first untill one half be consumed, or at least untill you know it be boyled and be coagulated, which will be known, when taking a little upon a stick and dropping it on a Polish'd marble or stone, if it remain congealed, or to say better thickned, it is a sign it is boyled, and therefore take it from the fire and suffer it to coole.

It being thus cooled & clarified, let there be ready some *Trays* made of Planks long & not too large nor too deep, but more large in the top then in the botome, let these be filled with the boyl'd and clarified waters a handfull high, putting into them some little sticks of wood without Barke, and cover the trays, and let them stand so two or three days, and at that time or longer, according to the season you shall find the *Sal-Nitri*, Congeal'd.

Congea'd and cleaving to the sides of the Trays, and the sticks, (after the manner of clear Chrystall,) which take away carefully and the water that Remains, let it be put to boyling anew as at first, leaving the salt and the dregs in the bottome of the Trays.

And because the waters in the boyling swell, and make a scum it will be necessary to take away that scum carefully, (as they do from the flesh-pots) and to reserve that scum to throw it upon the Earth taken from the Tuns to reimpregnate it with *Salt-petre*.

Moreover because the water in boyling will spatter out of the caldron, to remedy this let there be ready a strong lie, made 3 fourths of ferne Ashes, or the ashes of *Oak holme*, or *Oak* or with *Ash*, or *Maple* (such as was used at the first elixiviation,) and of one fourth of quick-lime, and in the said strong lie, for every hundred pints let there be dissolved four pounds for *Roach-allum*.

And of this lie so prepared, take one or two potfuls, and throw it in by little and little when the Caldron swells, and it will presently be quiet, and descend, and become of a clear *Azure colour*, and the dreggs of the common salt will fall to the Bottome.

Of the manner to refine *Sal-petræ* to make *gun-powder*, cap. 50.

ALL the vigour of *Gun-powder*, consisting in *Sal-petræ*, its quantity, and its perfection, if the *Sal-petre* should be put in use of the first boyling, the *Powder* would not be so perfect and so strong, as need would require; for the quantity of Terrestrial matter, Common-salt and *unctuosity*, which also reside with the *Petre*, do hinder its vertue and strength, and therefore the *Artists* do always anew Refine the said *Salt-petre*, and purge it from every extraneous matter, as much as is possible, that they may obtaine the most strenuous effects of *Powder*, that can be desired.

Nellarium bis
aut ter (immo
pluries adhuc si
tanto majorem
pulveris effectum
habere volumus)
purgasse et clarificasse
id. ibid. c. 3.

This Refining is made in two manners, either with water commonly called the *wett*; or with *Fire*, commonly called the *Dry*, or the *Burnt*.

A Guazzo.

The *wett*, or with water, is made thus; They take as much *sal-nitre* as they please to Refine, and put it in a Caldron over a fornace, and upon that *Sal-nitre* they put such a quantity of fresh and clear water, as may be sufficient to dissolve it; they take notice of the quantity of the water, and for every bartel of water which they put into the Caldron, they put five or six Pot-fulls of that strong *lie*, made of *Ferne-Ashes*, *Oake*, and *Quick-lime*, and *Allum*, and giving fire to the Caldron at first softly, and afterward increasing it, un till the melted

Aliquot cyathis
Cas. Semienowicz. ib. c. 3.

Sabbione, sand
or gravel. Imponatur Sabulo
nis loti et bene
purgati tantum,
ut ad altitudinem
unius palmi super
fundum vasis
emineat. Cas. Semienowicz. ibid.
c. 3.

Nitre boyle and raise a scum.

Let there be ready, a great Tun or vessel placed so high that another vessel may stand under it to receive the *Sal-nitrous* water, which by little shall strain from above, and in the said great Tun let there be put a hands-breadth of cleane and wash'd *Sand*, and upon that a great linnen cloth doubled, (as the laundresses do) and on that poure the water from the Caldron, (which contains the melted *Nitre*) as soon as it boyles and the scum is taken from it, and let it strain by little and

and little by the tap into the vessel below, as they do in making their *Backs*.

Which water being all strained, let it be put into a cleare Caldron and boyl it till by the proof of a Congealed drop, it may be known to be well boyled, (not forgetting to give it some of the strong lie, of *Allum*, *Ashes* and *lime*, when the Caldron swells and would spatter out the water, and having made proof it is boyled enough, let it be taken out and put into the long *Trays*, to coole as before, and preservethe congealed *Salt-petre*, and returne the water to boyle again that remains, and againe to congeale, and do so untill the water Give no more *Salt-petre*.

Now this *Salt-petre* so Refined, is called *Salt-petre Refin'd* of the second boyling, as the *Refiners*, of *sugar*, call their *Sugar Refined*, of the Second, Third or fourth, boyling, and to make *Salt-petre* of such perfection, you may (as some do) *Re-fine* it, that is Reboyl it, in such manner the third time, proceeding always as before.

Because that there is such difficulty in the depurating of *Salt-petre* from the fixed common *Salt*, *Allum* & *Vitriol* which adhere to it, & that, without this be done, no man can judge whether the *salt* it leaves upon calcination be from the *Nitre*, or some other body, which by the usual process even of Mr. Boyle, by filtration and coagulation can never be perfectly separated, nor the *Petre* reduced to crystals of the right Signature. *Quocunque enim studio et labore vulgari Salt-petre ex stabilis bestiarum erutus per solutionem et coagulationem purgetur, impossibile tamen est, ut mundiciem suam debitam et Signaturam veram consequatur.* so Glauber. de signat. Sal. pag. 27. And because the crystals of *Nitre* appear best in their own shape, after such an exact depuration, it may not be omitted to tell you what Mr. Henshaw might have done, for it is evident he had read Glauber, viz. that the sole way of making pure *Nitre*, is to take the course Mr. Boyle found out, to burne part to an *Alkali*, and to powr upon a filtrated solution of that the Spirit of *Nitre*, and evaporating it to a cuticle, to crystallize it in a cold place; But there is another way that may not be useless in *Casimirus Semenowicz* p. 1. l. 2. c. 8. Sumo 2 lb. calcis vivæ. 2. lb. salis communis. 1 lb. viridis. aris. 1 lb. vitrioli Romani. 1 lb. salis Ammoniaci, omnia simul mixta pulveri sentur: postea ponatur omnis materia in vase aliquo ligneo, & aceti, vel vini, aut in defectu horum aqua dulcis limpida superinfundatur, bona quantitate, et fiat lixivium; Quod per tridui spatium sibi relictum c larescat. Pone deinceps saleem-nitri in caldario, et superinfunde tan-

tantum lixivij ut salem-nitri cooperiat, presq; lento igne ad consumptionem media partis totius liquoris: residuum effunde in aliud vas, facies autem omnes immundas, quas fundum caldarij petijisse videbis foras ejice. frigescat postea aqua salnitrosa et ulterius elaboretur, more consueto, that is in such manner, as is prescribed by Sordi and bim, in the first boiling of Salt-petre.

The Refining *Salt-petre* by fire, to wit the dry, is made in this manner, they have a great and capacious and thick vessel of *Brass*, *Copper*, or *Iron*, placed on a *Fornace*, and in that they put, what quantity of *Nitre* they please, and making a gentle fire at first, and increasing it by degrees untill the *Nitre* be perfectly melted and running, and begins to boyle, and having ready fine powdered *Brimstone*, they throw some of it in the top of the melted *Nitre*, and if the *Brimstone* fire of it selfe, it is well, if not with a coale, or having a stick they fire it, and this *Brimstone* so fired, they let alone untill it have consumed all the greafe which swims upon the said *Salt-petre*.

The which being all consumed, the *Salt-petre* is emptied into what vessels a man will, that the Loaves or Pieces of *Salt-petre*, may become large, of which he may prepare what quantity shall seem sufficient, and in the bottom of the *Caldron* will remain the Dreggs and common salt, the *Salt-petre* being cooled, becomming like a piece of fine white *Marble*, & in this manner you may refine it as often as you will, and it shal always prove more perfect, and worke greater effects.

Of the Manner how to Re-impregnate the Earth, taken out of the Vessells with new *Salt-petre*.

HAVING taken out the Earth from the Vessells, after that the water hath extracted all the *Nitrous* substance therefrom, let it be spread on the face of the Earth, but not exceeding a foot thick, and in some covered place, that it be subject to neither Rain nor the sight of the Sun.

Which Earth being so ordered and spread, get a great quantity of Dung, as well of great Cartel as small, and spread

spread it on the Earth, as thick as you can, one or two foot thick, or more if you have dung enough.

Upon this dung cast all the scum, and the waters which were taken from the *Salt-petre*, leaving the Earthy dreggs, and the common salt.

And afterwards gathering in all publique places, in vessels prepared to that purpose, as much Human urine as is possible, and every Day cast it on the *Dung*, and doing so at two years end, that Earth will be impregnated, with as much *Nitre* as ever, and it may be with greater advantage.

How to prove *Salt-petre*, to know its finess. *Cap. 52.*

TAKE a Pound of *Salt-petre*, and put it on a smooth white Table, and with burning coales fire it, in the doing whereof note these effects.

If it make a noyse as *Salt* does, when it is cast on burning coales, it shall be a sign that it reteins in it much common-salt.

If it make a fat scumme, it is a sign it hath too much fatt.

If after it is all burnt, it leave in the bottom filth, it is a sign it yet retains some of the Earthy substance, and the greater these signs are, so much the more extraneous matter doth the *Salt-petre* contain, and it is so much the less purified fine, and of less Vigour.

But if the flame it cast be * cleare, windy, long, divided into many parts, after the manner of Brandishing Rays, or beams of light, that the Table remain clean, if it is burn'd as pure coale that makes no scumme or noyse, then the *Salt-petre* may be said to be well purified and perfect.

* Si fecerit
flammam clā-
ram, longam, &
in plurimos
radios disper-
sitam, fundum
vero tabulæ
remanerit

mundum: arseritque puri carbonis modo, sine somni spuma & crepitu horrido, minusque con-
venienti, purgatum bene & perfectum esse saltem nitri conjecturam capere licebit. *Cas. Semien-wicz.*
ibid. cap. 7. & Kircher. Mund. Subterr. lib. 6. Sect. 2. cap. 3. Quidam injectum candenti prunæ spe-
ctant, argumento bonitatis & puritatis, si diffuat & deflagret sine reliquiis salis communis, aut fœ-
cum terrestrium, & saltu crepitante. *Libazarius, Apocalyps. Hermet. par. 1, cap. 17.*

P

How

How to know the goodness of Powder. *Cap. 53.*

The goodness of *Powder* is known by the *Eye*, the *Touch*, and by the *Fire*: by the *Eye*, if it be very *Black*, or that it is *Moist*, and put upon white paper and ringing it with black, it is a sign that it hath too much *Coal*, but if it be of dark *Ash-colour* and ringe not, it is a sign that it hath its proportion of *Coal*, and it is dry.

Brethico, Grey or Ash-colour.

Nimia in pulvere nigredo,

signum est humiditatis: hæc si super papyro munda ponatur, & eandem nigro tingat colore, signum erit cum plurimum in se continere carbonum: cinericius autem sub obscurus pulveris color, & aliquantulum ad rubedinem vergens, bonitatis vestigium est. *Cas. Semionovicz, ibid. c. 17.*

With the *Touch* it is known, when rubbing it with the fingers, it appears soft and easily broken, it is a sign of too much *Coal*: and when rubbing it and powdering it with the fingers, you feel some little knobs that prick the fingers, it is a sign the *Sulphur* is not well powdered and incorporated, and that the *Powder* is not elaborated enough.

Denique ignis beneficio in notitiam bonitatis pulveris facile devenimus: si nimium pusillas aliquot congeries pulveris super tabula lignea munda & polita, latitudine dimidii palmi a se invicem distantes posuerimus, & unicam tantum ex omnibus incenderimus. Hæc si subito flammam conceperit, & sola tantum, aliis non accensis, conflagraverit, idque cum fragore & sonitu quodam feceritque fumum album, clarum, & in ascendendo velocem: in aere vero circulus quasi quidam, seu corolla fumosa appareat, perfectissime pulveris nota erit.

With the *Fire* likewise is known the goodness of *Powder*, taking a pound of it, and putting it on a *Table* smooth and white, and near unto it another, a third, fourth and fifth pound, so that they do not touch: and then giving fire unto a little heap, if at one and the same time all the heaps are fired, if the flame be raised clear and quick, cracking in the raising, it is a sign it is fine and well labour'd, but if the flame be slow in raising and with much smoke and without noyse, it is a sign of the little strength of it, of the great quantity of *Coal* and *Sulphur* more than it ought.

If after it is burnt the *Table* remain black, it is a sign of too much *Coal*; if *Unctuous*, it is a sign of the grease of the *Salt-Petre*.

Petre and *Sulphur* that were not well refined : and if with earthiness, and little granulets of matter, it is a sign the *Salt-Petre* was not well purged of common Salt, and earthy matter, and that the *Sulphur* was not well powder'd and incorporated ; and if after the powder is burnt, the Table remain whitened, it is a sign the *Salt-Petre* hath much of common Salt, and that it was not well cleansed from that.

Of Powder spoiled, and the ways to Recover it.

BY Powder spoiled is meant that which wants much of the vigour and vertue which it had in the beginning : now this want proceeds from no other thing, than that the vertue of the *Salt-Petre* which gives it that vigour is weakned and vanish'd.

Now the Vertue of *Salt-petre* reduced into *Gun-powder*, is lost either by *Age* or *Moisture* ; by old *Age*, because being conjoynd with *coal* and *Sulphur*, it doth participate of that corruption which will happen to them in time : by *Moisture*, because the *Salt-petre*, (composed of *Salnitrous Waters*, as all other *Salts* of their *Salt waters*) does no sooner as it were see the moisture, but by that, by little and little it is converted into moisture, and the vertue and vigour thereof is exhald by that humidity.

Thus a great part of the *Salt-petre* being separated by this Humidity from the rest of the Composition of the Powder; and the *Salt-petre* being more ponderous than the other two materials, which are not exhaled, as is the *Petre*; it follows, that of that quantity of Powder which in the perfection of it was inclosed in the Barrel : For example, one hundred pound, after the *Salt petre* is wasted in this manner either by old *Age* or *Moisture*, there will not remain the same quantity, but much less.

Now to recover this Powder thus wasted, it is to be done two ways, viz. to adjoyn the quantity of *Salt-petre* is wanting to make it vigorous and perfect ; or to take away that

P 2

Salt-

Carbones ra-
men & sulphur
minime hic suo
quem antea ha-
buere, privan-
tur pondere,
cum nullo dis-
solvuntur hu-
more : imo
carbones studio-
se cum attra-
hant, fiuntque
ponderosiores.
Id. ibid. c. 17.

Salt-petre which remaining in the wasted *Powder*, to refine the *Salt-petre*, and to make other *Powder* anew with it.

There is another way of recovering decayed *Powder*, by fortifying it with a certain *Lixivium* proposed by *Cas. Semienowicz*; p. 1. l. 2. c. 18. which you may see in him.

To recover that same weakned *Powder*, by the vanishing of the *Nitre*, proceed in this manner: Take all that quantity of wasted *Powder*, and put it on a cloath, and lay it in the Sun to dry, which being perfectly dried, fill a Barrel with it: for example, let there be one hundred pound:

Then let it be emptied aside, and let the Barrel be filled with perfect *Powder*, such as was the spoil'd in the perfect vigour of it, let it be weighed and noted how many pound it weigheth: for example, suppose one hundred and twenty.

Here we say that those twenty pound more which the Barrel of perfect *Powder* weighed, shall be twenty pound of *Salt-petre* which the other wanted.

Now let us see how much wasted *Powder* there is in all, and if there be for example 10000 pound; for to know then in this great quantity of naughty powder how many pounds of *Salt-petre* there are wanting to reduce it to perfection and vigour.

Work with the Golden Rule of the 4 Proportionals, saying, If one hundred pound of wasted *Powder*, there want 20 pound of *Salt-petre*, how much *Petre* will there be wanting in ten thousand?

Let the second number be multiplied by the third, viz. 20 by 10000, and the product shall be divided by the first, viz. by 100, and you shall have 2000 in the Quotient, and these shall be the pounds of *Salt-petre* which are wanting in the wasted powder to reduce it to perfection.

Let these 2000 l. of *Salt-petre* be powder'd, & likewise the 10000 of bad powder, as the manner is, and taking a proportion, let it be incorporated with the 2000 of *Salt-petre*, beating them together according to Art; and in such manner working them, there will be made good *Powder*.

If we will take away all the *Salt-petre* out of wasted powder, we must proceed in this manner: Let there be prepared one or more capacious Tubbs, and on them let there be laid three or four linnen Cloathes (like the skins of a Drum) well tied, but not so strait.

Then

Then let there be another Vessel or more of Copper or Wood, and put therein the quantity of spoiled Powder, that shall seem fit, and pour upon it as much fresh clear Water as shall dissolve it, stirring it with a cudgel or a Schoope.

This being liquified, with a Ladle or Bucket, throw it upon the cloath over the Table, that the clear water may strain into the Tubb, and upon the cloath may remain the Coal and the Sulphur: and when it is all strain'd, throw softly a Bucket or two of water to draw away the substance of Salt-petre that shall remain with the Coal and Sulphur.

And in this manner shall be done until all the Salt-petre of the naughty powder be strain'd, drawing away the strain'd water in the Table when it is full, and if these waters are not clear, let them be put on again on the washed and cleansed cloath, and let them be strain'd again, until they are clear.

Then take all these clear waters and boyl them in the Caldrons as before, and then put them in the Trays to congeal and make Salt-petre, and taken and refined, and new Powder made of it as the manner is; and the Coal and Sulphur may be dried perfectly, and proof made if it will serve, but if not, you must take new Sulphur and Coal.

But here I do advertise that all that is here said, is written only that the Gunner in time of Necessity may supply himself and do the best that he can, for such Salt-petre and Powder is not made with that diligence and Art that the Powder-Masters and Salt-Petremen do, but yet it will not fail to serve in time of Necessity.

Dal. Pietro Sardi: in Venet. 1629.

The.

*The Third Book of the various Questions and Inventions
of Nicolas Tartaglia.*

Of Sal Nitre, and the various compositions of the Gun-Powder : of the Propriety or the particular office which each of the Materials hath in that Composition, and other Particulars.

*The first enquiry made by Seignior Gabriel Tadino Prior
of Barletta.*

Prior.

IS it not to be wondred at, that the Antients had no knowledge of *Sal-Nitre* which to us Moderns is become so familiar?

Nicol.

Nitre is mentioned Jeremiah 2. 22. & Prov. 25. 20. although in the Septuagint that last verse is varied, yet Symmachus reads it ὡς πηλὸν ὄζειν, and St. Hierome follows it, and so does the English translation.

Yea, Rather the knowledge of that Simple is most Antient ; for most of the Antient Naturalists make mention of it ; true it is that some of them, and especially Avicenna have called it Baurach, because it is so called in the Arabic Tongue ; some Aphronitum, because it is so nam'd in the Greek ; and others as Serapion, Dioscorides and Pliny have call'd it Nitrum, or Spuma Nitri, for the Latins so call it ; and in the Pandects it is affirmed there are two sorts of Nitrum, or Sal Nitri, viz. Mineral, and Artificial, of the Mineral they say there are four, the Armenian, African, Roman, and Egyptian. Serapion says, that the Minerals of Sal Nitre are as the Minerals of Salt, for there are found of it, that are running waters, which become congealed and condensed like a stone, and this is affirmed also by Pliny, that it is found also in the Mine as a stone, and called Sal Petrolum ; yea, he says that this Sal Nitre is found White and Red, and of many Colours, inso-much that he affirms that there are many kinds of it, not only for the
diser-

diversity of the colour, but because there is found one that is Spongy, viz. full of holes, another very fragile, and lamine or plates; and of many other qualities, which would be too long to talk of one by one, of which one is more biting and powerful than the other: of the Artificial it is not worth time to speak, it being in these days better known than Betony.

Truly, I thought the knowledg thereof had been Modern. Prior.

But tell me, I pray, If the Antients had knowledge both of the Natural and Artificial Nitre, (as you have proved by the Authority of the Antient Naturalists) did they also know that it burns so vigorously as it does? The 2^d Question.

Truly the Antient Naturalists make no mention of it, save only of those proprieties that are found in it necessary to Medicine; but many other Antient Authors do acquaint us that they knew it burn'd; for they serv'd themselves of it in Compositions of fire for to burn the Testudo, or Ram, and the Ellepoli, and other portable Towers, which they used in those days in taking of Cities, and also to burn the Naval powers: it is true that in such Compositions, some call it by the name of the Burning Salt, and others the Stone Salt, and Salt of Skill, and others by the proper name of Sal Nitri.

Nicol.
c. siwius. Sen-
mieuowicz.
thinks that the
Antients did
seldome or ne-
ver use Salt-
petre in their
Fire-works;
and that where-
soever it is
found mentio-
ned as an in-

redient in the *I. nis Græcus*, &c. and that passage is spurious: at least if it were used, it was kept as a secret: for amongst the most renowned Writers of the Roman Wars and Militia, ne jotta quidem unum in illorum Commentariis de Sale Nitri, Nitro, aut Sale petreæ, quod Romanorum ignibus artificialibus inservierint, reperiet quispiam. A t. mag. p. 1. l. 3. c. 1.

Concerning this I have another doubt, If the Antients knew that Nitre burnt with so much force, how comes it to pass that they knew not how to make the Powder for Artigliary, of so great importance in Art Military, as well as we Moderns? Prior. The 3^d Question.

The Consequence is not good to say, that if the Antients knew that Sal Nitre burned, that of necessity they knew how to compound the Powder; for that is not made of Sal Nitre alone: yea, it is compounded of three Materials, of Nitre, Sulphur, and Coal; and therefore it is possible they might have the knowledge of Nitre, and the Nature of it, and yet be ignorant of the Composition of Powder. Nicol.

You:

Prior.
The 4 Quest.

You have reason ; But for what cause is the Powder compounded of those three materials ? and what particular office hath every one of them ? And what effect shall Two have without the Third ?

Nicol.

The Powder is composed of these three Materials, because each one doth mediate & supply the defects of the two other ; for the Sulphur is most apt to kindle the Fire with the flame of either of the other two, which fire with flame is very apt to introduce into fire the Sal Nitre more than any other, because the said Nitre burning resolves it self into a windy Exhalation, the which is so potent, that it presently quenches the flame introduced into the Sulphur, and consequently that introduced (by that of the Sulphur) into it self. For the Nature of Sulphur, and likewise of the Nitre is such, that the

So saith Semionowicz, also. Si componeretur corpus quoddam ex Sulphure & sale Nitri, optime tussis, & simul mixtis, admoto igne, subito quidem arriperet flammam, nihilominus tamen subito exstingueretur, id est, ignis ille non continuaretur, perduraretque ad consumptionem & combustionem materię totius, sed pauxillum tantum ex illa consumeret, residuo intacto. Art. mag. p. 1. c. 2. c. 20.

flame being dead, there remains not the least sign of fire, and therefore compounding together only Nitre and Sulphur well beaten, and putting fire to it, immediately it is inflamed and destroyed, for the Reasons abovesaid, to wit, that such fire will not continue until all the matter be consumed and burned, but only a little of it, and the rest will remain not offended by the said fire : therefore to cure this defect,

there is mingled with both Coals well powdered, because Coal is of that Nature, that touched by the flame of fire, it is presently kindled and converts it self into fire without flame, the which fire without flame the more it is vexed by any wind, so much the more it is enkindled and continued, until that all the substance of it be converted into Ashes : and therefore touching that Composition with the fire, immediately the Sulphur is taken with flame (as is said) which flame not only introduces presently fire and flame into the Nitre, but also in the same instant introduces fire without flame into the Coal, which fire is not extinguished, but rather augmented by the wind, and because that wind caused by the Nitre is not apt to extinguish that fire without flame which is in the Coal, yea, rather, as I have said, it augments it, and forasmuch as the Sulphur is contiguous with the fire with flame or without flame, and cannot be without flame, the which flame (as is said)

in-

inflames the Nitre, and therefore these three Materials powdered and mingled well together, and fire being put to this mixture, it becomes altogether inextinguishable, until all the substance be consumed: (except there be some accidental defect in some of the materials, either of Humidity, or that there were taken of them much different from the convenient proportion) and therefore it is concluded that the office of the sulphur is to take hold of the fire with flame, and to introduce it into the other Materials: and that of the Coal is only to maintain the said fire without flame, already introduced by the sulphur, and chiefly against that great wind which the Sal Nitre causes; but then the office of the Nitre is only to cause that great exhalation of wind, for in that wind consists all the virtue and propriety of the Powder, for that is it which drives out the Bullet with so incredible a force, and therefore it is concluded that only on the Nitre doth depend all the virtue and puissance of the Powder, and the other two Materials are put therein only to resolve into fire and wind the said Nitre, and for no other end: for be that should compound powder only of sulphur and Coal, and charge a Gun with a considerable quantity of it, I say, giving fire to it should not be able to drive forth a stick or a straw. And this proceeds because all the expulsive virtue depends solely on the pure Nitre, and not of any other thing, and therefore it may be rather concluded possible to make Powder without Coal and sulphur, than without nitre: for it is more probable to find other Materials to do the office of sulphur in taking fire with flame, and likewise of the Coal in maintaining the fire without flame, than to find another which shall be fit to cause so great and impetuous a wind, as the nitre does.

You have well assigned the cause why the powder is composed of those three Materials, and the office every one of them hath in the Composition; now I demand who was the Inventor thereof, and with what reason the proportion of each of the materials was determined by him.

Who was the Inventor of powder and Guns, it is spread amongst the Vulgar by the Authority of Cornazanus, who says it was found by chance by a Dutch Alchymist: but I am of opinion, that Archimedes the Syracusan, that famous Philosopher and Mathematician,

Prior:

Nicol.

The 5 Quest.

Q

was

was the Inventor of the Composition, and of the same mind is the Commentator of Vitruvius upon the first Book; for of him it is written in many places (as Valturius says in his tenth Book De re Militari) how he found out a certain Machine of Iron, with which he threw towards a Land Army stones of prodigious weight and greatness, and with an incredible sound; which gives us to understand that it was a Machine like a great Gun, with which he threw great Balls of stone (as it is not long ago, since the Moderns did,) and chiefly for their great sound, which in discharging them happens, and in any other kind of Machine it does not appear to me it could be done except in one like it. True it is, that at that time it is probable they were more deformed and unhandsome than those used at this present time; for the first Inventions are always something homely, but mend with time, it being an easie matter to add to things already found out; and the same thing I say of powder which in the beginning was found out (either by Archimedes, or by whom you will) but was not compounded in such order and proportion as at present is used. Yea, I rather judge that from that time until this, the Composition hath been varied many ways, and that this is true I have found in some Book not very Antient certain ways and Orders of composing it much differing from the present, the variety whereof I shall here distinctly set down:

1 Gun-powder of the most antient way.

Sal Nitre
Sulphur
Coal.

} Each equal parts.

2 Powder not so antient.

Sal Nitre
Sulphur
Coal.

} 3 parts
} 2 parts
} 2 parts

3 Powder not so antient.

Sal Nitre
Sulphur
Coal

} 10 parts
} 3 parts
} 3 parts

Powder

(115)

- Powder not so antient**
- Sal Nitre } 12 parts
Sulphur } 3 parts
Coal } 2 parts
- 5 Powder not yet so antient.
Nitre } 9
Sulphur } 2 parts
Coal } 3
- 6 Powder of the Moderns.
Nitre } 4
Sulphur } 1 parts
Coal } 1
- 7 Powder more Modern.
Nitre } 20
Sulphur } 3 parts
Coal } 10
- 8 Powder more Modern.
Nitre } 100
Sulphur } 10 parts
Coal } 36
- 9 Powder Great after the Moderns.
Nitre } 100
Sulphur } 20 parts
Coal } 37
- 10 Fine powder not very antient.
Nitre } 9
Sulphur } 3 parts
Coal of Mirochea } 6
- 11 Great Powder more modern.
Nitre } 2
Sulphur } 1 parts
Coal of willow } 1
- 12 Powder of Harquebuses more Modern.
Nitre } 3
Sulphur } 1 parts
Coals of branches of young willows. } 1
- 13 Fine powder more modern.
Nitre refined many times } 5
Sulphur } 1 par.
Coal of the twigs of young Hazel } 1
* Atolano
- 14 Great powder more modern.
Nitre refined } 3
Sulphur } 1 p.
Coal of Willow } 2
- 15 Middle powder more modern.
Nitre refined } 10
Sulphur } 2 p.
Coal of Willow } 3
- 16 Powder of Harquebuses modern.
Nitre refined many times } 10
Sulphur } 1 p.
Coal of * the tender branches of the Filberd or Hazel } 1
cleansed } 2
Gun- not find it.
- * The Author confesses he knows not what Mirochea is.
* Verzelle, Nizala is a filberd or a hazel
Probably, Verzelle may be the shell of the Nut, but I cannot find it.

17 Gun-Powder more modern.

Nitre refined } 27
 Sulphur } 3p.
 Coal of the tender } 4
 branches of the }
 filberd or Hazel }
 cleansed. }

18 Gun-powder more strong and modern.

Nitre refined } 7
 Sulphur } 1
 Coal as last before } 1

* Nizolaro.

19 Pistol powder more fine and strong.

Nitre many times }
 refined } 6
 Sulphur } 1 parts.
 Coal as before of } 1
 Hazels, or Fil- }
 berds }

20 Great powder modern.

Nitre } 4
 Sulphur } 1 p.
 Coal of Willow } 1

21 Great powder modern.

Nitre } 20
 Sulphur } 4 p.
 Coal of Willow } 5

22 Pistol Powder modern.

Nitre refined the }
 dry way } 48
 Yellow Sulphur } 7 parts.
 * Coals of filberd } 8
 or Hazel, or }
 Hempe- stalkes }
 dried. }

23 Pistol powder modern.

Nitre refined } 18
 Sulphur } 2 p.
 Coal of Filberd wood } 3

Now to make any of the aforesaid Powders, it is necessary to take notice that the nitre be pure and potent; the which is known by the practices by burning a little; likewise that the sulphur be clear from the earth and other filth, and that the Coal be not moist by standing in a moist place, and that it be not mixt with Dust or Earth; Lastly, that it be well beaten, and the materials be well incorporated together: and making such powder it will not want effects answerable to the kinds of it, not forgetting that it be well dried, and kept in a dry place.

Prior.

Nicol.

Certainly there is reason to wonder at the various change of the proportions, and I cannot wonder, what should lead them so to determine them.

The first Invention (some believe it was by chance) I am well satis-

satisfied was found by reason Speculatively; to wit, that these three Materials well beaten and mingled together should be apt to make a fire so strong and unquenchable, until each matter should be consumed, for there are clear reasons that it ought to be so, but to give the proportions of the said Materials, I believe they were advised by Experience; for the first Order was founded upon Equality, for they took alike of each, but although it might have a good effect, nevertheless perceiving that effect proceeded from the nitre, they took a greater quantity than of each of the other, and they found that Powder more potent than the first, and so with rational advice some have varied the order unto this day: True it is, there are some orders of the afore-noted that have been ordained with little Reason, and less judgment; yea, I believe some of them, (because they would not do what was done before) to shew their wit without any other reason have made new Inventions, viz. increasing the Coal and diminishing the sulphur, & vice versa, others varying all three in such strange proportions that it might appear found out with greater prudence and subtilty.

There are indeed a certain sort of *Inventors* who knowing not how to speak or do, but what hath been seen or done already by others, and are ashamed that it should appear that they have lern'd or taken any thing from those went before them, do force themselves to vary something from the former manner, or the speech, though it be to make it worse than it was before.

It is a sad truth indeed.

You have shewed me how the *Order* and *Proportion* of the three materials, have been varied from time to time, now I desire to know which of the afore-mentioned Orders you esteem to be the best, that is, the most perfect and potent Powder?

Prior.

And Tar-
taglia was
very sensible
that some of
his Inventions
would be in-
vented over
again.

Nicol.

Prior.

The 1. Quest.

Doubt:

Nicol.

Doubtless that which contains the greater quantity of nitre, I say that the greater in respect of the whole, therefore that of the 16th. Order shall be more potent than any of the rest, viz. that thus composed,

Thus in the Original.

Sal nitrio raffinato piu volte	}	10 parts.
Solfere		1 part.
Carbon de Vezelle de nizola giorene e monde		1 part.

Nitre refined many times	}	10
Sulphur		1 parts
Cole of the tender branches of the Hazle or filberd young & clear.		1

and this shall be the most powerful for two Reasons: the first is, because it doth contain five sixths of Nitre, the which five sixths is greater than that in any other part occurring in any of the above specified Orders. The second is, because the Nitre is refined many times, which makes it more perfect: and there is in it also more perfect Coal; for if the Coal be made of a light and soft matter, it is more apt to receive, and more falsely to maintain the fire, and so shall be more fit and disposed to do the office with celerity.

Prior.
The 7th Quest. You have concluded the 16th. Order to be the best powder, but I demand, if yet it shall not be more potent that shall receive a greater part, than five sixths of Nitre, and a lesser by one sixth between the sulphur and the Coal?

Nicol.

Without doubt it shall, provided that, that little part of the sulphur and Coal be but sufficient to do its office, which is discovered by taking fire with speed, and also by introducing and maintaining it in the Nitre until it be wholly resolved into fire, for if there be so little quantity of the sulphur and Coal as not to do its duty, that composition shall be but useless and of no value: and therefore it will behoove one to take good heed, for if it were possible to make good powder of pure Nitre, it would be the best and most powerful of all, but because it is not apt alone to take fire with that celerity with quick flame as does the sulphur, nor to conserve it till it is all consumed, as does the Coal, therefore it is necessary to give it the company of
the

the other two, and in such a quantity as may be apt and sufficient to do as it ought, which may be discovered, as I told you before.

I understand you well, but is this rule general for all kind of Artillery? for it is well known, that Pistols require finer powder than Arquebuses, Arquebuses finer than Musquets and Falcons; and Falcons better than other sorts of great Artillery: and therefore I demand whether it be not necessary to limit this composition, and finess according to the sorts of the Pieces?

Prior.
The 8 Question.

It doth appear to me so, although it be the custome, yea I have an opinion it is an error as that about your Cannon in the XI Quest. of the first Book, about the length of Guns, quantity of Powder and weight of Bullets, &c. but I will consider better of it and make you sensible of the error in that thing.

Nicol.

Of the same opinion with Tartaglia in this last point doth Vannuccio Biringoccio seem to be, in that he thus expresseth himself. The great Artillery does require other Powder than the small, as the Gunners are pleased to say. But the common Experience, as well as the authority of Casimirus Simienowicz, doth shew that the large grained powder, called Cannon-powder is not so serviceable for small pieces, as that which is less, and in smaller grains. Though whether the smaller-grained powder be not more effectual in Cannons, than what is commonly used, I know not. certain it is that the lesser the grains are, the more powerful is the Powder: and yet, if the powder be not grenulated at all, but in a subtile powder, it loseth its efficacie, and will scarce throw the Bullet beyond the muffle of the Gun. These and other curiosities (many of which are touched upon by that learned Lithuanian, & by Kircherus; our Virtuosi might have taken notice of, rather than have digressed into those impertinencies with which he concludes his discourse of Salt-petre. Neither have I time to enlarge upon this Subject: nor is it my intention to carry this animadversion further, than to demonstrate to the meanest capacity, how ill some have written upon so noble, so common, and so necessary a Subject: and wherein they had such excellent helps from the writings of others, had not their ignorance bereaved them of those aids.

E I N I S.

An additional Review.

TO the end that no exceptions may be taken against what I say in relation to the *English Liturgy* by any of the *Episcopal Clergy* on the one hand ; or that the *Non-Conformists* may not derive any further prejudice against the *publique and established Worship* in this Nation : I do profess that I neither do hereby any way derogate from the *Liturgy* of the Church of *England*, neither do I think any man can justly condemn *Queen Elizabeth* for the course *She* took herein, but rather commend her most *pious* prudence ; what I say, is agreeable to what sundry *English Writers* say, that justify the *equitableness* of our *penal Laws* against the *Papists* ; it is conformable to what *Dr. Heylin* writes in his *History of the Reformation primo Elizabethæ*, and the words of *Mr. Hales* in his Sermon preached at *Pauls-Cross* are these :

Mr. Hales's
Sermons, pag.
57, 58.

And here I may not pass by that *singular moderation* of this Church of ours, which she most *Christianly* expresseth towards her *Adversaries of Rome*, here at home in her bosome above all the *Reformed Churches*, I have read of ; for out of desire to make the breach seem no greater, than indeed it is, and to hold *Communion and Christian fellowship* with her so far as we possibly can, we have done nothing to cut off the favourers of that Church. The reasons of their love and respects to the Church of *Rome* we wish, but we do not command them to lay down : their *Lay-Brethren* have all means of instruction offered them. Our *Edicts and Statutes* made for their restraint, are such as serve only to awake them, and cause them to consider the *innocencie* of that cause for refusal of *Communion*, in which they endure as (they suppose) such great losses. Those who are sent over by them, either for the retaining of the already perverted, or preventing others, are either return'd by us back again to them, or without any wrong unto their persons, or danger of their lives, suffer an easie restraint, which only hinders them from dispersing

dispersing the poyson they brought. And had they not been
 stickling in our *State-business*, and meddling with our *Prince's*
Crown, there had not a drop of *their Blood* fallen to the
 ground: unto our Sermons, in which the warnings of *that*
Church are necessarily to be taxed by *us*, we do not bind their
 presence, only our desire is that they would joyn with *us* in
 those prayers and holy Ceremonies which are common to them and
us. And so accordingly, by singular discretion was our *Ser-*
vice-Book compiled by our *Fore-Fathers*, as containing no-
 thing that might offend them, as being almost meerly a *Com-*
pendium of their own *Breviary* and *Missal*, so that they shall
 see nothing in our Meetings, but that they shall see done in
 their own, though many things which are in theirs, here I
 grant they shall not finde. And here indeed is the great and
 main difference betwixt *us*: As it is in the Controversie con-
 cerning the *Canonical Books of Scripture*: whatsoever we hold
 for *Scripture*, that even by *that Church* is maintained, only *she*
 takes upon her to add much, which we cannot think safe to
 admit: so fares it in other points of Faith, and Ceremony;
 whatsoever it is we hold for Faith, she holds it as far forth
 as we: our Ceremonies are taken from Her; only She over
 and above urges some things for Faith, which we take to be
 Error, or at best but opinion, and for Ceremony which we think
 to be superstition: So that to participate with *us*, is, though
 not throughout, yet in some good measure to participate with
 that Church: and certainly were that Spirit of Charity stir-
 ring in them, which ought to be, they would love and honor
us, even for the resemblance of that Church, the beauty of which
 themselves so much admire. Thus far Mr. Hales, with whose
 sentiments my thoughts so correspond, that to justify the pro-
 cedure of that renowned Queen, I add that Her action is war-
 ranted by the deportment of the Christians from the Apostolique
 and primitive times, to the revolution under Constantine, and
 that I never read any thing in Ecclesiastical History relating to
 Christianity, to convince me that Her demeanor therein was un-
 lawful, or unexpedient.

Where I speak of the Sweating-Sickness, to the accounts of

R

Polydore

Polydore Virgil and Hollingshed, add this out of the Chronicle of Edm. Hall published by Richard Grafton Anno Domini 1550.

In the first year of King Henry 7. a new kind of Sicknes came suddenly through the whole Region, even after the first entring of the King into this Isle, which was so sore and painful and sharp, that the like was never heard of to any mans remembrance before that time: For suddenly a deadly and burning Sweat invaded their bodies, and vexed their blood with a most ardent heat, infested the stomach and the head grievously: by the tormenting and vexation of which sickness, men were so sorely handled & so painfully pangued, that if they were laid in their bed, being not hable to suffer the importunate heat, they cast away the sheets and all the cloaths lying on the bed. If they were in their apparel and vestures, they would put off all their Garments, even to their shirts. Others were so dry that they drank the cold water to quench their importune heat and insatiable thirst. Others that could or at the least would abide the heat and stench (for indeed the Sweat had a great and strong savour) caused cloathes to be laid upon them as much as they could bear, to drive out the Sweat, if it might be. All in manner as soon as the Sweat took them, or within a short space after, yielded up their Ghost. So that of all them that sickned, there was not one amongst an hundred that escaped: Insomuch that beside the great number which deceased within the City of London, two Mayors successively died of the same disease within eight days, and six Aldermen. And when any person had fully and compleatly sweat 24 hours (for so long did the strength of this plague hold them) he should be then clearly delivered of his disease: yet not so clear rid of that, but that he might shortly relapse and fall again into the same evil pye; yea, again and twice again, as many one in deed did, which after the third time died of the same. At the length by Study of Physicians and experience of the people, driven thereunto by dreadful necessity, there was a remedy invented: For they that survived, considering the extremity of the pain in them that deceased, devised by things meer contrariant, to resist and withstand the furious rage of that burning furnace, by luke-warm drink, temperate heat, and measurable cloathes. For such persons as relapsed again into the flame after the first deliverance,

verance, observed diligently and marked such things as did them ease and comfort at their first vexation, and using the same for a remedy and medicine of their pain, adding ever somewhat thereto that was sanative and wholsome. So that if any person ever after fell sick again, he observing the regiment that amongst the people was devised could shortly help himself, and easily temper and avoid the strength and malice of the Sweat. So that after the great loss of many men, they learned a present and speedy remedy for the same disease and malady, the which is this: If a man on the day time were plagued with the Sweat, then he should strait lie down with all his cloathes and garments, and lie still the whole 24 hours. If in the night he were taken, then he should not rise out of his bed for the space of 24 hours, & so cast the cloathes off that he might in no wise provoke the sweat, but so lie temperately that the water might distil out softly of its own accord, and to abstain from all meat if he might so long sustain and suffer hunger, and to take no more drink neither hot nor cold, than will moderately quench and delay his thirsty appetite. And in this his amending, one point diligently above all other is to be observed and attended, that he never put his hand or foot out of the bed to refresh or cool himself, the which to do is no less pain than short death. So you may plainly see what remedy was by the daily experience excogitated and invented for this strange and unknown Disease, the which at that time vexed and grieved only the Realm of England in every Town and Village, as it did divers times after: but 55 years after, it sailed into Flanders and Germany, where it destroyed people innumerable for lack of knowledge of the English experience.

In the twenty second year of the aforesaid King, though the Sweating-Sickness did break out again, yet he saith that it did less hurt and displeasure to the people at this time, than it did before, by reason of the remedy which was invented by the death of many a Creature in the beginning. But in the subsequent years the Sweating-sickness is represented by him to be as direful, as others relate of it. But neither doth Hall, or any other Chronologer speak of this famous and almost infallible Medicine, what effect it had: so that we may conclude, that since it was impossible for the people to have been ignorant of

that remedy during those latter mortalities, the course it self must needs have been ineffectual.

Whereas I observe that the *Arcanum* of *Ivy-berries* was no secret, however that Arcanist pretended it to be so; I prove it out of *Alexius Piedmontius* and others: I add to those Authors *Parkenson's Herbal*, a Book called, *A thousand Notable things*: and *Simon Paulli* professeth he was taught it by a *Scotch Soldier*. And that it may appear with how much more accurateness the receipt is in our Medicinal Books, than in the account of Mr. R. B. I shall set down the words of *Alexius Piedmontius*; and that the rather, because if the Receipt were so effectual as 'tis represented, (as I am satisfied it hath been at other times) 'tis necessary men should know how to use it.

Alexius Piedmontius Secret. l. 2. pag. 92. ex vers. Latin. Weckeri Basilea 1563. 'Præsentiſſimum remedium ad eos, qui 'Peste correpti sunt; quod valet etiam ad lividas pustulas in 'cute ex febre pestilentiali subortas: itemque ad carbunculos, 'ignem sacrum, & id genus alia.

'R. *Hederæ* baccas, maturas, & in umbra siccatas, deinde 'contritas, & fiat pulvis, de quo accipiant ægri ʒ ʒ. cum poculo dimidio vini albi, deinde maneant in lecto, ut optime 'sudent. Posteaquam sudaverint ægri, indusium, linteamina 'lecti, & stragula mutantur, siquidem fieri potest: sin minus, 'indusium tantum cum linteaminibus. Atque sic aliqui una 'nocte sola sani evaserunt. *Mediolanensem* quendam vidi ipse 'Aleppæ, correptum peste, una cum bubone in inguinibus & 'sub axilla altero, qui cum hoc pulvere bis in die, mane scilicet ' & vesperi uteretur: sequenti die, bubonibus ruptis con- 'valuisset.

The old MSS. Receipts to which I refer (there is a mistake in the year of that Plague in the Print, it being 1525. not 1540.) Give as much as will lie on a six-pence (or more) in half a glass of white wine, and direct to cover the party well and make him sweat: and they add, That some have taken of the said powder over night, and found themselves in the morning so well, that they have rose up, cloathed themselves, and walked about the house,

house, and finally been thoroughly cured. Probat. Ann. Domini 1625.

The *Treasure for English men*, or Receipts published in 7h. Vicary (pag. 245.) Give a dram of the said powder tempered with two ounces of Planten-water, or white wine : and direct the Patient to sweat upon it as much, and as often as he can : and in using this for three or four days together, he will die or mend without all doubt (by Gods help.) This hath been often and truly proved. The Author of *A thousand Notable things* gives only half a dram with two or three ounces of *Planten-water*, and directs them to sweat, as *Alexius* doth.

Thus they, whereas Mr. R. B. says only that in the *Irish* Plague, the *Arcanum* which cured such numbers (and which he purchased by the exchange of another Secret) was only a good dose of the powder of fully-ripe *Ivy-berries*, which did usually work plentifully by sweat. Here is neither an account of the Type, or quality of that Plague ; (yet there is a great difference betwixt one and another, howbeit they go under one name : nor are they cured by one method.) No relation of the dose of the powder, whether half a dram, one, two, or three drams : yet in the plague such *sudorifiques* as are otherwise used, are given in double quantity to what is commonly practised in lesser exigencies : and though it be said to work plentifully by sweat ; yet is there no directions that the patient be laid to sweat ; but, for all this saying, it might induce one that knew no more than this about *Arcanum*, to advise it only as such powders are given frequently to continue (with other Medicines) plain transpiration insensibly. In sum, there is not set down whether that our *Irish* Physician did begin his Cure with this powder, or with what Method he used it : and when all these Circumstances are added, (without which the Receipt is useless) though I am pleased to have read the happy success of it once, yet I dare not promise that it shall again, any more than Mr. *Sprats* almost infallible cure of the *Sweating-sickness*, or those other *Anti-Pestilential Medicaments* (now exactly) recorded by *Experimental Galenists*.

Whereas (pag. 54.) I speak of the age of *Geber*, as following

Mr. Parkensson
from the Em-
pericks, Quack-
schoers, and
Chirurgeons,
expresseth not
the dose nor
circumstances
with which it
is given ; but
that it must be
taken 2 or 3
days together.
R. B. Of the
usefulness of
Nat. Phil. par.
2. pag. 142.

See Hottinger
Histor. Orient.

Blancanus
Chronolog.
Mathemat.
Secul. 18.
Andr. Libe-
rius exam.
conf. Parisienf.
Vide Naudæ-
um in histor.
Magix. 6. 14.
Vide Riccioli
Chronicon u-
trumque præ-
missum Alma-
gesto novo.

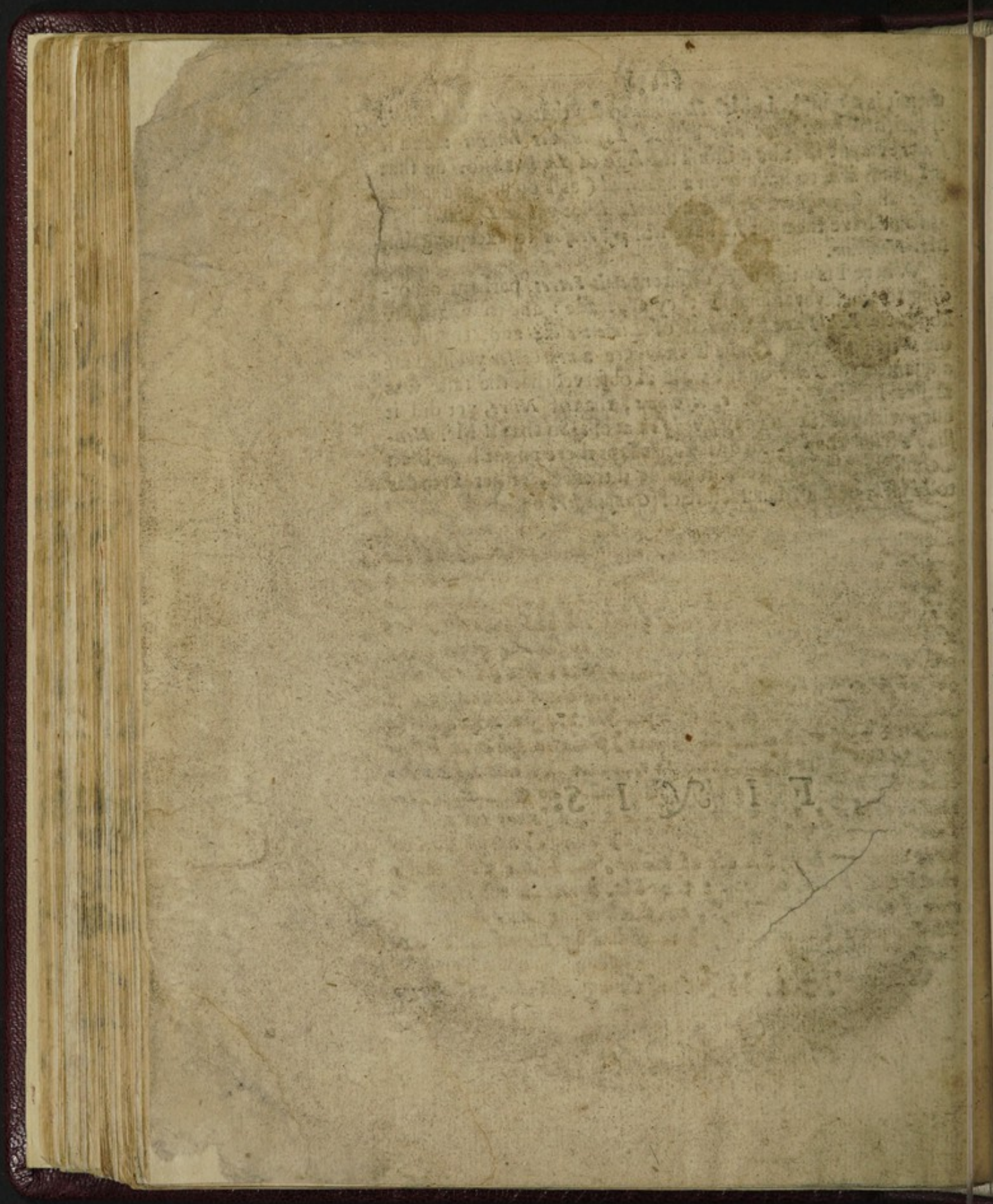
Math. Lib. 10.
exam. conf.
Parisienf.
Conting. de
meate. Hermet.
6. 57. pag. 380.

ing of *Leo Afer* in my judgment, and that he lived but one hundred years after *Mahomet*: and consequently many Centuries before *Raymund Lully*: the Argument I use is manifest to any man that knows the time of the birth of *Mahomet*, (which yet *Historians* fix to be, some *A. D.* 570. others *A. D.* 610. others in 620.) and that the *Hegyra* begins *A. D.* 622. as *Vossius*. But I think it fit that I observe here that as in all the *Arabian* Chronology, so in this particular about the age of *Geber*, there are great uncertainties. *Blancanus* placeth *Geber* (the *Arabian*) in the ninth Century after *Christ*; and so he must have lived about five hundred years before *Raymund Lully*. The inquisitive and learned *Libavius* reckons upon *Geber* as contemporary with *Mahomet*, saying, *Geberus quem volunt circa annum partus virginis sexcentimum in vivis fuisse*. I find that *Vigner* placeth him in the year of our Lord 723. *Ricciolus* calls him a Spaniard, *Geber Hispalensis* in his Chronicle of *Astronomers*, he placeth him in the year of our Lord 1090. and gives this reason against *Blancanus*, that it must be so, because that *Geber* in his *Astronomie* mentions *Arzachel* who lived in the twelfth Century after *Christ*, and whom by the name of *Arzael* is placed by *Blancanus* two Centuries after *Geber*, that is, within the eleventh Century after *Christ*. There is such a confusion in the *Arabian* names, that I am ready to imagine there were two *Gebers* (or more, the name being commonly assumed by the *Saracens*) the one very antient, and a Chymist, of whom *Leo Afer* may speak; and another in Spain, famous for *Astronomy*, who corrected sundry things in *Ptolomy's Almagest*, of whom *Ricciolus* and others speak, who call *Geber* a Spaniard. As for *Raymund Lully*, whom Mr. *Henshaw* placeth in the year 1333. I find *Libavius* to say he flourished sooner: *Illustris fuit Reimundus anno salvatoris 1324.* but *Conringius* relates how he was killed in the year 1315. *Lullius 1315. Octuagenarius circiter, dum religionem Christianam Bugia in Africa doceret Martyr lapidibus obrutus est.* From whence it is manifest, that if we place *Geber* in the twelfth Century with *Arzachel*, (as *Ricciolus* in his larger and more accurate Chronicle doth) then

then it is a mistake in Mr. Henshaw to say that Geber for certain flourished some Centuries before Raymundus Lullius : and it seems evident that he mistook the Age of Lullius also. So that if I grant him to have been a Spaniard (as I do not grant that Geber the Chymist was either a Spaniard, nor yet an Indian King, as some have thought) I have still just reason to except against Mr. Henshaw.

Where I say there are different Salt-Petres, perhaps according to the several Earths they are made : and to what I say about the Salt-Petre gathered of Lime-walls ; add, that since the writing hereof I have been where a new Cellar yeelded me a quantity of Peter on the walls : I observed that the taste was rather like the salt of calx viva, than of Nitre, yet did it burn without leaving any fixed salt at all. So that if Mr. Henshaw's friend had minded that, perhaps there might have been a considerable improvement deduced thence, either in order to Physick, or the Manufacture of Gunpowder.

F I N I S.



THE
PLUS ULTRA

reduced to a

NON PLUS:

OR,

A SPECIMEN of some *Animadversions* upon the
PLUS ULTRA of M. *Glanvill*, wherein sundry
Errors of some *VIRTUOSI* are discovered, the Credit of the *Aristotelians* in part *Re-advanced*; and Enquiries made about

The Advantages of the *Ancient Education* in England above the *Novel and Mechanical*.

The old *Peripatetick* notion of the *Gravity of the Air*, and the *Pressure of the æreal Columne or Cylinder*.

The *Deceitfulness of Telescopes*.

The *World in the Moon*, and a *Voyage thither*.

The *Original and Progress of Chymistry*.

The *Use of chymical Medicaments*.

The *Usefulness of the Peripatetick Philosophy* in reference to the *Practice of Physick*.

The *Original and Progress of Anatomy*.

The *First Inventor of the Circulation of the Blood*.

The *Transfusion of Blood*, the first *Proposers and Inventors thereof*, and its *Usefulness*.

The different *Nature of the Blood*, and the variety of *Phænomena* appearing upon the *burning thereof*, and *mixing of it with several liquors*.

Some *Trials* in order to a discovery of the *Nature of the English Baths*.

By *Henry Stubbe*, Physician at *Warwick*.

Isocrates in Encomio Helenæ,

Πολὺν γὰρ καλλίον ὅτι καὶ ἐπὶ χηνοῖσιν ἐπεικῶς δεῖξαι ἢ καὶ ἐπὶ ἀνθρώπων ἀκριβοῦς ἐπιδείξει.
καὶ μηδὲν ἀνέχον ἐν τοῖς μεγάλοις ἢ πάλιν διατρέχει ἐν τοῖς μικροῖς καὶ τοῖς μὲν πρὸς τὸ βίον ἀ-
φαιδῶσι.

A P R E M O N I T I O N to the
Ingenious and Considerate R E A D E R.

A Bove a year ago, at the Table of a Person of Honour, there hapned a Debate concerning the Utility of the Ancient and Established Method and Medicaments used in Physick, and How much the knowledge of the Doctrine of Elements, Elementary Qualities and Humors, (as vulgarly delivered) might contribute to the skill and successful Practice of a Judicious Physician? There hapned to be present a Gentleman, very much concerned for the Promoting of Science, and a professed Admirer of the Institution of the Royal Society, who (as is usual with that sort of Virtuosi) instantly usurped all the Discourse, and avowed that All the Ancient Methods of Science were vain and useless to a Physician, and did not so much as contribute to the Cure of a Cut-finger. With this rash and hasty Censure I confess I was surpris'd, and demanding what know'edge he had in the received Methods of Physick and Medicamen's? I found him altogether ignorant therein, but some crude Assertions of the new Philosophers, and some imperfect Experimen's were alledged in behalf of Universal Inferences, and no less then Stupidity charged upon the preceding Philosophers and Physicians, with those that adhered unto them: In fine, He avowed that this opinion of his was the

TO the READER.

positive and dogmatical averment even to a syllable, of Mr. Glanvill and other Virtuosi, and that it was undeniably evinced in a Book of theirs about **The Modern Improvements of Useful Knowledge.** After a brief reple to this Insolent, shewing that the ancient Philosophy had not been so steril in reference to Physick, but that it had been the foundation of all those accounts of the Causes, Prognosticks, and Cures of Diseases (as also of the Healing of Cut-fingers and green wounds) by which of old and in latter times Patients had been benefited: that the nature of infirmities had been explicated, and the qualities and use of Medicaments **successfully** explained upon **those grounds**: and whatever Defects there were in those received Principles, No Physician, that understood what he said, could deny them to be **exceeding useful**; that for any man to speak otherwise, was to expose himself to just scorn and contempt. As also for any man to go about to inodiate and discredit the present authentic Methods of Curing upon no other exceptions then those, that the Philosophy whereupon those Theorems were raised was false and frivolous, was an Intolerable Impertinence; since that even in Mathematicks it was **notorious**, that many solid Truths had been happily deduced from false suppositions and Postulata; that in Common Logick Right Conclusions might be the result of ridiculous Premisses; and the Rule of falshood in Arithmetick would alone serve to convince any man, that upon imaginary, yea, confessedly

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sedly false Hypotheses, important and true deductions might be judiciously continued. After that an end was put to this contest by a more general conversation, I still retained a sense of the Injury I supposed to be done to me and all Rational Physicians, by this barbarous Opinion; I determined to avenge my Faculty upon Mr. Glanvill for this, and by sacrificing that Virtuoso to publick Obloquy, thereby to establish (if possible) our general repose and tranquillitie, that we might not (as I observed we were) be troubled in all Companies and Assemblies, with Extravagancies of this kinde; there appearing unto me daily a greater necessitie of securing our Eares with black wooll or Wax, against the Buzz and Noise of these Prattle-boxes, then ever Ulysses had upon his approach to the Sirens: Our ruine being as certain from them; and there being nothing of Harmony in such Discourses, nothing but discord and jarring, in comparison whereof the screeching of Owls, the creaking of doors, and whatever noise else is offensive, seemed Musical and Melodious. Upon the perusal of Mr. Glanvill's Book (which He had recommended unto me) I met with so much of Ignorance, that I wondered how several men should concur to mistake so, and I thought it a difficult matter to reply, it being too tedious for one of so little leisure as I have, to inform persons that were conceited and knew nothing.

How.

To the READER.

Howsoever, for the general benefit of the Age, I purposed to write some *Animadversions* upon him, and thereby to put a stop to the pride of such Ignoramus's, and amongst the several antiquated Philosophies which our Times have renewed, to introduce amongst the *Virtuosi* that of Pythagoras, the first rudiments whereof consisted in this, that **the Disciples were obliged for five years to hold their peace.** Upon the reading of Mr. Glanvill, I saw my self under a necessity of examining the *History of the Royal Society*, the tendencie whereof I observed to be so pernicious, that, if the first provocation had made me **angry**, I was now become **obstinate**. In that *Famed Work* I encountered with so many **illiterate passages**, that the credit of our Nation seemed concerned in the refuting it. I met with *Passages* so destructive, that, if to be concerned for the interest of the present Monarchy, the Protestant Religion, and the emolument of each private person (and not solely of Tradesmen) could warrant any one for putting Pen to paper, I ought not to be silent. I divided my *Animadversions* into several parts; some whereof were to represent these *Comical Wits* as really ridiculous; others were to make them odious to the Kingdom. I considered, that in these days few had patience to read over prolix Treatises; as also I imagined, that the Contest would be more deeply imprinted in the minds of men, if they were excited by a variety of discourse of that nature. The first Specimen of *Animadversions* upon Dr. Sprat and Mr. Glanvill were dispatched last Easter;

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Easter; but the *Comical Wits* were so alarmed at what they at first despised, that they employed all their *Artifices* to divert me: and if *malicious threats* or other *disingenious proceedings* could have wrought upon me, the thing had died: But those *pitiful Mechaniciens* understood not the weakness of such Batteries upon me, and in all my life (which those mean spirits pretended they would write) I am sure there was never any circumstance could induce them to conjecture that I was to be discouraged by *Menaces*; Besides, having found them so *ungenerous*, I concluded it more unsafe to *desist*, then to *proceed*: I knew the cruelty of *Cowards*, and that who had to do with *wolves*, must not make himself a *Sheep*: I evidently saw designs not only upon my *Fortunes*, but *Life*; I know the pernicious *Menacy* of mean and proud spirits, the *Obligation* would be lost in *sparing* them; whilst the *Ignominy* was so great, to be at my *Mercy*: I concluded that the most daring *Council* was the best; that it was no *disparagement* for me to be overthrown by power, and that I should multiply *sham*: upon them, when it should be said, I fell their *Victour* and their *Martyr*. Although I had submitted those papers to the most severe Judgment of a *Cautious Person* (giving him absolute liberty to dispunge whatsoever he thought harsh, or culpable) resolving never to look upon or alter them after he had viewed them; when they were authorised to the *Press*, and that there was no longer doubt of their *Innocency*, they containing nothing repugnant to the *Government*, *Church of England*,

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OF *Good Manners*, yet did some of the *Virtuosi* (notwithstanding that they pretended to be desirous it should come out, and that rather than the Book should meet with any obstacle their President should licence it) procure the *Impression* to be stopped: If this be Generous, if this be agreeable to that frankness of minde and Philosophy which you profess; *O tres-haute*, and *tres-agreeable* Comediants, I appeal to all English and brave spirits! Could any man have perswaded the world, before this *Essay*, that you who seem the sole Dictators of *Wit*, and useful *Knowledge*, would have employed your power against me! And that thirty Legions were to be called to aid You against a young Countrey-Physician, who had so long discontinued Studies of this nature, and had so little time to resume them, or recollect his thoughts! Pardon me, if I tell you, there is nothing Noble in this demeanour, and whatever there may be of the *Virtuoso*, there is no Gallantry of Vertue will give countenance to it, nor any thing that derives from the Tutor of *Alexander*. Go, procure an Act of Parliament, or sollicite for a Proclamation, that none write or speak against you; by such means ensure those Triumphs over the ancient Education of this Kingdom, the two Universities, and the Protestant Church, which the Sprats and Glanvills by their Goose-quills cannot achieve for you. To this course I should willingly submit, and not envy you such accessions of Glory: And as a Supplement to the Lives of your Worthies, only write them impartially,

To the READER.

I give you leave to *seign* what you will concerning Me. Take not the advantage against these *Animadversions*, which the *Printers* mistakes occasioned: they are many, and since you were in part a cause of them, by *distracting* and *impeding* of the publication; and I being absent could not remedy them, 'twill be ignoble to press upon confessed errors, some whereof are reduced into a Catalogue. As to the *incoherences* of some places, and the *incongruities* of the *English*, I acknowledge there are sundry of that kind; but do not think my self accountable for those failures, nor for those repetitions of things, which as I travelled came into my memory; some whereof had been sent to London before. Howsoever, if you can refute the substance of the Discourses, I shall leave it to your prudence, after this declaration, how you will manage the controversy. When the other piece against Dr. Sprat will come out, is a matter I cannot well promise to the world: The *Virtuosi* can best undertake for that. I have respited the publication hereof thus long, to try, if any Letters of mine, or Entreaties might prevail with them: I joyned also Menaces that I would post them; which indignities I wonder men of To'erable Ingenuitie, or of so great arrogance would out-libe. And the Theological Censure being already publick, I found the expectation of all men impatient to see some of these *Animadversions*.

There

To the READER.

See Campa-
nella of the
Spanish Mo-
narchy, in
English, c. 10.
p. 47. c. 25. p.
157. c. 27 p.
177, 180, 181,
182, 183.

There is another Treatise, shewing the *Original* of the Colledge of *Experimental Philosophers*, as *Campanella* projected it, and containing a parallel of what *He* contrived (and their *Historian* hath pursued) for the reducing of *England* and *Holland* to *Popery*: also a *Specimen* of sundry *Experiments* published by several *Virtuosi*, that are **false** or **stolne**, yet boasted of as **their proper Inventions**: together with Instances of the danger that all *Tradesmen* will run into by the continuance of **this Assemblie**; which to manifest further, I shall here adde a *Proposal* designed to have been tendered, and improved into an **Act**, in this last Session of *Parliament*. It was delivered by *Sir P.N.* to an *Honourable Member* of the *House of Commons*, and by *Him* sent unto me, adding, "In which you may see what **they drive at**,
"viz. Instead of *Monopolizing* this or that
"particular Trade at a time, once for all to
"have a *Monopoly* for all that ever should be
"invented.

"It is proposed, that such kinde of pre-
"tended new *Inventions* relating to *Mecha-*
"nicks, *Trades*, or *Manufactures*, as are or
"shall be offered to the *Parliament*, may by
"them be referred to such indifferent judici-
"ous persons, as are like to give them a faith-
"ful Account, about the *Newness*, *Reality*,
Use-

To the READER.

“Usefulness, &c. of the things proposed,
“and whether they are like to answer the ef-
“fects pretended to, and to make Report of
“the same to the Parliament.

“And the Royal Society of London for
“Improving of Natural Knowledge, being
“already fixed into a Corporation, and the
“Council of the said Society consisting of 21,
“being by their Constitution under an
“Oath, to deal faithfully in all things be-
“longing to the Trust committed to the said
“Council: It is offered, that such things may
“be preferred to the said Council, and they
“to Report unto the Parliament.

They that know the *Mⁿ*, know their meaning: and
whosoever understands the Constitution of our Par-
liaments, is assured that they need not look out of
their own number for indifferent judicious persons, to in-
form the House what the *Reality, Usefulness, or New-
ness, &c.* is of *Inventions*; or should the Parliament
be at any time destitute of such Intelligence, the Coun-
cil must make better Reports than doth their *Histo-
rian*, or else it will be in vain to resort to them in the
Case. Upon the same pretence, if they once gain
this, that miscellaneous Assembly of indifferent & in-
judicious persons, shall pretend to detect the
Frauds of Trades; and endeavour to recommend to all

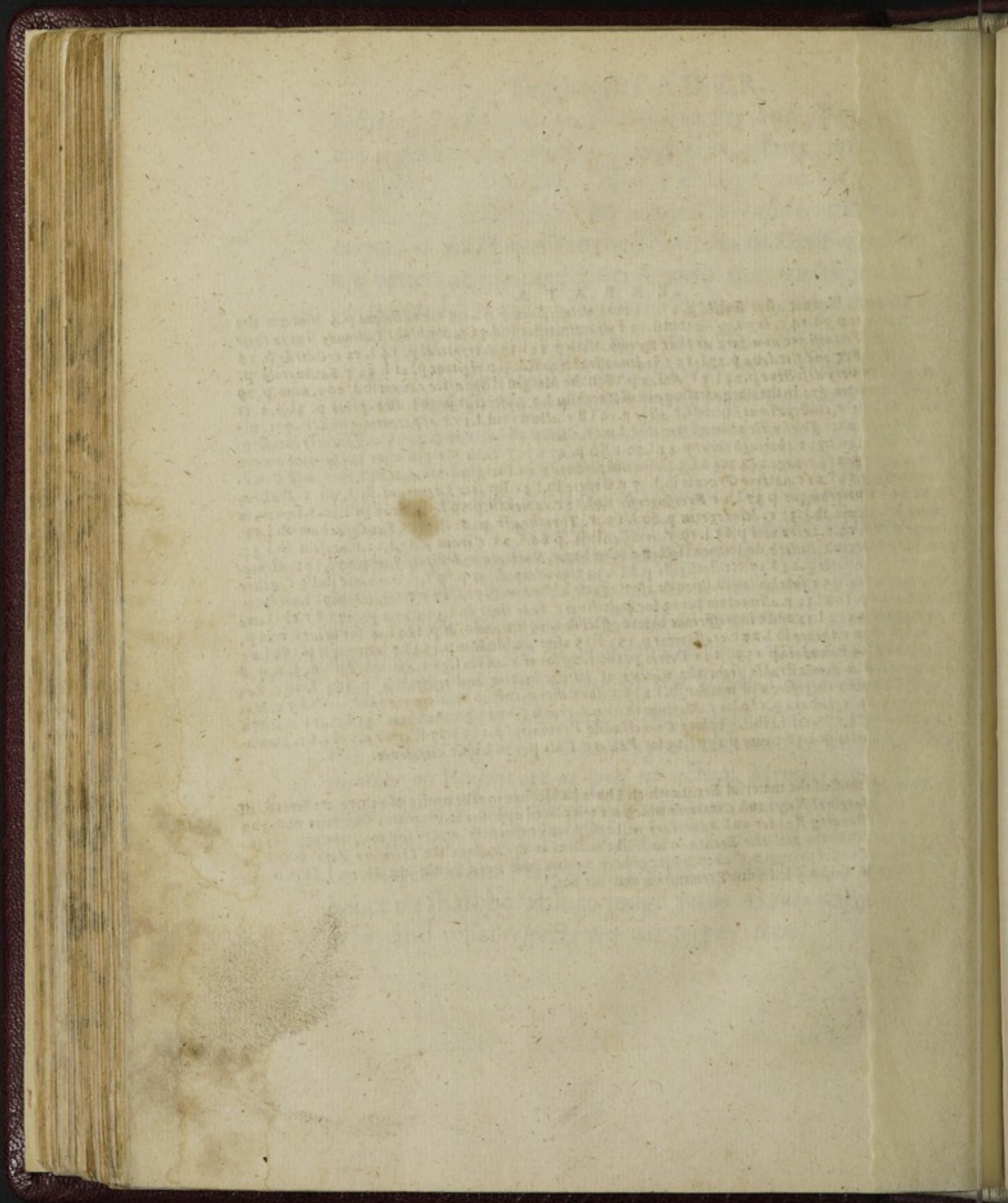
To the READER.

besitting Preferments in the University and elsewhere, the ingenious and learned: and then affairs will be brought to a fair pass. But I enlarge too far, and shall only adde, that I do remit the consideration and purport of this Project to the Tradesmen of London, who are better acquainted then I with the tendency and consequences hereof. Had my Preface to the Animadversions upon the History of the R. S. come out first, I had there shewed that it is no way my intention by any of these Pieces to detract from any Person of Quality or Learning, that is an Honorary Member of that Society, not from the Institution of it: I must referre my Reader to that, as containing no ample Justification of me, as also a defence of those passages in my life, which I apprehended most obnoxious to their censure. My quarrell lies only with the Comical Wits, who make such a Noise in the world, that in them all the rest are as it were drown'd, who have deviated from the intentions of the Royal Founder, and are so deserted by sober and serious men, that I make it my further Request, that they would inform us what number of Persons are at present actual Members of the Royal Society, and which resort thither, and pay the usual Contributions: and that in their Transactions there may be related what Persons are present each Month: from hence we shall be able to judge what repute they deserve, and what respects we are to pay them.

E R R A T A.

Page 2 Line 31 blot out after *Euclid* p. 1. 13 read *vetustissimus* p. 41. 35 r. *ex actis* p. 5 blot out the Marginal note p. 9 l. 14 r. *ἐπιλαχμα* ibid. l. 13 r. *diacelastoston* ibid. l. 34 r. *Metbinks I already live in these times when the Virtuosi are as absurd as that Romish Monk* p. 12 l. 17 r. *cryptical* p. 14 l. 22 r. *Order* p. 15 l. 22 r. *Bagdad, Fez and Cordova* p. 17 l. 15 r. *indemonstrable* ibid. l. 31 r. *rigorous* p. 17 l. 34 r. *Savonarola* p. 22 l. penult. r. *be very defective* p. 23 l. 3 r. *Anian* p. 28 in the Margin r. *Spherice cavum* ibid. l. 29 r. *none* p. 29 l. 19 r. and thereupon, &c. in the Marg. citation out of *Zucchini* l. 9 r. *vitiatus* p. 30 l. 26 r. *pius* p. 31 l. 2 r. *Sarsuis* p. 32 l. 32 r. *construximus* l. penult. r. *aliis* p. 33 l. 8 r. *album* ibid. l. 17 r. *apparentiam* ibid. l. 17 r. *vi-* *trorum* ibid. l. 31 after *Telescopis* adde *us sunt* ibid. l. ult. r. *elicis* p. 38 l. 15 r. in p. 39 l. 5 r. *Focanry* ib. Marg. r. *peffum itura* p. 40 l. 33 r. *thorough three* p. 41 l. 20 r. *et* p. 47 l. 33 r. *tubis* Margin after *Discis* blot out the full stop, and for p. 233 r. page 234 p. 48 l. 33 blot out perhaps p. 49 Margin r. *Muscia* ibid. l. 20 r. *most Com i-* *cal Gentlemen* p. 51 l. 22 r. *natione Gracum* ibid. l. 17 r. *Genere* ibid. l. 31 for *free* r. *ignorant* ibid. l. ult. r. *Trallia-* *mus* p. 56 l. 25 r. *urorumque* p. 57 l. 2 r. *Freisingensis* ibid. l. 13 r. *capiendis* p. 59 l. 18 r. *πρόξ* ibid. l. 20 r. *ἐπειτα*, &c. *Thamyas* ibid. l. 14 r. *facies vini* p. 63 l. 19 r. *καταλόγῳ* p. 66 l. 2 r. *Cordus* p. 67 l. 22 r. *acefcet* ibid. l. 33 r. *tonus* p. 69 Margin r. *Billich* de ferment. fct. 89 p. 67 l. 16 r. *Noricatum* *Institutoriam* p. 77 l. 33 r. *Alcma-* *us* p. 80 l. 32 r. *versatos* p. 84 l. 17 r. *Osteologists* p. 88 l. 34 r. *quadrupedibus* p. 89 l. 3 r. *rentat* ibid. l. 9 r. *aliter* p. 95 r. *about* ibid. l. 135 r. *subclavian* ibid. l. penult. after *equals* adde *him* p. 97 l. 17 r. *mediately* p. 93 l. antepen. for *who* r. *well* p. 106 l. 13 r. *alimentum* p. 113 for *indeclines* r. *rude lines* ibid. l. 31 r. *now* p. 117 l. 8 r. *the same* ibid. l. 13 r. *about* p. 122 l. 12 adde *impersperous* before *eff* ibid. l. 19 for *and* r. *as* p. 124 l. 4 for *urine* r. *vein* p. r. *In fine* p. 156 l. 5 r. *domini* p. 159 l. 18 r. *Delrio* p. 160 l. 29 for *or* r. *an* ibid. l. 37 r. *approched* p. 163 l. 6, 7, 8 blot out which is demonstrable from the variety of its declination and restitution p. 163 l. 20 r. *Le-* *vity* p. 167 l. 23 after *therefore* add *wonder* ibid. l. 29 for *duo* r. *dico* p. 168 l. 6 before *were* adde *me* ibid. l. 9 r. *Ma-* *gnetus* ibid. l. 15 r. *pragravata* p. 169 l. 1 r. *Marinus* ibid. l. 10 r. *granis* p. 174 l. 30 r. *volatum* l. 31 for *at* r. *er* p. 174 l. 2 r. *raillery* ibid. l. 4 r. *scurrilia* ibid. l. 5 before *Council* adde *Provincial* p. 175 l. 27 r. *artus* p. 178 l. 1 r. *Dama-* *getus* ibid. l. 2 r. *Cortes* ibid. l. 36 r. *cone* p. 179 l. 13 for *Philos* r. *Puls* p. 178 l. ult. r. *consistence*.

These are most of the material *Errata* which I have had leisure to take notice of: there are several of the *Marginal Notes* and *Citations* which are not placed opposite to the places they refer unto; an understanding Reader and Adversary will easily judge thereof: and if any man take any advantages from any probable *Errata* or such like failures as my haste or the *Licensers* dash may have occasioned, (though not taken notice of here neither have I ever seen all the *Sheets*), I know not how to help myself if this *Premonition* avail me not.



(1)

TO THE

Reader.

THE Discourse of Mr. Glanvill, was the first occasion of my writing about the Royal Society, the provocation which it gave to all sorts of men, of different Professions were such, that it might stir up any publick spirit, to support so common a cause. I was sensible of the injuries he doth unto the dead, the affronts he puts upon the living, the contempt wherewith he decries that University-Learning, and those Studies by which Christianity hath been supported against the Arrians, the Jews, the Mahometans, and of late the Papists and Socinians: and which if they be relinquished, I profess, that I think that the Christian Religion must inevitably fall without the aid of a Miracle. It is a kind of Apostacy from the Nicene and Athanasian Creeds to slight Metaphysicks. The distinction of the Trinity, of Essence and Personality, the Hypostatical Union of the two Natures in our Saviour, and the meritoriousness of his death, (which depends thereon,) are undermined with School-Divinity; and whosoever hath any sense or value for the benefits we derive from Controversial-Divinity, either as to the quieting of his Conscience, or convincing of his Adversaries, must detest this Enterprize of Mr. Glanvill. And methinks that whosoever doth but call to mind that variety of foolish Sects, which gave the Church so much trouble in its first Infancy, and of late years, and considers that they had their Original from want of Logick, should not condemn that Art, by which men argue rightly from sound Principles. It was no less strange to me to finde the names of Reverend, Sage, Grave, Disputer and Logician, perverted into terms of Contumely; yet had not all those Motives prevailed with me, but that he had so defamed the Ancient and Modern Physicians, until these late Innovators, that many importuned me

A

to

to revenge my Faculty upon this Insolent Man. Besides, I had been much troubled with *impertinent discourses* of some, who to excuse their Ignorance in the *Prognostick* and *Therapeutick* parts of *Medicine*, indulged themselves in the vilifying all the *ancient learning* and *reading*, and asserting out of the *Writings* of the *Society*, the necessity and *conveniency* of *new-methods*, in *curing* and *abbreviating diseases*. I soon espied my advantages over Mr. Glanvill. But perceiving his *Defence* so complicated, with the *History* of the *Royal Society*, that I could not well meddle with the one without reflecting upon the other; I set my self to peruse that also, and found the *Errors* therein so *numerous* and *gross*, and the tendency of it so *dangerous*, that it seemed but an easie, yet *necessary* work, to the *Universities*, and all *Learning*, as well as the profession of *Methodical Physick*, to write against these new-fashion'd Philosophers; I remarked so many *defaults* in both books, that I was at last weary of taking notice of them, there being still *Plus ultra*. I resolve to give my *Studies* no further diversion in pursuing Mr. Glanvill; but to leave him to the scorn of some more common Pens, who being at the *Universities* may have more leisure than I have at present. After all this *Ostentation of Learning*, the things he talks and writes of are such, as he is utterly unacquainted with: the Authors he mentions he never saw, and all his discourse about the *Mathematicks*, and *Mathematicians*, procured him no other acknowledgements from a *Learned* and *Reverend Prelate*, (to whom he sent one of his Books) than a *Reprimand* for intermeddling with what he understood not. Who can choose but smile when he reads how *Apuleius* improved the *Mathematicks* after *Euclid*? who ever heard of such men as *Maximus Palanudes*, *Achazen* and *Orentius*? I suppose this last should have been *Orontius*, and he is so famous a *Geometrician*, that when Sir *H. Savill* (as I remember) was to seek for an instance of a pitiful fellow; this was the man he fixed upon; He tells us that the most learned men of all sorts and professions; *Mathematicians*, *Chymists*, *Physicians*, *Anatomists*, *Antiquaries*, and *Philosophers*,

Plus Ultra.
pag 23.

Page 4.

phers, make up the *Royal Society*: but one would not guess so by their *History*! He tells us, that the former *Methods of Science* for so many *Centuries*, never brought the world so much *practical beneficial knowledge*, as would help towards the *Cure of a Cut Finger*, which he says is a palpable *Argument*, that they were *fundamental mistakes*, and that the *way was not right*. Can any one that hath heard of *Podalirius* and *Maebao* in *Homer* prate thus? *Quos tamen Homerus non in pestilentia, neque in variis generibus morborum aliquid attulisse auxilii, sed vulneribus tantummodo ferro & medicamentis mederi solitos esse proposuit. Ex quo apparet has partes medicinae solas ab his esse tentatas, easque esse vetustatissimas.* Had our *Virtuoso* but known how *Hippocrates* had writ about *Wounds and Ulcers*, and that *Aristotle* himself was descended of the line of *Æsculapius*, and that his Ancestor *Nicomachus* was *Physician to Amyntas* King of *Macedon*, And that *Aristotle* also was a *Physician*, and writ several books (besides his *Anatomy of Man*) in that *Science*, and was upon that account valued by *Alexander the Great*, as *Plutarch* saith. And how little the *Ancients* stood in need of *modern discoveries and aids* to cure *Cut Fingers*, any man may judge, that knows what *Scribonius Largus*, and *Galen* (in his books *de Compos. Medicam. sec. genera*) have written: and how this last Author (upon *Philosophical deductions*) compounds several *Medicaments* to that purpose. In the *Augustane Dispensatory*, to this day his *Tripharmacon*, his *Diapalma*, his *Diadictamnium*, and others are recorded. And if any thing rendred *Paracelsus* justly famous, it was the cure of *inveterate Ulcers*, not green *Wounds*: and that therein he did out-doe the *ancient Physicians*, is a question, I cannot grant, and have not leisure to dispute.

He reckons up *Five Instruments* by which the *latter Ages* have improved *Knowledge* above *Antiquity*. "The *MICROSCOPE*, *TELESCOPE*, *THERMOMETER*, *BAROMETER*, and the *AIR-PUMP*. Some of which were "first invented, all of them exceedingly improved by the "*ROYAL SOCIETY*. But as for the *Telescope*, he con-

Plus Ultra
Pag. 7. and 8.

Corn. Celsus
in Praefat.

Diog. Laert. in
vita Arist.
Suidas in Ni-
comacho, &
Ammonius in
vita Arist.
Vile notae
Menagii in
Diog. Laert.
l. 5.

Plus Ultra
Pag. 10.

Plus Ultra
Pag. 10.

'fesses that to have been invented by *Metius* and *Galileo*. Which Confession of his, although it take from the Society all pretences to the invention thereof; yet it is unbecoming an inquisitive person, who might upon better Intelligence from *Borellus*, in his book about the Inventor of Telescopes, published in 1656. He might have learned thence that *Adrianus Metius* of *Alkmaer* did not invent them, but one *Zacharias Joannides* of *Middleburgh* in *Zeland*, (though perhaps *Baptista Porta* had obscurely proposed it) and that he who may most justly come in for a second share in the glory of that invention is one *Joannes Lapreius* of the same Town. And whereas 'tis generally written, that *Galileo* was the first who applied those tubes to the contemplation of Celestial Objects, even that appears to be false, seeing that the first Inventor, even *Zacharias Joannides*, (together with his son *Joannes Zacharides*) did make use of them to discover several new Phenomena in the Moon and Heavens. Which mistake is unpardonable in our *Virtuoso* (and his Assistants) because that a more particular Enquiry hath been made of late years hereinto, then ever before. The *Barometer* he allows to have been first invented by *Torricellius*, not to try the gravitation of the Air, but to prove a vacuum; Afterwards, the different ascent of the *Quicksilver*, being tried on the top and at the bottom of Hills in France, the opinion of the rising of the *Quicksilver* from the pressure of the Air, was introduced and illustrated. But nether is the gravitation, or pressure of the Air, a new opinion; it is as old as *Aristotle*, it is his, and he essayed to weigh the Air, in his book *de celo* l. 4. sect. 29, 30, 39. He proves the Air to ponderate, because a bladder full of Air weighs heavier then one that is empty. Concerning which Experiment I shall adde the words of *Scipio Claramontius*, that learned Writer, the truth of it having been questioned, "Possum tamen testari observationem *Aristotelis dicto faventem, fuitque diligens observatio, & à diligentissimo pensatore, exactusque stateris & lancibus peracta, me presente & adistente, cum pluribus veritatis cupidis viris: pensitavimus ergo primum follem novum penitusque vacuum, primo statera quæ solum unciarum differentiam indicabat, invenimusque*

Borell. de vero
invent. Tele-
scopio, p. 11.

Pecquet. Ex-
perim 2. in
Diff Anat. p.
34. Ed Paris
1651.

Scipio Clara-
mont. de uni-
versal. 14. c. 3.

"venimusque unciarum decemnovem, & totidem reperimus eun-
 "dem follem diligenter inflatum, & solo spiritu nulloque hu-
 "more immisso: ac postea usi sumus lance, quæ semuncias quoque
 "indicabat, tumque follem inflatum unciarum decemnovem &
 "semis invenimus, adeo tamen ut ibi libra in æquilibrio abs-
 "que tractu (ut vocant nostri) adamussim permaneret: at idem
 "vacuus non amplius in eodem signo sine tractu, sed cum tractu
 "perstabat. Quocirca verum dicit Aristoteles. So that whe-
 "ther we consider the gravitation of the Air, or its being
 "weighed, (which Mr. Glanvill in his *Plus ultra* thinks so
 "strange of, as he expresses, "To have said in elder Time, That *Plus Ultra*
 "Mankind should light upon an Invention, whereby those Bodies *p 59. c. 8.*
 "might be weigh'd, would certainly have appeared very wilde
 "and extravagant; and it will be so accounted for some time
 "yet, till men have been longer, and are better acquainted
 "with this Instrument, &c.) The opinion it self, and the
 "attempt to weigh it, is *Aristotles*: Nor is this Discourse ca-
 "sually proposed once in *Aristotle*; but sundry times he avows
 "the gravitation of the Air in his *Problems*, viz. *sect. 11. probl.*
 "*45. sect. 21. probl. 18. sect. 25. probl. 12, 13.* From hence we may
 "judge how well Mr. Glanvill is acquainted with the tenets
 "of *Aristotle*, and how well read he is in him whom he condemns.
 "He and his *Philosophick* friends dealt only in some pitiful
 "Compendium of *Physics*, and from thence learned that which
 "was the opinion of *Themistius*, *Simplicius*, and other eminent
 "*Peripatetics*, as if it had been the avowed doctrine of their
 "great Master; and thereupon they thus deliver themselves.
 "And on this occasion, Sir, I observe the incompetency of their
 "judgments, who are Enemies to the real Experimental Philoso-
 "phy, in that they do not (as I intimated) at all, or very little,
 "understand what they condemn. This I have some reason to
 "say, since in the whole Compass of my Acquaintance, which
 "is not very narrow, I profess I know not one who opposeth the
 "Modern way, that is not almost totally unacquainted with
 "it. And on the other side, upon the most careful turn of my
 "thoughts among my *Philosophick* friends, I cannot light on
 "one of all those that are for the free and experimental proce-
 "dure, but who hath been very well instructed in the *Peripatetick*
 "doctrines,

Many *Peripa-*
tericks (as
Claramontius)
 held that the
 impure Air of
 our Atmo-
 sphere doth
 graitate,
 though they
 deny it as to
 the pure Ele-
 mental Air.

Mr. Glanvill's
p. 122.

Pecquet. Ex-
pet. Phys. o-
mach. de Va-
cuo. pag. 50,
&c. Paris
1651.

Alex. Janni
Phænomena
Pneumat. pag.
1, 0. Par. 1044.

"doctrines, which they have deserted, and most of them much better than those who are yet zealous Contenders for them. I might tell our Divine, that the Gravitation of the Air seems proposed in Job 28.25. *Qui fecit ventis pondus*, God is said to make weight for the winds: indeed neither the gravitation of the Atmosphere, nor the notion of Aerial cylinders, pressing upon subjacent bodies, were any News in the world when the Society was first established. But the News of the Barometer is so pleasant, that I will insert the whole passage.

"But (IV.) The BAROMETEER is another late Instrument, very helpful to useful Knowledge. That there is gravity even in the Air it self, and that that Element is only comparatively light, is now made evident and palpable by Experience, though Aristotle and his Schools held a different Theory: And by the help of Quicksilver in a Tube, the way is found to measure all the degrees of Compression in the Atmosphere, and to estimate exactly any accession of weight, which the Air receives from Winds, Clouds, or Vapors. To have said in elder Times, that Mankind should light upon an Invention whereby those bodies might be weigh'd, would certainly have appeared very wilde and extravagant; and it will be so accounted for some time yet, till men have been longer, and are better acquainted with this Instrument. For we have no reason to believe it should have better luck than the Doctrine of the Circulation, the Theory of Antipodes, and all great Discoveries in their first Proposals. 'Tis impossible to perswade some of the Indians that live near the heats of the Line, that there is any such thing as Ice in the World; but if you talk to them of Water made hard and consistent by Cold, they'll laugh at you as a notorious Romancer. And those will appear as ridiculous among the most of us, who shall affirm it possible to determine any thing of the height of the Wind or Clouds. But Experience turns the laugh upon the confident incredulity of the Scoffer; and he that will not believe, needs no more for his Conviction, than the labour of a Trial. Let him then fill a Tube of Glass, of some Feet in length, with Quicksilver;

"and

“and having sealed one end, let him stop the other with his Finger, and immerge that which is so stop’d into a vessel of Mercury, the Tube being perpendicularly erected; let him then substract his Finger, and he will perceive the Quicksilver to descend from the Tube into the subjacent vessel, till it comes to 29 Digits or thereabouts; there, after some Vibrations, it ordinarily rests. The reason that this remainder of the Mercury doth not descend alio, is, because such a Mercerial Cylinder is just equiponderant to one of the incumbent Atmosphere that leans upon the Quicksilver in the Vessel, and so hinders a further descent. It is concluded therefore, That such a Cylinder of the air, as presses upon the Mercury in the Vessel is of equal weight to about 29 Digits of that ponderous Body in the Tube. Thus it is when the Air is in its ordinary temper: but Vapours, Winds, and Clouds alter the Standard; so that the Quicksilver sometimes falls, sometimes rises in the Glass, proportionably to the greater or less accession of Gravity and compression of the Air hath received from any of those alterations; and the Degree of increase beyond the Standard, is the measure of the additionable gravity. —

There is something so charming and so divertive in this discourse, that I cannot yet dismiss it, notwithstanding what I have said out of Aristotle and Claramontius. That there is gravity even in the Air it self, and that that Element is only comparatively light, was of old made evident by the Man of Stagira: nor did the Schools hold a different tenet, if you take Air for this impure mixture and *Sphæra vaporosa* about the Earth, which we breathe, and in a special manner have to do with: as appears from Claramontius in his Book of the Universe, and Septalius upon Aristotle’s Problems. But Mr. Glanvill neither understands what he opposeth, nor what he Asserts. For in the beginning he speaks of the gravitation of the Element of the Air; whereas that Instrument called a Barometer proposeth only a way to measure the degrees of compression in the Atmosphere, in which Region I believe no man ever denied but that the Aqueous and Terrestrial corpuscles interspersed had their weight and pressure: Thus the ordinary temper of this Air (which is never pure) the al-

A vacuum adheres to Aristotle, and holds the Air both gravitate.

Experim. Phy-
fico-Mechan.
Exper. 17.

Besides, the
difference in
Quicksilver is
such, that all
Writers take
notice of it,
and I am apt
to believe the
Phenomenon
may be much
varied in the
Cylinder ac-
cording to
that.

terations of it by vapors, winds, and clouds, are the subject of those contemplations, as any man knows that reads Mr. Boyle, or even Mr. Glanvill. Thus all the flourish of Rhetorick comes to nothing, the wonder is ceased, and we come to try only a more particular way of examining the weight of a body, which no man in his wits ever denied to be ponderous. And here I must tell our *Virtuoso*, that his reading or consideration extends not so far as to the writings of Mr. Boyle, and the experiment in him. For it appears out of Him that the *Mercurial Cylinder* riseth and falls in the *Magdeburgical Air-Pump*, according to the lessening or vigorating of the *Spring of the Air*: and that upon putting in the *Barometer*, "and closing the *Engine*, there appeared not any change in "the height of the *Mercurial Cylinder*, no more then if the "interposed *Glass-Receiver* did not hinder the immediate "pressure of the ambient *Atmosphere* upon the inclosed *Air*; which hereby appears to bear upon the *Mercury*, rather by virtue of its *Spring* then of its weight. And if this *Phenomenon* proved such in a greater and less *Receiver*, with a greater or less cylinder of *Mercury* (it being indifferent which is used,) I doubt this *Barometer* will not determine the strength of the *Spring of the Air*, much less its weight. For the *Elasticity* is a distinct consideration from the weight of the *Air*: as when some *Experimentators* went about to weigh the *Pike*, the *Flownce* or *Spring of the Pike* was no part of the weight of the *Pike*, though it might turn the *Scales*. This sole consideration destroys all the great promises we have from the *Barometer*, for if the *Spring of the Air* cannot be exactly known, that we must be for ever ignorant of the nature of those other bodies which influence and press upon our *Air*, and compress the *Spring of the Air*, and may have many operations upon it which we know not, neither can comprehend; If the height of the *Atmosphere* cannot be determined, (which I make a *postulatum* of) the alterations in the higher *Regions* are unsearchable, and the *mechanismes* of those *corpuscular combinations* incomprehensible, I shall not doubt to say, that there is not yet found out a way to measure ALL THE degrees of Compression in the *Atmosphere*: nay, 'tis far from

from that *exactness*; for the body of the *Quicksilver* varies not upon *insensible* variations in the *Air*: the *intercepted Air* in it takes off from the *Niceness* of the *Experiment*: and since even *heat*, (and perhaps other circumstances) adds to the *Spring* of the *Air*, it cannot give us that account pretended, about *vapours*, *winds* and *clouds*.

The *Essay* by *Tubes* and *Quicksilver*, as ingenious as it is, yields the *Society* no further *glory*, than to have illustrated it, and perhaps to have made some further *Experiments* in it then those had done, to whom, as the *first Inventor*, (by the concession of the *Historian*) appertains all or most of the Honour which ariseth from such *accessionals*. It is true, our *Virtuosi* fixed on it the name of *Barometer*, but they had done better to have called τὸ ἔμετρον, or εὐτολέχεια, or *Gas*, or *Blas*, or *Diacetateston*, or some such *unintelligible* name, rather than have termed it thus: the *Appellation* signifying no more an *instrument* to measure the gravity of the *Air*, than an *instrument* to weigh a parcel of *Tarre*, or indefinitely a pair of *Stillyards*. The *Aerometer* might have been a little more *Emphatical*; especially considering that ἀερομετρεῖν and ἀδολεχεῖν are *Synonymous*. Had not *Aeroscopium* been accommodated to the *Thermometer*, it would not have been much *incongruous*. But I conceive, that *Aerobaricon* or *Aerostaticon* would have fitted the *Experiment* as well as any name I can now think upon. The *Barometer* was invented by *Torricellius* to prove a *Vacuum*, and in *Mersennus's Cogitata Physico-Mathematica*, you may find it applied to the examining the difference of the *Air* in several places. The *Air Pump* was found out at *Magdeburgh*, and not in *England*; it was first published by *Schottus*, under the name of *Instrumentum Magdeburgicum*. Mr. *Boyle* amended it, and prosecuted many ingenious *Experiments* in it, for which all *Philosophers* are redevable to him, but cannot proclaim him the *Inventor* of the *Instrument*, no, nor of the (notion of the *Elasticity* of the *Air*, which was proposed first to the world by *Henricus Regius*, under the name of the *spontaneous dilatation* of the *Air*: and illustrated by *Pecquetus*, who first, (that I know of,) spoke of the *Elater*, *Pecquetus* pag. 49 (*quem elaterem nuncupo*)

Hen. Reg.
Philos Nat.
l. 2 c. 12. p. 4.
& l. 2 c. 3 p.
173 ed. 1661.

Forel ubi su-
pra c. 12. p. 26.
Blancaus de
mundi fabr.
part. 3. c. 2.

nuncupo). The Microscope was invented by the aforesaid Zacharias Joannides: The Thermometer, or Thermoscopium was first the invention of Sanctorius; so Blancaus saith, *Audivi Doctorem quendam medicum Patavii degentem, qui Sanctorius cognominatur, hujus esse inventorem*. And now I demand of our Virtuoso, which of these Five Instruments for the Improvement of knowledge have been found out by the Royal Society: The Thermometer is the discovery of a Galenical Physician; but as to our Virtuosi nothing appears but the pretension to other mens discoveries, and the improving of them.

By the Benefit indeed of one of these Instruments, the Telescope, we are put in hopes to find a sure way to determine these mighty Questions, Whether the Earth move? or, The Planets be inhabited? And who knows which way the Conclusion may fall? — I perceive hereby that Mr. Glarwill is not altogether convinced that the Earth moves; and I am as little satisfied, that the solution of those Questions is so mighty and important a thing; for if the Earth stand still, then things will be as they are now: and if it be determined otherwise, yet shall we not need to fear that the Revolution of the Earth in its Diurnal motion, either shake our houses about our ears, or shake us off by the tangent line: and as for those inhabitants of the Planets, in case all our other trading should be lost, we shall not finde out any gainful commerce with them; nor need we dread that they will piss out our Eyes as we look up. So that let their Telescopes be brought to that unimaginable perfection, whereby to discover the inhabitants of the Planets as plainly as mites in Cheese, and let the Conclusion fall which way it will, things will fall out no otherwise than they do.

He inveigheth bitterly against Aristotle for his Heathen-Notions, and in his Preface to the Clergy of B. & W. wishes that the devoted Admirers of Aristotle would study his Rhetorick, History of Animals, and Mechanicks. I wonder he did not recommend unto them the perusal of his Ethicks. Certainly they deserve as much to be read in these days, as any Piece.

And

And perhaps his *Politicks* might contribute something to the instruction of a *Nation*. But how dare here commend any book of that man of *Stagira* to be read, if those motives that swayed him to *Anti-Aristotelism*, be of any *validity*: Alas! he is troubled at his *Heathen-Notions*! Oh! rare *Puritanism*! But my dear Brother *Scruple*, ought any one to be offended at every thing that is of *Heathen-Original*, though it contain nothing of *Gentilisme* in it? Represent your adversary as you please to his *Diocesan*, nothing hath more of the *Presbyterian* and *Fanatick* then this *Topick*. Moreover, what do you think of those *Atoms* and *Corpuscles*? are they not *Heathen-Notions*, and decried by the *Fathers*? what do you think of the terms used by the *Mathematicians*? what of the *Langnages*, such as are not *Sacred*? what of the months, days of the year, and the names of the *Stars*, *Constellations*, &c. Must every thing be reformed according to the *Cælum Stellatum Christianum* of *Julius Schillerus*? Besides, these words in *Theology*, of *Unity* and *Trinity*, have as much of *Heathenism* in them, as they have of *Platonism*. I shall here take further notice of his *exceptions* against *Aristotle*, as they are *Recapitulated* here (though they are more largely proposed by him in his *Letter* against *Aristotle*, which I have fully answered in a distinct *Treatise*) the *generall censure* whereof is, That they are nothing but *Lies*, and such as no man that is acquainted with any thing of *ancient Literature* could have uttered. I protest in the *Presence of Almighty God*, that if there be not great care taken, we may be in a little time reduced to that pass, as to believe the story of *Tom Thumb*, and all the *Legends* or *falsifications* of *History*, which the *Papists* obtrude upon us! This *Philosophy* fairly disposeth us therevnto, by taking us off from the *Pedantism* of *Philology*, and *ancient reading*, and by accustoming us to believe the *forgeries* they obtrude upon us. Methinks herein he is one as absurd as that *Romish Monk* was in the *Pulpit*. *Heresbachius* l. C. citante *Taubnino*, *audivi*, inquit, *Monachum in Ecclesia declamantem*, *qui, nova, inquebat, jam reperta est Lingua, que vocatur Græca; ab hac sedulo cavendum: Hæc enim est que parit* omnes

Jo. Hen. Hittingerus in
Smegm. Ori-
ent. l. 1. c. 1.
p. 2.

omnes istas hereses. Ea lingua est liber proditus, in manibus passim habetur & vocatur N. 1. Plenus hic liber rubetur, & viperis. Alia etiam oritur lingua, quam vocant Hebraeam, hanc qui discunt, efficiuntur Hebraei. We are running on as fast as we can to this condition of ignorance, and shall be so injured to *Historical* untruths, magisterially imposed upon us, and disused from inquiring into them, as to believe any thing. He tells us the *Aristotelian* Philosophy aims at no more, than the instructing men in *Notion* and *Dispute*, that its *Design* was mean, and its *Principles* at the best uncertain and precarious, — One may guess how well our *Virtuoso* understands the *Old Philosophy*, to ascribe that unto it all in general as its aim, which is but the intendment (and that a necessary one too) of the *Dialectick* and *Metaphysical* parts. In *Natural Philosophy* their designs were the same that our *Moderns* boast of, if they miscarried in the main, let us pity their misfortunes, but not blame their intentions. Did *Aristotle* in his books of *Animals*, or *Theophrastus* about *Plants*, instruct men only to *Dispute*? Had his *Anatomy*, and his *Problems* nothing but *Notion*? Must we cast off all *Notions*? Or ought we to endeavour after the gaining of *clear notions of things*? If men hitherto did proceed no further, and yet pretended to be *Peripateticks*, blame the abuse, but condemn not the *Philosophy*, which hath nothing in it that puts a stop to *Enquiries* and *Curiosity*. Nor do I find that those *Physicians*, and others, who advanced the several parts of *Natural Philosophy* and *Physick*, did thereby act contrary to the rules of their *Master* or *Tutors*. It is true, that their *Schools* did meddle but with few points mainly, and those were such as related to *Divinity*, as the *Eternity of the World*, the *Nature of the First and Second Causes*, of the *Soul and its Faculties*, &c. as to an exact *natural Philosophy*, they did not much trouble themselves, nor had we had what we have, but that *Averrees* and the *Physicians* befriended us. But must *Scaliger* and such like suffer under these *Imputations*, which particularly relate unto their *School-Divines*? and must they also be blamed for not teaching nor putting men upon further *Enquiries* than were necessary to that *Christianity*, which they were to

to support against the *Mahometans* and *Jews*? He that knows the end of *their* first institution by *Charlemagne*, can best judge how *prudential* it was, and how they answered *expectation*. But our *Illiterati* know nothing of *that*, and are always reviling *them* where they are not *faulty*, and would have had them neglected that part which was *necessary* to the *Education* of all that were to live *under* and *support* *Christianity*, to pursue *Studies* that contribute *little* thereto, and such as were never *essential* to the being of a *State*, but have been often exploded as *prejudicial* thereunto. The same *Apology* may serve the present *Universities*, who do enough in breeding up men to be fitly qualified for *Employments* in *Church* and *State*, and instruct them in so much *Philosophy* as is necessary for the explaining and defending of our Religion against *Atheists*, *Papists*, and *Socinians*: and whosoever shall put the accurate debate of *these* Points, the *Art* of reasoning, the *Validity* of *Consequences*, the unfolding of *critical* *Syllogisms* and *Fallacies*, the general doctrine of *Topicks*, the *Moral* *Philosophy*, and *Foundations* of *Civil* *Prudence*, (besides *Civil* and *Ecclesiastical* *History* and *Languages*) which are taught there, or ought to be by their *Constitution*, into the *Scales* on one hand, and the *Mechanical* *Education* (recommended with all the advantages that ariseth from *Aphorisms* of *Cider*, planting of *Orchards*, making of *Optick* *Glasses*, *magnetick* and *hortulane* *Curiosities*) on the other hand, will be able to judge easily which *Studies* deserve the most *encouragement* by the *publick*, and which are most *useful* and *requisite*. Having said thus much in behalf of our *University-Learning* (which is now *contradistinguished* from the *Mechanical* *Education*) I shall adde thus much in favour of our *Ancestors*, who gave solemn *encouragement* to *Archery*, *Cudgel-playing*, *Foot-ball-playing*, and other *Exercises*, that prepared the *Vulgar* to *Military* *Performances*; as the more *Academical* did the *Gentry* to *State-affairs*: whereas they gave little countenance to the *Experimental* *Philosophers* and *Naturalists*: that the practice is justified by *Vegetius* l. 3. c. 10. *Quis autem dubitat artem bellicam rebus omnibus esse potiore, per quam libertas retinetur, & dignitas propagatur, provincia conservantur & Imperium*

See Mr Sprat,
p. 329.

Imperium? Hanc quendam relietis doctrinis omnibus Lacedæmonii, & post coluere Romani. Hanc solam hodieque Barbari putant esse servandam: cetera aut in hac arte consistere, aut per hanc artem assiqui se posse confidunt. Hac dimicaturis est necessaria per quam vitam retineant & videriam consequantur. But to return to our Virtuoso! Are not the principles of Des Cartes, and the figured Atoms of Gassendus as precarious as those of Ari-

stotle, and lets subjected to sense? Have not the Chymical principles so much of uncertainty, as they have of Equivocation? Are not they precarious too, and suspicious? Are there any of those that agree amongst themselves? and do not they as little agree with Nature as those of the Peripatetick way? I will not doubt to maintain

Analogicè si accipiantur hæ Chymicorum principia essentia eis possumus, ita ut pro ætæcio aqua ponatur, Sulphure ignis & aer, Sale terra. Analogiâ negata negatur omnia coabire. Ex aqua & terra fac lium vitidum, & hunc cura conglutinari & concrescere in lapidem: quemadmodum natura id fieri videmus. Si huc resolvatur in ultima non in Mercurium, Sulphur, & Salem, sed in volgata & Physica resolvatur principia.
M. Ruland. Progygn. Alchym. Qu. 6.

stotle, and lets subjected to sense? Have not the Chymical principles so much of uncertainty, as they have of Equivocation? Are not they precarious too, and suspicious? Are there any of those that agree amongst themselves? and do not they as little agree with Nature as those of the Peripatetick way? I will not doubt to maintain

that as far as *Physick* is concerned in the debates; The ancient *Philosophy* better agrees with the *Phænomena* of *Nature*, and carries us on with more assurance to *work* (as they phrase it) then any other, and that the diligent reading of *Vallesius*, *Mercatus*, *Saxonia*, *Claudinus*, &c. shall produce better *Physicians* then *Sylvius*, *Helmont*, or *Odorode*. And whosoever resolves any of the other *Questions* in the *Negative*, whatever he pretend, hath never considerately studied the *Points*. Give therefore the *Aristotelians* leave to hold an *Hypothesis*, which is accommodated to the *polity* of our *Nation*.) at least as *revocable*, till a better be *introduced*; and do not proceed in an *exterminative* way, till something else be ready to be *substituted*.

If *Notions* might be rejected for being first proposed and used by *Heathens*, then is not *Aristotle* in a worse condition then *Epicurus*, *Democritus*, *Plato*, or *Pythagoras*; If *Impiety* in the *Teacher* may authorize us to reject doctrines not *impious*, I think the condition of our *Stagirite* not to be worse then that of other ancient *Philosophers*, and better then some of the *New*. That there is *impiety* enough in *Gassendus's* Answer to *Des Cartes*, any *Christian* will grant, esp. ci lly if he be a *Protestant*. And the life of *Des Cartes* had

had but little of the *Saint*: this is manifest. And I desire Mr. *Glanvill* to acquit *Paracelsus* from being *impious* in his life, and many of his *doctrines*. If he was a *Corrupter* of the *Wisdom* of the *Ancients*, for *mis-citing*, and misrepresenting *their* opinions; and must therefore be condemned and rejected: who can approve of Mr. *Sprat*, Mr. *Glanvill*, and their *Adherents*? He saith, that *Aristotle* was of no such *superlative Account* in the *wisest* times. But he tells us not which those

most wise times were, when he was in *disesteem*. I have not read of any more wise people, then *Greece*, *Rome*, and the *Mahometans*, under their first *Caliphs* and King *Almansor*. And yet all these admired him at several times. He that chargeth *Philip* of *Macedon*, *Alexander* the Great, and his Successors, (particularly the *Ptolomyes* of *Egypt*), with *Folly*: and *Sylla*, *Tully*, and those other *Romans* that admired him, with want of *wisdom*; Or, who thinks that the *Empire* of the *Moors*, and their *Academies* at *Bagdad*, *Fez*, and *Cordula*, were composed of a sort of *Simpletons*, may go seek for the *wise* and the *prudent* in *Gotam Colledge*. And perhaps those *Christians* that celebrated *Aristotle*, and advanced him to that *repute* in their *Kingdoms* and *Universities*, were not *Idiots* or *Changlings*. That He was much opposed and slighted by the first *Fathers*, is an *Objection* that hath some truth in it, but not much to the particular prejudice of our *Stagirite*. For at first they hated and detested all *humane Learning*, and *Philosophy*; and when they came any of them to admit of those *Sciences*, then they divided into the *Aristotelians* and *Platonists*, as they did into *Arians* and *Catholicks*: That the *Arians* were *Aristotelians*, is to me as evident, as that *Mahomet* taking the advantage of that *faction*, and of the *brutal* lives and ignorance of the *Catholiques* depending upon the *Patriarch* of *Constantinople*, did advance the *Sect* of *Christians*, called *Mahometans*; and his Successors the *Caliphs*, did

I cannot finde any ground to conclude *Aristotle* so wicked. If we indemnifie him for having an hand in poisoning *Alexander*, (which perhaps is not true). In his last Will, there is much generosity: in his life, many testimonies of a singular vertue: in his discourses much wit and worth. He writ an *Apologie* for *Piety*; got the walls of his destroyed Country to be rebuilt, and made excellent *Laws* for it. *Philip* chose him to breed up *Alexander*. And those are greater assurances that he was not so wicked, as he is reported by his adversaries. They repeat nothing but old lies, such as *Apellicon* refuted: and *Aristocles* saith, *ἠποδὶκλον πᾶσι πλάσαν*. See *Casaubon* upon *Diog. Lart.*

I desire that the *Virtuosi* would enquire after the *Peripatetick* Philosophy, at *Alexandria* after the *Ptolomies* and not at *Athens*. And when they have done that, and studied the condition of *Christianity*, during the time of the *Arrians*, and enquired into the rise of *Mahomet*, the circumstances that advanced him, and contributed to the spreading of his doctrine, and increase of that Empire under the *Caliphs*, then they will be able to judge of the truth of what their *Historian*, and Mr *Glanvill* writes in the books animadverted on, and in his Letter concerning *Aristotle*.

wholly employ themselves to improve the doctrines of *Aristotle* and the *Peripateticks*. So that *Aristotelism*, *Arianism*, and *Mahometanism* issued out of the same parts of the world, viz. *Alexandria*, and the adjacent Countreys: Nor was it *Chance* or the black ignorance of the Age, but great prudence in *Charlemaine* and his Successors in the *West*, that brought in *Aristotle*: as any man will say that understands the circumstances of those dayes. But so much History is above the reach of my *Experimental Philosopher*. To supply that defect, *Christians* must be once more told, that since their minds are enlightned with the rays of the glorious Gospel, they have less reason to bow down to the Dictates of an *Idolater* and an *Heathen*. And so farewell to the *Rhetorick* and other works of *Aristotle*, which our *Virtuoso* a little while agoe recommended unto us. Let us shake hands with *Seneca*, and *Epictetus*, and *Plato*: and joyn with *Tertullian* in that saying, *Nobis Philosophia opus non est post Jesum Christum, nec Aristotele post Evangelium*. Having said thus much to these grand accusations against *Aristotle*, with which Mr. *Glanvill* was so perplexed, I suppose he may think that a more devout Admirer of *Aristotle* than I am, with more time, may say enough to convince him, that it was his fault, and not the *Peripateticks*, that he benefited so little by them. And I pray what language did *Epicurus*, *Pythagoras*, and *Philolaus* make use of? He writ better about divine things than *Plato*, as *Vossius* witnesseth, *Quaquam multa de Deo scripta sunt a Platone, accuratius tamen apertiusque de iis egit Aristoteles*. He cites a passage of *Plato*, ο θεός γεωμετρῶν, and adds, that the *Universe* must be known by the *Art*, by which it was made. If it be not to be known any other way, it is unintelligible. Let him answer Dr. *More's* Dialogues upon that point, where he explodes the *Mechanism* of *Nature*: and reckons upon *Des-Cartes* as the most prodigious Fool that ever was, for holding that opinion. I shall adde, that *Geometricians*

tricians are commonly a sort of men, that being once got out of *their Science*, they are far from being elevated and improved thereby: And the reason is, because that the severe procedure of *Mathematical demonstrations*, and *their ways* they take to demonstrate things appertaining to *their Science*, these do not qualify a man at all for those *argumentations* which sway and guide in *Metaphysicks*, *Ethicks*, *Politics* and *Religion* it self. Upon this account *Aristotle* observed, that a *child* might become a *Mathematician*, but not a *Politician*, or *Moralist*. Hence it is, that *Geometricians*, (except their studies have particularly acquainted them with those *Dialecticks*, which regulate the generality of Mankind in such discourses,) seldom, if ever, prove *Metaphysicians*, *Religious*, or otherwise of tolerable ratiocination: either rejecting as false, frivolous, and indemonstrable, those reasonings and studies, according to which humane affairs are regulated; or else ignorantly, running into *Whimseys*, and phantastical ways of arguing. Neither is this more manifest, then I think these two Conclusions are, which I deduce from thence in opposition to some *Comical Wits* in their *History*, viz.

Arist. Ethic. l. 6. c. 8. d.

That by how much more general as to publick and private use and emolument in order to domestick affairs, or *Civil Prudence* and the preservation of *Humane Society* and *Government* those things are, which depend upon *persuasive Arguments*, and those topicks and methods of ratiocination which are laid down by *Aristotle*, not *Euclide*: by so much those courses ought to be pursued, upheld and encouraged by understanding *Statesmen* which are subservient thereunto, above the less necessary and inutile *Mathematicks*.

Next, That the *Mechanical Education*, or that whereby Youth are inured at first to vigorous demonstrations, and necessary deductions from evident Principles, and a *Philosophy* that is purely *Corpuscularian*, ought not to be premised or preferred to other studies in order to the fitting men for humane life: seeing either accidentally, (yet so, as in regard of our depraved nature it is almost unavoidable) or intrinsically those courses dispose mens minds afterwards to *Atheism*, or an indifference in *Religion*, and inhabilitate them towards those more

Hist. of the R. S. p. 319.

important, but less delightful studies of Law, Policy, and Religion, with their several dependencies.

I finde that *Aristotle* hath complained of some, that in their Explications of Nature made too much use of Geometry. *Magnenus* hath complained also of them; and *Conringius*, *Bullialdus*, and *Ricciolus*, of *Kepler*; and *Bodinus*, in his *Theatrum Naturæ* l. 5. and all *Physicians* almost of *Des-Cartes* his ridiculous book *de Homine*. And if *Plato* was so solicitous, that none but *Geometricians* should come into his School, yet he sent them very fools out, if they allowed of his *Logick* and *Physiology*. I shall leave the further defence of *Aristotle* to others; only I must tell him, that *Vossius* in his account of *Geometricians* allows of *Aristotle* for no mean one. And we find that he supposeth his *Scholars* not ignorant in *Geometry*, since without that knowledge they could not understand his *Analyticks*, nor that part of his *Ethicks*, where he illustrates *Justice* by the *Arithmetical* and *Geometrical* proportions. And as for his *Ethnical* opinions, it is ridiculous to upbraid the *University-Learning* with them, since they are not taught, but solidly refuted there, However if *Aristotle* must suffer on this Account, let not *Epicurus* triumph. He tells us that *Archytas*, that great *Geometrician* was scared from *Mechanical* and *Organical* Methods to the great hinderance of beneficial Improvements that way, so that he kept himself up in *Abstractive* Contemplations. I cannot finde any such thing in his life written by *Diog. Laertius*, but the contrary, ὅτι πρῶτον τὰ μηχανικά ταῖς μηχανικαῖς περὶ ἡρώδου ἀρχαῖς ἐμεθώδευσε, καὶ πρῶτον κινήσιν ὀργανικὴν διαγεύματα γεωμετρικῶς προσήγαγε. He made a Pidgeon of wood artificially to flie. So *Favorinus*. Ἀρκύτας ταραντῖν φιλόσοφος ἅμα καὶ μηχανικός ὢν, ἐποίησε περὶ ἡρώδου ἐυλίην, πέλομένην ἥτις ἐπὶ καθίσαιεν, ἐκέτι ἀνίστατο. I wonder oftentimes how He did to commit so many mistakes; and I cannot believe that He or his *Philosophick* friends were ever well instructed in the *Peripatetick* doctrines, who are so ill taught in all manner of *Humane Learning*. I resign him up to

Vide Ricciolum in *Almagest*. nov. l. 4. p. 278.

See Mr. *Parkers* censure of the *Platonick Philosophy*.

Vide *Blancanum* in *loci Mathematica Aristotelis*.

Epicurus *Mathesis* insuper habuit: unde ut *Plutarch*. ait libro contra *Epicurum*. *Philosophum* quendam nomine *Apellem*, eo nomine laudabat, quod ab adolescentia nunquam esset contaminatus disciplinis Mathematicis. *Vossius de Philosoph* §. c. 8. §. 7.

Diog. Laert. l. 8. in vit. *Archytæ*.

Collins x. 12.

πρῶτον τὰ μηχανικά ταῖς μηχανικαῖς περὶ ἡρώδου ἀρχαῖς ἐμεθώδευσε, καὶ πρῶτον κινήσιν ὀργανικὴν διαγεύματα γεωμετρικῶς προσήγαγε. He made a Pidgeon of wood artificially to flie. So *Favorinus*. Ἀρκύτας ταραντῖν φιλόσοφος ἅμα καὶ μηχανικός ὢν, ἐποίησε περὶ ἡρώδου ἐυλίην, πέλομένην ἥτις ἐπὶ καθίσαιεν, ἐκέτι ἀνίστατο. I wonder oftentimes how He did to commit so many mistakes; and I cannot believe that He or his *Philosophick* friends were ever well instructed in the *Peripatetick* doctrines, who are so ill taught in all manner of *Humane Learning*. I resign him up to

to be the scorn and entertainment of others henceforth. Nor will I engage particularly in the dispute betwixt him and Mr. Cross. I am informed, that the *Relation* is very false; and I profess I have no mind to believe this *Virtuoso* in any thing he says. It is easie for him to misreport a private discourse; His great and admired friend Mr. Sprat relates general Encounters false; He tells us, "Of a mischance that befel the Christian Army in Egypt in the time of the Holy Warre. Their strength was great and irresistible, if they had only understood that which every Egyptian could have taught them, the course and the time of the overflowing of the Nile. For the want of that slender knowledge, the bravest men of all Christendome, were led up to the Neck in the River, and were forced to yield to the Enemies conditions without striking a stroke. This was occasioned by the stupidity of the Cardinal who commanded them. If he had been less skilful in the Schoolmen and more in Nature, that dreadful disaster had never happened. — Such an untruth as the Historian tells here, such perhaps is the Narrative of what passed betwixt him and Mr. Cross. I cannot finde any such Story in Fullers Holy Warre, but the contrary, viz. "Egypt is a low level Countrey except some few advantages, which the Egyptians had fortified for themselves. Through the midst of the Land runs the River Nilus, whose streams they had so bridled with banks and sluices, that they could keep it to be their own servant, and make it their Enemies Master at pleasure. The Christians confidently marched on, and the Turks perceiving the Game was come within the wile, pierced their banks, and unmuting the River, let it run open mouth upon them, yet so that at the first they drowned them but up to the middle not to the neck. There is no body charges the Cardinal Pelagius, who was Legate, and commanded the Army there, for invading Egypt in an unseasonable time, nor with being ignorant of the time when Nile did overflow. The Christians were not ignorant of that, who had discovered and invaded Egypt before in 1218, and this was but two years after in 1220. The Egyptians, 'tis true, dammed up the River (which was now low) and upon the approach of the

Hist. of the
R.S. Pag. 412.

Fullers Holy
War, l. 3. c. 27.

the *Cardinal* cut their banks, and so gained the victory. That the *Cardinal* was no *Souldier*, and unacquainted with *Stratagems* of war, I grant; and for this *Historians* condemn him, but not for being ignorant of that part of *Natural Philosophy*. A Member of the *Royal Society* published lately an account of the *Original of Nile*. The Description had nothing of *News* in it to any *Scholar*, that was material. But they should have procured an account of the manner of the inundation of *Nile*, for the *Historian* is more ignorant than the *Cardinal* of it. Had it been the time of the beginning of the overflowing of *Nile*, they might have retired easily to

Prosper. Al.
pin. de Medic.
Egypt. l. 1. c. 8.

Damiata without damage; for it never exceeds in rising above ten inches each day, sometimes it riseth not eight

I know not what *Logick* Mr. *Glanvill* read at *Oxford*, but 'tis *Ignoratio Elenchi* in him, to oppose what Mr. *Cross* might say about *Asia* as twas of old named, and bounded, and travelled over, with the new discoveries of *China*, *Japan*, &c. which rather constitute a fifth part of the world, then are included in *Asia*. That is *Asia*, which they imported that gave it the name, not what others affix to it. By the same *Sophistry* it may be said that the former *Kings* were not *Kings* of *France*, because late *Conquests* have enlarged the borders.

Nor was *Aristotle* implicitly guided by the relations of those *Hunters*, &c. he diligently inquired into their reports, and oftentimes refutes the vulgar stories. See this particularly asserted by *Federicus Bonaventura* de partu *Uctomeltri* l. 1. c. 6.

inches. Just such an Account, I fear, doth Mr. *Glanvill* give of Mr. *Cross*'s discourses, whom report speaks so advantageously of, that we must give the Lie to general fame, or believe him a very learned Person, as well as pious. Perhaps he, as well as my Lord *Bacon* might suspect the truth of those *Telescopes*. And perhaps also he might be mistaken in saying that *Aristotle* did travel all over *Asia*: yet, however that, that *Fonssius* (*de Script. Philos.* l. 1. c. 18.) disproves that opinion, yet no less man than *Josephus* l. 1. adv.

Apionem, was deceived as well as Mr. *Cross*. *Solinus* also c. 14 and *Ammonius* in the life of *Aristotle* say, that *Aristotle* did accompany *Alexander* in his *Asiatick Expedition*. And I profess my self in an error as well as Mr. *Cross*, if it be not true, that *Aristotle* had sundry advantages to pen his *History of Animals* which our *Virtuosi* want. *Pliny* Nat. Hist. l. 8. c. 16. saith, *Alexandro Magno rege inflammato cupidine animalium naturas noscendi, delegataque hac commentatione Aristoteli, summo in omni doctrina viro, aliquot millia hominum in totius Asiæ, Græciæque tractu parere jussa, omnium quos venatus, aucupia, piscatusque alebant: quibusque vivaria, ar-*
menta,

menta, alvearia, piscine, aviaria in cura erant: nequid usquam gentium ignoraretur ab eo: quos percontando, quinquaginta ferme volumina illa præclara de animalibus condidit.

Let a man now consider the greatness of *Alexander*, the impatience he had to effect his purposes, how generous he was in acknowledging Services, and how vindictive when neglected, and how understanding to know what was done and omitted: Let any man consider this, and he will think that the Society have not a Patron that interesteth himself so much as *Alexander* did for *Aristotle*. He had several thousands commanded to give him intelligence: their number transcends any that ours can pretend to: their quality is such as the R. Society wisheth for, viz. Intelligence from the constant and unerring use of Experienced men, of the most unaffected and most unartificial kinds of life. And if notwithstanding all these circumstances *Aristotle* were abused or mistaken, or defective in his Narrations, I am confident there is less credit to be placed in the Narrations of some of our Virtuosi, who have been so mistaken in their Accounts of *Cider* and *Salt-Peter*, domestick Enquiries; what man will give himself the trouble to inform them, either at home, or abroad? with what negligence and imperfection will they register things? how unphilosophical will their memoirs be? How will they be able by intreaty to procure a second information? That there are more parts of the world discovered and sailed unto then in *Aristotles* time, I grant. But what certainty shall we have of Narratives picked up from negligent, or un-accurate Merchants and Seamen? What judgement have these men of no reading, whereby to rectify or enlarge their Enquiries? Mr. *Glanvill* doth not so much as know who writ well upon the several subjects, in which he pretends that the Moderns have out-done the Ancients. As Improvers of the History of *Bathes* (by the way we are far inferior to them in the practice of *Bathing*) he reckons *Savonarola* for one: he might as well have recounted *Bayrus*, *Gordonius* and *Gatinaria*: or any of the barbarous Physicians, for advancers of the practick: He might have told us of a Volume of Writers de balneis: But why did he omit *Solander*

Mr. Sprat. p.
257.

mander de thermis, Libavius, and our Dr. Jordan (who lived at our Bathe) and Bauhinus de fonte Bollenfi, and the other Writers about particular Bathes? Alas! He knew them not: nor did I ever hear any man commend Blanchellus upon that subject. About Minerals, could he not have named Encelius, Casalpinus, Fallopius, and Lazarus Erkerus, whom I find by some to be preferred before Agricola? In his Account of remote Histories of Nature, could he remember the Author of the Caribby-History, and pass by Carolus Piso, Burggravius, and Bontius about Brasile and the East Indies. So where he speaks of discoveries made by Microscopes (pag. 57.) by naming only Dr. Power and Mr. Hooke, ingenious Mechanicks, Members of the Royal Society; he seems to intimate, as if none but the Virtuosi had proceeded in that adventure, whereas Petrus Borellus, Physician in ordinary to the King of France, published a Century of Microscopical observations An. Dom. 1656. such as have (if true) more of utility then those of Mr. Hooke, though less of curiosity, and destitute of Cuts; and Kircher after many years employed in those contemplations, per exquisitissima Microscopia, did publish several Experiments of that kinde, in his book de Peste; and Nicolaus Zucchi about the same time (1656.) published a short account of Microscopical observations, about a Louse, a Flea, the feathers of a Peacocks tail, &c. encouraging others to prosecute the work. He tells us, (pag. 56.) "that the discoveries by Telescopes may inform us of the Longitudes: upon which must needs ensue yet greater improvements of Navigation, and perhaps the discovery of the North-west passage, and yet unknown South. I grant that the invention of Longitudes will be extreemly beneficial to man-kinde in point of sailing: and the R.S. have made great boasts how that it shall be achieved by their Members; and thereupon caused some projects to be rejected, which yet perhaps would have proved as unfeasible as the attempt of Galileo's, to calculate it by the Medicean Starrs. I desire much to see the happy result of our Virtuosi, though the consequences here affixed to it, as Improvements was very defective. I shall propose some Scruples about the North-west passage, and

Kerch. de P. ff.
 sect. 1. c. 7.

Nic. Zucchi
 Philos. optic.
 part. 2. c. 3. c.
 7. ff. 4. p.
 348.

and the utility of its discovery, as also of the hopes of finding out the *Southern Tracts*.

First, I say that the story about the streights of *Aman* is very *improbable*, if not certainly a *Fiction*. It hath been so thorowly search'd into by our Nation, that there is no encouragement to a further trial: and this Streight of the *North-west* passage, is indeed nothing but a narrow difficult passage to *Button's Bay*, the entrance being properly called *Hudson's Streight*, in regard of his first finding it; the mouth whereof lies in 62 degrees. But were there such a passage, it would much more concern the *Portugals*, and the *Spaniards*, and *Dutch*, then it doth the *English*; for their trade is to the *North-part* of the *East-Indies*, and ours to the *South*: theirs to the *Moluccoes*, *Philippinas*, *Japan*, and *China*; whereas we seldom pass beyond *Bantam* in *Java*.

Secondly, were there a passage that way, yet it were not to be chosen before the other: for, could a man sail in a strait line, first from *England* to the Streight, and thence from the Streight to the *East-Indies*, it would prove a further way then the other by the *Cape of good Hope*. But those that know any thing of those Seas, know that the Sea-Course to any part of *North-America*, is as low as 23, 24, 25, or 30 the highest by reason of the *winde* which bloweth in the *South-sea* East and West, as well as in the North, that is to say, for the most part West without the *Tropicks*, and almost constantly East within them. Wherefore you must go out of your way as well from the North-part of *America* to the *East-Indies*, as from *England* to this supposed Streight: and there is as much difference in relation to pleasantness in the Voyages, as between *Summer* and *Winter*. For when one is clear of the Bay of *Biscay*, in all the Voyage by the *Cape* you find no cold weather till you return to the same place again: but on the contrary, it is so cold and icy about the Streight in the middle of *Summer*, that there is no making way without much difficulty and trouble. And in the *South-Sea*, where the *Sunne* keeps the same course as in the North in *June*; Sir *Francis Drake* in compassing the world, found so much cold in thirty eight degrees of North-lati-

See Mr. GARDNER in his description of *America* c. 25, where he professeth to write nothing but what his own knowledge, or good intelligence perswaded him unto, he having lived long in the remote parts of *America*: the lots of whose large Account thereof we may deplore,

Judge hence what hopes there is of making discoveries in the *Southerne Tracts*.

tude,

tude, that he was forced into a *Southerly* course. Besides, if we may take a conjecture from the *windes*, which have blown when the Undertakers for that discovery passed into those *Streights*, one would guess by their *great coldness*, that they did *blow from the Land*, and consequently that there is no Sea to the North of *America*, but that the Land of this *New World* reacheth by the North parts, even to the Northwardly Provinces of *Tartary*, &c.

I am surprized to finde, that Mr. *Glanvill* doth not make the *Moderns* to surpass the *Ancients*, in *Architecture*, *Sculpture*, *Picture*, and several other Arts of *ingenious Luxury*. That he doth not advance the glory of our *Mathematical burning-Glasses*, above the *Specula Ustoria* of *Proclus*; and the *Artificial Fires* of our *Virtuosi* above those invented by *Gallicinus*, when he burned the *Saracens Fleet*.

But not to upbraid him with what he hath omitted: I shall resume the discourse about *Telescopes*, and their *fallaciousness*, wherein if Mr. *Croft* was a little *doubtful*, yet Mr. *Glanvill* is so *assured*, that he makes an *ample recital* of the *contest*, and the advantages he gained in it. I shall set down his words, the better to divert my *Reader*, and to shew how insupportable such kind of *men* are in all *judicious* and *intelligent* company.

Mr. Glanvill's
Plus Ultra, c.
9 p. 65.

"To my Discourse about the *Dioptrick Tubes*, the *Telescope* and *Microscope*, the *Reverend Disputer* replied, [*That our Glasses were all deceitful and fallacious*] Which Answer "minds me of the good Woman, who when her Husband "urged in an occasion of difference, [*I saw it, and shall I not "believe my own Eyes?*] Replied briskly, *will you believe "your own Eyes before your own Dear wife?* And it seems "*this Gentleman* thinks it unreasonable we should believe ours, "before his own dear *Aristotle*.

"For an assurance of the credit of those Glasses, I told him "he might try them upon *objects near*, and *easily visible* by the "unassisted sight; and if he made the trial, he would finde "they altered the *objects* in nothing but their *proportions*, "which are represented *larger* for the advantage of *vision* in "things *small* and *remote*; and we have all the like reasons to distrust

" distrust our Eyes, as these Glasses (for their informations
 " are the same in all things, but the mentioned difference) and
 " there is no man so much a fool as not to make allowances
 " for that. Never was any yet so grossly deceived by the Micro-
 " scope, as to be perswaded that a Flea is as big as a Lobster;
 " nor did the Telescope ever make any one believe that the
 " Moon was at the end of his Tube: But if the former repre-
 " sents that little Creature as bristled and jamar'd, and the o-
 " ther makes the Planet mountaneous and uneven, we have no
 " reason to believe but that their reports are sincere, though
 " our unaided Senses are too gross to perceive either the one
 " or other; since, if the mentioned bristles and jamars are
 " in the Glass, and not in the Animal, they would appear in
 " like manner in all the small Creatures which in the same
 " light and position are look't on through the Microscope:
 " And if the ruggedness of surface were in it, and not in the
 " Moon, the same would be seen upon all other distant Ob-
 " jects, that are view'd through the other Optick Instrument.
 " And if there be deceit in those Glasses, Seamen had need
 " beware how they trust them, since the Flags which appear
 " to be those of their Friends in the Perspective, may be re-
 " ally the Colours of their Enemies.

" Upon these Accounts, Sir, which afford plain and sen-
 " sible evidence, I wondred much at the Disputers strange
 " suspicion, which had been scarce pardonable in a vulgar head;
 " and I know not what to call it in one, that would be
 " thought a Philosopher: But the wary man gave a reason,
 " which made me as much wonder at his Argument, as
 " his Doubt. And to this attend Ye Philosophers of the ROY-
 " AL COLLEDGE, and prepare your selves to answer a
 " Demonstration from Experience against your Glasses; Raise
 " your Expectations for a wonderful, convictive Experiment;
 " Let the Mountains travel, and the Birth will follow. [Take
 " two Spectacles (saith the Experimental Sage) use them
 " at the same time, and you will not see so well as with one singly.]
 " therefore your Microscopes and Telescopes are Impostors.
 " This man, Sir, is a Logician, and no doubt you perceive so.
 " O how I admire this rare faculty of arguing! How dull are

"our Wits, to those subtile, Eagle-ey'd Schoolmen, who see
 "Conclusions so far off, through the more unerring Telescopes
 "of their own piercing Understandings? Did ever old man
 "before make *this* use of his Spectacles? But to leave won-
 "dring, let's endeavour to understand this Philosophy of
 "Chue. How a man may see by Spectacles, that Perspectives
 "are deceitful. [*We can see better through one pair, than two*]
 "saith the deep Philosopher. Most sagely observ'd! The
 "Argument begins strongly: But in the name of Aristotle,
 "whence comes the Consequence? Therefore Perspectives are
 "fallacious.

"One Proposition for Sence,
 "And th' other for Convenience.

"This fits his purpose to discredit new Discoveries, 'tis no
 "matter how it follows. This Gentleman, you must know,
 "Sir, useth to have his word taken among his admiring Neigh-
 "bours, and so is not wont to be put to the trouble of pro-
 "ving: but I was so unmannerly as to expect it, chusing ra-
 "ther to see with mine own Eyes, than his infallible Spe-
 "ctacles. *We can see better* — saith the Disputer. How
 "doth he know that? If Perspectives deceive us, though
 "naked sense witness for them, Why may not his single Spe-
 "ctacles be as deceitful as they? These represent things big-
 "ger than they are to the unaided sight; and the Philosophi-
 "cal Glasses do but the same thing, in a higher degree of
 "magnifying the Object. But we allow him the benefit of
 "his single Spectacles, though he will not be so courteous to
 "our Glasses, and confess his Reverend Experiment of the
 "use of two, but are inquisitive about the Consequence. The
 "Reason of which certainly must be, (if any be intended in
 "it) that our Telescopes and Microscopes have a Glass at each
 "end, which the Pan of Sapience thinks answers the two
 "pair of Spectacles, and therefore must render the Repre-
 "sentation deceitful. If this Philosopher had spared some of
 "those thoughts to the profitable doctrine of Opticks, which
 "he hath spent upon Genus and Species, we had never heard
 "of

"of this *Objection*, which is as much a reason against the credit
 "of all *Perspective Glasses* whatsoever, as the *Philosophical*
 "ones he would discredit. And without more *Opticks* than
 "those of natural *Understanding*, he might, if it had pleased
 "him, have known, that we see better through the two *Glas-*
 "ses in *Perspectives*, then any single one; because they are
 "so fashioned and ordered, that the *visive rays* are better ga-
 "thered and united by them for the advantage of sight: But
 "in the two *Spectacles*, the case is contrary. These things
 "I suggested, and some others from the *Dioptricks*, in which
 "this *Sage Person* was pleased then to conceal his Know-
 "ledge; and how great that was in these matters, will ap-
 "pear by the *Learned Problem* he proposed at this period of
 "our Discourse, [Why we cannot see with two pair of *Spe-*
 "ctacles better than with one singly? For, saith the Man
 "of a *Flimsy*, *Vix unita fortior?*] A pleasant piece of *Philoso-*
 "phy this; And I'll shew the *Disputer* how strongly he in-
 "fers from his *Maxim*, by another Question like it. Why
 "cannot he write better with two *Pens* then with a single one,
 "since *Vix unita fortior?* When he hath answered this *Quære*,
 "he hath resolved his own. I said in the Discourse, That
 "the reason he gave why one would expect it should be so,
 "is the reason why 'tis not; and this is plain enough to
 "sense, from the confusion of *Vision*, which shews, that the rays
 "are not united after the way requisite for the aiding the
 "sight (as I just now intimated) and how that should be, I
 "had here shewn, but that I am ashamed to adde more in
 "earnest about a grave foolery.

Upon this Discourse, the first Remark I shall make is,
 That Mr. *Glanvill* hath little or no insight into *Opticks*, and
 is in a manner as ignorant in that profitable Science, as he
 represents his *Adversary* to be. It is something for a Man to
 be able to give an account how he spent his time, though a-
 bout *Genus* and *Species*; rather then to appear to have idly
 pass'd it away, without acquiring any knowledge at all. The
 Solution of Mr. *Cross's* fallacy, (if it were his) by that Inter-
 gatory, Why cannot he write better with two *Pens*, then with a
 single one? is ridiculous, since there is no *vix unita* there:
 and

Vitrum Spharicè earum, dilatando radios per ipsum transmissos amplificat notabiliter imaginem, si in debita distantia constituitur post Spharicè convexum. *Zucchi* phil. opt. part. 2. tr. 1. c. 7. sect. 5. pag. 360, 361, 362. How it is in *Telescopes* made up of all convex-Glasses, the same Author shews there: and so doth *Kepler* in his *Dioptricks*.

Zucchi phil. opt. part. 2. tr. 3. c. 7. sect. 5. p. 358.

and in one sort of *Tubes*, though the rays be united in the first convex-Glass, and brought to a *Convergency*, yet must the *Spherical Cavity* of the next Glass dilate again, and dispose them fittingly to effect the expected vision in the *Retina*; and besides this, it is

requisite that the Tube be so fitted unto the eye (not to speak of the fitting it differently according as the Medium is) as to exclude all other impressions and radiations, that may divert and impede the sight, viz. *Ad consulendum sufficienti determinationi potentia per languidiorem & angustiore impressionem a remotioribus, multum prodest, si ex forma instrumenti & ejus applicatione ad Oculum vel ex conditione loci è quo per instrumentum remotiora, & in minori amplitudine apparentia prospectamus, impediuntur radiationes aliunde intra oculum simul & semel diffuse, præsertim valide.*

As to what Mr. *Cross* is said to have argued against *Telescopes*, that the addition of one Glass to another must hinder rather than improve vision, because that the superadding of one pair of Spectacles to another, rather weakens then amends the sight. I must say, that whosoever understands the forming of an Argument cannot except against the form of that, nor do the Propositions cohere so ill together, as that one should be as it were for sence, and other, for convenience. All that excursion of our *Virtuoso* shews his Ignorance, not Mr. *Cross's*. 'Tis one thing to except against the form, another thing to except against the matter of a Syllogism. I confess there is reason enough for to do the latter; but now for the other procedure. I believe such a dispute was never heard of since the declining of *Arcadia*, as this was: If Mr. *Cross* did urge this otherwise then to try the Intellectuals of Mr. *Glanvill*, (concerning whose inhability he might be well satisfied) there is no defence to be made for him, otherwise then that he was unacquainted with a sort of knowledge which is unnecessary in a Divine, and not expected from him; whose credit is better supported by those Qualifications which represent him as a man of godly Conversation, faithful and able in.

in the discharge of his Gospel-Ministry. But that Mr. Glanvill as little understood the subject of a knowledge he pretends unto, it is manifest from hence; that he might easily have denied the Assertion of the Spectacles, that two pair did not impede, but amend the sight in some eyes that are very weak. I know a young Gentlewoman that hath two Cataracts breeding in her eyes, which reads and works with two pair of Spectacles, whereas she cannot with one pair. There is also an old Gentlewoman of my acquaintance who useth the same helps. I am ashamed to debate these fooleries (as our Virtuoso calls them,) but if Mr. Cross did call in question the integrity of the Telescopes, I shall assume the liberty of a digression about that Point, which perhaps may not seem unseasonable in this Age, and which will abate the pride, and evince the great ignorance of Mr. Glanvill.

Either my Memory doth very much deceive me, or else the Lord Bacon did suspect these Telescopes, that they might impose upon our Senses: and I am sure Mr. Boyle is in the same Errour with Mr. Cross, for he complains that when He went about to examine those appearances in the Sunne called Maculae, and Faculae solares, he could not make the least discovery of them in many months, which yet other Observators pretend to see every day: yet doth Mr. Boyle profess, that He neither wanted the conveniency of excellent Telescopes, nor omitted any circumstance requisite to the Enquiry. Besides these, Scipio Claramontius, he that baffled Tycho about the Comets in the judgement of most men, and gained advantages enough against Kepler and Galileo to make himself glorious, and to shew that instead of Mathematical demonstrations they proceeded upon uncertain Topics and Probabilities: this learned and inquisitive person doth avowedly suspect the Telescopes as fallacious more then once, and that there are more then He of that judgement, is a thing unquestionable by any but Superficial Scholars: nor do I apprehend any other reason then this to be in their

Tentam. Phys.
si log. pag. 144.
145, 146.

Vide Ricciol.
Almagest. nov.
l. 8. sect. 1. c. 16.

Scipio Claramontius in defensione Anti-Tychonis, & libri de novis stellis à se conlari per Italico idiomate edita, multis contendit Telescopium in representatione objectorum fallax esse. Part. 2. c. 15. ex quibus inferre c. 16. ei qui velit apparentias coelestium per illud exceptas ratas haberi, necessario ostendendum esse à nullâ aberrationum, quibus illud obnoxium est, huiusmodi miras esse. Quare cum ex una parte assumi nequeat, quasi universaliter verum quicquid per Telescopium representatur; ex alia

heads

parte non possit talis proposito universalis restringi ad apparentias coelestium, sine manifesta petitione principii, cum hoc ipsum sit quod controversatur; an fallaci de se instrumento observata in coelestibus pro certis habenda sint? manifeste sequitur nihil ex usu Telescopii constitui posse de dispositione coelestium. Zucchius Philos. opt. part. 1. c. 17. sect. 2. p. 175.

heads, who have till this day employed their thoughts here to contrive new Glasses, and amend defects in the former. Our *Virtuosi* have complained of an *Iris* in their Glasses, and gone about to correct that by *Turning of them*; but a friend of mine

writes, that he imagines it was after that *Eustachio Divini* at Rome had given them an *hint of it*: and then they found it out. A little more modesty in *Assertions of this kinde* would become our *Wits*, considering that affairs of this nature (it is the opinion of *Archimedes*, and refers to all *Mechanisms*) admit not demonstration. Cum neque visus, neque manus, neque instrumenta per quae experiri oportet, satis habeant fidei ad exquisitam demonstrationem. — *Archimed.* in libro de *Arena*.

Scipio Claram. de univers. fol. 9. c. xxi.

Vile Scip. Claram. de univers. fol. 9. c. 17. 18. 19. 20. Zucchius philos. opt. part. 1. c. 1. sect. 6. p. 111. lib. p. 216.

I shall not so far engage in the controversie, as to repeat the *Arguments* and *Replies* on both sides. It seems *strange*, that the Telescopes should so magnifie thirty, forty, or one hundred times objects on earth, and yet lessen those of the fixed Stars in Heaven, viz. *Stellas primae magnitudinis, Caniculam, &c.* Jovem, Saturnum minores representat multo, quam oculo libero appareant: & idem instrumentum stellas nusquam apparentes, ut Jovis Satellites justae magnitudinis representat, & paulo minores representato Jove, imo tantas facit, ut possint plus apparere, quam queant apparere stella primae magnitudinis, — at quid? in *Octava Sphaera* stellas nihil apparentes magnas facit, *Nebulosas scilicet & Galaxias formatrices*. — This is granted all by *Galileo* to be true, but he solves by an imaginary irradiation, the fancy whereof he advanced upon some weak *Experiments*, most whereof he deserted himself, and the rest are excellently refuted by *Zucchius*, who introduceth another *Salvo* from the configuration of the Eye, and that part of it called *Uvea*: which perhaps may be discovered to be as false as any of the other hereafter: but he adds, *Ex quo est, ut in facilitate detrahenda circumfusa sideribus radiationis sit notabile discrimen inter Planetas collatos inter se, & inter stellas fixas invicem, & aliquas earum cum aliquibus eorum comparatas.*

ratas. Thus the Objection in its full force is granted by all
 (except *Sorsius* deny it) only the cause of the *Phænomenon*
 was not till *Zucchi* (if then) sufficiently explicated; Sure
 I am that *he* in another place avows, that long *Telescopes*
 rightly made do not lessen *Jupiter*, but represent him great-
 er then He appears to the naked Eye: insomuch that his
Tube of 23 feet-long did represent *Jupiter* as big as the
Moon is when at full, and looked upon without any *Telescope*:
 so that He says the Objection holds only in *Telescopiis brevi-*
oribus, in quibus pariter evenit inspiciendo lucida inferiora.

Besides, were there such certainty in the *Telescopes*, how
 comes it to pass that there is such a variety of opinions a-
 mongst those *Observers*, whose diligence can be as little
 suspected as their learning? *Glaramontius* did set two per-
 sons to observe the Spots of the *Sunne*, (both were inclined
 to *Novelties*) they were not 40 miles distant, yet did not
 their *Schemes* agree as to number, or situation. Nor is this
 a signment of that partial *Peripatetick*: any man that reads
Ricciolus, and *Zucchi*, will see that they cannot agree a-
 bout the number, the motion, the situation, or so much as
 colour of them. The words of this last *Writer* are very re-
 markable in reference to Mr. *Glanvill*, and that certainty
 which he asserts unto the *Telescopes*, viz. *Neque obstat dis-*
crepantia numeri, vel figura macularum in observationibus plu-
rium, circa idem tempus captatis: tum quia longiores Telesco-
pium in ampliori disco plures exhibent, quæ spectantem brevior
Telescopio, angustiori disco latent: immo eodem Telescopio, ad
exactam mensuram suæ extensionis redactæ, notabiles fiunt ali-
quæ, ante inobservatæ: & facillimum est in tali mensura minus
exercitatos decipi; cum tam pauci ex observatoribus, nec nisi
monente Scheinero, didicerint ad exacte consignandam Solis
imaginem, & in ea maculas, per trajectionem radiorum Tele-
scopio in planum directe oppositum, necessariam esse mutatio-
nem extensionis Tubi, eo notabiliter magis productæ in hyeme,
correptæ in æstate: Tum quia sicut facilis est, ex allatis varietas in
numero macularum, ita in terminations, quæ facilius mutari po-
test ex iisdem capitibus in illis, quæ in pluribus observationibus
consignantur, & ex modo consignandi. Less do they agree

E

about

Z. c. hius
phil. opr. part.
l. c. 17. sect. 5.
p. 199, 200.

Ricciol Al-
mag. nov. l. 3.
c. 3

Zucchi
phil. opr.
par. l. c. 7.
sect. 8. p. 233.

See this point
 of the variety
 of the spots
 in the Sun,
 particularly
 handled by
Schottus in
 his Notes up-
 on *Kircherus*.

Her exstati-
cum celest. I-
tiner. l. dia-
log. l. p. 183.

And how dif-
 ferent the ob-
 servations of
Galileo and
Scheiner were
 you may see
 in a Synopsis
 in the *Rosa*
Ursina l. c.
 4. & ib.

about

about the nature of them: one *Joannes Farde* named them *Astra Borbonia*: and *Malapertius*, *Mastrius*, *Rheita*, do hold them to be *Starrs*: of this opinion was *Scheinerus* once, but he afterwards assented to that of *Galileo*, *Kepler*, *Bullialdus* and *Blancanus*, that they were not *Starrs*, but *fuliginous exhalations* arising out of the furnace of the *Solar Globe*, which he conceives to be a fire. *Kircher* and others are of the same judgement; but *Ricciolus* distrusts it, being not able to comprehend how *fuliginous vapours* should arise in such a number, so constantly, so permanently as to keep a motion about, or with the *Sunne*, of about 27 days.

The like uncertainty there is in the *Observations* about *Saturn*, *Jupiter*, *Mars*, &c. what controversies do they raise and how contradictory are their *Relations*? *Galileo* doth represent *Saturn* in one figure, *Scheiner* in another: the former saith, that the oblong shape in *Saturn* ariseth from a defect in the *Telescope*, or *Eye*, that could not distinguish the *Comites Saturni* from the *Planet* it self. But *Ricciolus* and others dissent from him in that point: and *Christianus Hugenius* made observations about *Saturn*, such as neither *Antonius de Rheita*, nor *Hevelius* did ever see; and represents the ansula of *Saturn*, differently from what *Fontana* and the *Dantiscan Selenographer* do write. The words of *Hugenius* I shall propose to Mr. *Glanvill's* consideration, *Exspectamus ut sub finem Aprilis, si non antea, brachia Saturno renascantur, non curva illa, cujusmodi a Francisco Fontana, & Hevelio depicta cernuntur, sed secundum lineam rectam utrinque prominentia, si quis melioris notæ perspicillo intueatur. Nam vulgaria si adhibeat binos orbiculos referent, sicuti Galileo primum se obtulere. Nostram quo Saturni assectam reperimus, quinquagies diametrum rei visa multiplicat, duodenos pedes equans; cui postea duplum longitudine confriximus, multiplicatione centupla. Cum autem longiora etiam hisce Telescopia, utpote triginta & quadraginta pedum ab aliis fabricari dicantur, aliquid aut vitii vitii inesse, aut hac eadem non debita proportionem mutuo respondere credibile est. Neque enim alius hucusque aciem eorum effugisset novus Saturni Satelles.* Being to speak of *Saturn*, I must not forget *Zucchi*, who after

Vide Scheiner ubi supra, p. 184.
Ricciol. Alm. g. nov. 1. 3. c. 3 p. 7.

Galileo n. ej. ad Velsorum, citante *Caramentio* de universis. l. 9. c. 9.
Ricciolus Alm. g. nov. 1. 7. l. c. 2. p. 487, 488.
Scheiner in *Kircher*. iter exilat. cœlest. p. 301, 302.
Christ. Hugenius apud *Bevellum* de com. p. 63.

after thirty five years diligent observation with variety of the best Telescopes, represents this Planet differently from what any others write, viz. *Affero Saturnum multorum annorum spatio figura passim oblonga, & in oppositione ad Solem, notabiliter majorem apparuisse, in apparentiæ medio visum esse album illustre tumidum, aliquo modo ad rotunditatem vergens, accedentibus hinc inde ad illud duabus velut nigris notis, quas altum illustre, totam apparentiam ad apices terminans ita includit, ut ad apices illius multo sit crassius, ubi vero eas notas complectendo ad medium extenditur, gracilescat.*

Zucchius philosoph. opt. parr. l. c. 17. sect. 5. p. 200, 201.

Affertio est facti, in quo a multis jam, annis conveniunt accuratiores, ex variis Provinciis observatores longioribus Telescopiis instructi.

Scio a prioribus vulgatum, tres a se stellas in loco Saturni spectatas, media multo majori, quæ simul mutantes in cœlo situm, a fixis aperte distinguerentur, & Saturni duobus Planetis minoribus stipati apparentium exhiberent, qui postea, illis a tali situ motis spectatus sit figura rotunda. Verum triginta quinque ut minimum, anni sunt, quibus figura semper oblonga, cum dispositione in assertione assignata, a me spectatus est pluries quotannis, pro vario ad Solem situ, acutioribus, minus acutis, cavis, convexisque lentibus ad oculum proxime in Telescopio adhibitis apparentia eadem, semper magis distincta, & majori, in oppositione ad Solem, etiamsi meliorem vitiorum elaborationem in multo longioribus Telescopiis postremo D. D. Evangelistæ Torricellii, & Eustachii Divini artificio, & beneficio singulari consecutus sim.—Quare in hoc priorum observationes, qui brevioribus, minusque perfectis Telescopiis, ut omnino ratas admittere non audeo.

Concerning Jupiter, and his Satellites, and their number, taking in the Urban Octavian Starrs, I finde a great variety, even when two men observed at the same time, as de Rheita and Gassendus: that both of them were in the right, cannot be said: which of them were in the wrong, I know not. In summe, the observations about Jupiter and his Attendants are so various, *Aliter enim apparuerunt Simoni Mario, aliter Appelli, aliter Galilæo, that Claramontius takes this advantage of it. Ego igitur argumentum ex ejusmodi diversitate alicio*

Vide Schortum in Kirch. iter exstaticum cœleste p 268, 269 &c. Riccioli in Almag. nov. l. 7. sect. 12. p. 426.

Scipio Cla-
ramonti s de
universo l. 5.
c. 8.

contra veritatem objecti, non contra observationum diligentiam, cum observatio ejusmodi non sit nisi pura per tubum transpectio, eaque defixa: ii etiam viri perfectum instrumentum habebant, estque id verisimile, cum in eam rem toti incumberent, instrumentum etiam exactum paravisse: oculorum etiam & visus acumen, cur demam Apelli & ejus in observando sociis, potius Galilæo demerem, qui se fateatur oculum minus perfectum habere

Scottus in
Kircher. iter
exstar. cœli.
p. 242. &c.
Ricciolus Al-
mag. nov. l. 7.
lib. 1. p. 486.
Zucchi-
phil. opt. part
1. c. 17. sect. 4
p. 193.

Neither are they better agreed about Mars and his Figure, the umbo or spot in him. Gassendus denies that ever he saw it, though he used the Tube of Galilæo; others avow it: as you may see in Schottus and Ricciolus. In fine, as to the new Phenomena about Mars, Venus, and Mercury, to defend them Zucchi is forced to complain of the Telescopes, and protests thus. *Interim te, amice Lector, provoco Spectatorem, bono & longiore Telescopio instructum, cujus Lens superior ad obtinendam figuram apparentiarum bene præcisam, juxta dicta, maxima ex parte contacta sit, modico ad medium aperto foramine.*

Berigardus
Circul. P. 1.
de Luna. id. 5

I am tired with the further prosecution of this subject; and therefore shall confine the rest of my discourse to the Observations about the Moon: the contemplation whereof, as it is more facile, so it hath been more pursued then any other of that kinde. There is none of our Comick Wits doubt that it is a World, divided into Hills, Valleys, Seas, Lakes, Rivers, and even peopled as this Terraqueous Globe of ours. But it is remarkable, that the use of the Telescope hath not convinced some, that the Moon hath an unequal surface, but that the Phenomena of the spots may be solved by the conceit that some parts of it are more Diaphanous, some more opaque. Who hath not heard how Scheiner looked on the Moon in an Eclipse, and did conceive it was fistulous, (at least translucent in part) and so did transmit the light thorough several Cavities in some places, whilst others, not directly subject to the Sunne, are obscure. They cannot agree whether the Spots of the Moon be more bright, or obscure in an Eclipse. The observations and descriptions of the Moon, made by Galilæo, Scheiner, Fontana, Schottus upon Kircher,

&c.

&c. are so defective, that we must repute them but as the first rudiments of an intended Science. And as for the descriptions of the Phases of the Moon, made by Langrenus and Hevelius, however there be many things in which they all agree: yet the Telescopes of Ricciolus (made by a Bavarian Artist) and of Franciscus Maria Grimaldi, either rectified the mistakes, or represented many Phenomena different from those delineated by Galileo, Fontana, Torricellius, and Manzini, viz. *Lunaris faciei partes omnes magnas, mediocres, ac minimas singillatim Telescopio intuens Grimaldus, easque statim cum Langreni & Hevelii Schematibus comparans, deprehendit multa quidem egregie ab iis peracta, non pauca tamen superesse, quæ aut addenda, aut quoad situm, magnitudinem, figuram, symmetriam, nigroris aut claritatis differentiam corrigenda forent.* Such as reject the exact Sphericalness of the Moon, introduce Asperities and inequalities in the surface of it, which some explain by Mountains, Valleys, and Waters: but concerning the parts of the Moon, which might be Water, and which Land, our Observators did differ. Galileo believes the spots or obscure parts to be water. Kepler held the contrary, that the bright parts were water, and pretends to demonstrate it out of Opticks. though afterwards he changed his opinion for that of Galileo's, which is generally received. As to those asperities in the surface of the Moon, whether they extend to the Limbus, or utmost circumference, or no, is a doubt amongst them: Galileo denies it; Kepler, Ricciolus, and others affirming it: and the latter gives this reason why they are less frequently observed there: *Vera causa cur raro asperitas illa Limborum videatur, est partim imperfectio Telescopii, &c.* Neither are they better satisfied about the Atmosphere of the Moon: that there is one, Galileo, Kepler, Antonius Maria de Rheita, Kircher, Gysatus, Scheiner, with others do avow: and Langrenus saith, that we may observe it with a Telescope: *eandem Tubo-specillu conspicui affirmat Michael Florentius Langrenus.* But others deny it as peremptorily.

Ricciolus Al-
mag. nov. l. 4.
c. 7.

Galileo sy-
stem. cosmic.
p. 131. edit.
London.
Kepler. Astro-
nom. Optic. c.
6. sect. 9.

Ricciolus Al-
mag. nov. l. 4.
c. 8. qu. 2.

Kircher. iter
extat. cœ. et.
p. 48.
Ricciolus Al-
mag. nov. l. 4.
c. 6. sect. 8.

Interim

Ricciol. Al-
mag. nov. l. 4.
c. 2. sect. 3.

Zucchi. phil.
opt. part. 1.
c. 17. sect. 9. p.
264.

Joan. Heve-
lius Seleno-
graph. p. 148.

Ricciolus Al-
mag. nov. l. 4. c.
7. p. 203.

Zucchi. phil.
opt. part. 2. c.
17. sect. 9. co-
rol. 7. p. 266.

Interim mihi (saith Ricciolus) nondum quocunque Telescopio adhibito aer hic ita patuit, ut illum potius prope ac circa Lunam, quam in aere nostro, in quo & Halones fiunt, cogar agnoscere. And Zucchi. at large proveth this Corollary, *Non eleventur illuminis Solis vapores e Luna, sicut eleventur ex Globo e terra & aqua integrato: Neque datur circa Lunam Sphæra vaporosa ulla, qualis circa dictum Globum deprehenditur.*

Having proceeded thus far, I shall take notice of some extravagant opinions that possess many of our Comical wits, and their Associates or Admirers, which are extended to the prejudice of Christianity, and the growth of Atheism in this Age, viz. That the resemblance betwixt the Moon and the Earth is such, that it is a *Terraqueous Globe* inhabited by men, and they hereupon concern themselves about their *Progeny, Salvation, &c.* I shall from hence take occasion to instruct those phantastical persons, that even *Hevelius*, who accommodated the *Terrestrial Geography* to the *Lunar Globe*, and seems to conclude that the *illuminated part is earth*, the *darker is water*: yet did it only because He knew no fitter comparison amongst sublunary bodies. — *Non est autem quod quispiam ideo existimet Lunam ex ejusmodi sabulo, luto, aut lapide esse compositam, ut hæc terra nostra, siquidem fortassis ex alia poterit constare materia, ab imaginatione nostra prorsus diversa, & modo adhuc incomprehensibili.* — *Minime etiam hæc Lunares aquas nostris similes assero, sed quod nihil quicquam similis, propter magnam utrarumque affinitatem hic in terra habeamus, cum quo illas comparare valeamus.* It was indiscreetly done of *Kepler, Kircher, Hevelius*, and such Writers to carry on the comparison so far, the resemblance betwixt the two Globes being so little as the most unprejudic'd persons find it to be. *Hevelius* perinde ac si *Luna* esset altera tellus, *Geographica* nostratis *Telluris* nomina in *Lunam* transtulit: licet quoad figuram, situm, symmetriam, &c. nulla fere sit Analogia inter utriusque superficiem. The truth whereof will further appear from those considerations which the inquisitive *Zucchi* after thirty five years use of all manner of Telescopes at length fixed upon, viz. That the discrepancy of Parts in the illuminated Moon may be explained with-

out

out attributing thereunto any variety of colours: yea, it ought to be so explained. The first part of which Assertion he proves thus: because in *Opac bodies* the difference of a greater and lesser *Obliquity* in their situation towards the body that shines upon them doth cause a diverse manner of illustration. Thus the same wall, of one uniform colour, according as it is differently illuminated, seems in some parts to be *white*, in others *pale*, in others *dark-coloured*, and *black*: besides that, a greater or lesser *asperity* or inequality of the superficies may cause an intermixture of the *enlightened* and *over-shadowed* parts, and so create different appearances of *light* and *opacity* in their most observable parts.

The second part He proves thus: because that the face of the Moon being looked on with a *Tube* of an extraordinary length, with *Glasses excellently polished* (such as He used for many years) appears all of it like a great *Tract* of Land covered over with *Snow*, which the *Sunne* variously illuminates accordingly as the parts are differently framed and situated. Where there is any change of situation in the parts illuminated in reference to the body that irradiates them, then do such parts *abate of their whiteness*: and although they still continue in such a position that his beams may in some degree and manner reach them, yet by reason of the *unequal surface* of the Moon (in which some parts are more elevated then others) some parts are *directly opposite* to the *Sunne*, others are glanced upon with an *oblique ray*, and this mixture of *shades* and *brightness* occasions those spots which we so talk of. Thus upon the *libration* of the body of *Jupiter*, the *girdle*, which otherwise seems remarkably *black* above the other adjacent parts of the *Planer*, becomes like unto the rest of the body in *whiteness*, and so disappears.

As to the distinction of the Moon into *Sea* and *Land*, consisting of *Mountains* and *Valleys*; although the *Analogy* may seem allowable by reason of the *Asperities* in the surface of the Moon, (which is a thing not to be denied: albeit that the calculation of the height of those more elevated parts are ridiculous, except the nature of the *Cavities* were better

Existimo materiam globi lunaris non constare terræ & aqua Galilæo system. cosm. p. 132.

Zucchi-
phil. opt. part.
l. c. 17. sect. 9
p. 260, 261.

Zucchi-
us supra p.
263.

Galileo pro-
fesseth, that in
the Moon there
is no rain; no
clouds there
thicken the
air. Longis ac
diligentibus
observationi-
bus nunquam
id animad-
vertere potui,
ac semper u-
niformem pu-
rissimamque
serenitatem
ibi deprehen-
di. Galileo.
system. co-
smic. p. 133.
Zucchi-
us supra p. 264.

to be discovered, as *Zucchi-
us* shews) yet the imagination
of Seas and Lakes therein, or any thing of that Na-
ture, except what borders upon the *Peninsula delirio-
rum* in the *Lunar Chart* of *Ricciolus*, 'tis all an improbable
phancie. For, that the more pale and obscure spots are not
water, appears hence, that those spots keep the same *Phasis*
or appearance for many days, though the *Site* of the *Moon*,
both in respect of the *Sunne*, and of us the *Spectators*, do
vary much in that time: whereas when the *Sunne* casts his
beams upon Seas or great waters on *Earth*, the *Phenomena*
differ according as the *Sunne*, or the beholder vary their sta-
tion: And this alone might convince us, but that I finde
now in *Zucchi-
us*, viz *Similiter transitum successivum radiis So-
lis ad fundum usque ad magnis maculis intra margines illustri-
ores contentis præbent* (ut diximus in *apparentiis*, pag. 239.)
*quod non evenit in liquido profundo instar aquæ, ut in aquis ex-
perimur etiam in multa vicinitate illustratis, quando notabilem
habent profunditatem: tum quia constantem inæqualitatem illu-
strationis exhibent in horizonte Lunari, & quidem juxta dicta
in Apparentiis (num. 3.) secundum magnam extensionem illu-
stratam, intra reliquas partes nondum Solis radiis perfusas; imo
aliquæ, Soli proximiores, alias sequentes in eadem majori ma-
cula inumbrabant: hujusmodi autem convenire non possunt cor-
pori inconsistenti, & liquido aquam referenti, quæ tamen cer-
tum est convenire aliquibus Lunæ partibus, ab omnibus inter ma-
culas computatis.* I must confesse I think these reasons con-
vincing to any persons not prepossessed; and they are
much more inforced by him with a discourse concerning ex-
halations and an *Atmosphæar* about the *Moon*, which he de-
nies absolutely: yet considering the proportion of the ima-
ginary Waters to the *Land* in the *Moon*, and the heat and con-
tinuance of the *Sunne*-beams thereupon, common reason
would tell us, that the vaporous exhalations would propor-
tionably exceed those about the *Earth* here, and produce
an *Atmosphæar* that should be observable, whereas the most
accurate inspection at most opportune times with the best
Telescopes could not satisfie *Zucchi-
us*, that there was any
such thing at all.

Kepler.

Kepler (and his Master Mœstlinus) did believe that the Moon was a World consisting of Sea and Land, making up one entire Globe, as the Earth does; and that the Mountains there were much higher and bigger comparatively then those of the Earth: and adds by way of jocundry, that since the Men and other Animals commonly participate of the nature of the soyl and climate they dwell in, that the inhabitants of the Moon must be of a greater stature, and more robust constitution then those of the Earth: The Day there making up fifteen days of ours: and the Heats seem so scorching, and so unexpressible by reason of the Suns being vertical to them so long. In fine, he thinks it no absurd opinion of the Gentiles, that made the Moon a kinde of Purgatory for departed Souls.

Upon the most serious consideration of all circumstances, whereunto I could ever engage my thoughts; when I reflected upon the great difference betwixt the Days here and there; the different influence which the Sunne must have here and there through the Diversity of his Aspects, (whereupon depend Terrestrial productions) that there is no rain, no clouds there; no Atmosphere (like ours) proportioned to such respiration and life: no intermixture of earth and water: no innate diversity of colours, which occasion the Phenomena that perplex our over-curious Mortals: and that all the Enquiries hitherto made, have so little of evidence, that 'tis more clear that the

Galileo system Cosmic. p. 132. Existimo materiam Globi Lunaris non constare terra & aqua. Quæ res una ad generationes alterationesque nostris similes tollendas sufficit. Verum tamen etiam si concederetur Aquam ibi Terramque dari; non tamen plantæ & animalia nostris similia nascerentur, idque ob duas præcipue rationes: primo quia ad nostras generationes aspectum Solis varietas adeo necessaria est, ut sine illis esse nulla possint. Jam autem habitudines Solis ad Terram, ab illis quæ sunt ad Lunam, valde differunt. Nos quoad illuminationem diurnam, in majori parte terræ, singulis horarum viginti quatuor periodis, noctis atque diei vicissitudinem experimur, quæ in Luna menis duo demum spatia absolvitur. Item ille Solis in Zodiaco descensus & ascensus annuus, qui hiemis æstatisque vicissitudinem & dierum ac noctium inæqualitatem producit, in Luna unico mense finitur: Cumque Sol apud nos sic elevetur ac deprimatur, ut inter maximam ac minimam altitudinem intercedat differentia graduum, 47. quanta nimirum est distantia ab uno tropico ad alterum; in Luna non nisi 10 gradibus aut paulo amplius illa differentia constat, quantalibet est maxima latitudo Draconis ultra citraque Eclipticam. Nunc consideretur qualis operatio sit futura Solis in Zona torrida, si per quindecim dies continuos radiis suis eam ferire pergeret. Per se enim intelligitur, omnes plantæ, herbes & animalia possum itura. Quod si vel maxime generationes ibi fierent, illæ tamen ab herbis, plantis, & animalibus nostris diversissime forent.

Secundo perscrutissimum est mihi, nullas in Luna pluvias esse. Nam si qua parte nubes ibi congregarentur, ut fit in terra, videremus utique rerum illarum aliquid abscondi, quas ope telescopii in Luna conspicimus: & in summa, in particula aliqua notis variaretur aspectus. Id quod longis ac diligentibus observationibus nunquam animadvertere potui, ac semper uniformem purissimamque serenitatem illi deprehendi.

Moon is a *Cheese*, (not fat, for then it would melt) oddly figured and made with *Asperities* in its *Superficies* (and perhaps a little rimy'd in some parts) then an *Earth* resembling ours: I could not but condemn those our *Comical* and *Atheistical Wits*, who use so little of *modesty* or *scrupulousness* in their discourses about this so uncertain subject. They are men of so little reading and *inquisitiveness* (whatever they pretend unto; as if this Nation produced no persons equal to them for *Learning* and *Abilities*, that they never examined these debates; but the opinions which they take up and transform into *Assertions*, are only the *railery* or *casual* and imperfect pieces of conversation betwixt more intelligent persons, or some *Coffee house talk*, which they confidently obtrude and impose upon *speculative* or more considerate *Gentlemen*, and render themselves insupportable in any Society.

*Tuus lenti-
bus duabus
constans dici
potest oculus
mere artifi-
ciosis Schei-
neri Rol. Ul-
fin. l. 2. c. 7
quem vide ib.
a c. 23. uique
ad c. 30.*

*Tam raritas
quam densitas
potest esse cau-
sa refractionis.
Merleau.*

A young *Gentleman*, a friend of mine, who was not a little valued in the world, who was no stranger to the *Mathematicks*, and whose wit and learning far transcended any thing I can observe in a droll and *Comediantes* of these times, entertain'd me with a discourse once of this nature; Having spoken of the *Celestial Phenomena*, how differently they were represented by *sundry men*, he was more prone to suspect their *dioptrick Tubes*, than their integrity: He thought our *Eyes* were *Telescopes* of God Almighty's making, and the model by which the others were regulated and amended: and that any man who regarded the *daily Occurrents in vision*, could never believe it possible, that any certainly could be derived from *Telescopes*, about such *Phenomena* as we could employ only *one sense* about, and that not in a *due distance*, and with such circumstances as *legitimate* the judgement thereof: That we were to look through their *different mediums* (granting that our *Air* makes but *one Diaphanum*) and those not contrived *dioptrically*, that we know, and that since every *medium*, thicker or thinner, (besides the intercurrenties of *irregular* and *unknown* particles, like to *moats* in and upon a *Glass*) did cause a *different Refraction*, and that neither the constitution of our *Atmosphere* (as not proportionate to our *sensible enquiries*) and *air*, nor the *intermundial Aether*,

nor

nor the *Sphæra vaporosa* of the *Planets* could ever be accurately and satisfactorily searched into; no man could particularly know what he beheld, and deduce with prudence any theorems and conclusions from such infirm hypotheses. He added, that our senses and the daily objects we converse with on earth, did prejudicate rather than qualify us for these speculations: that we might easily observe what mistakes arise from the contemplation of resemblances: that similitudes, though very slender, engage the unwary, (and some that are cautious too) to conclude an identity in objects: that it would be impossible for any man without the aid of a nearer approach, and even of his other senses, to conclude whether a stick lying part in, part out of the water were straight or crooked, by reason of the refraction in the different mediums of Air and Water: and that a Glow-worm, or an Indian fire-Fly would create strange disputes and contests amongst mankind, had they no other helps to discover the Phenomenon then a Telescope, magnifying the object and its parts thirty, forty, or one hundred times. He admired that saying of Aristotle, *περὶ τῶν ἐξ ἀνίων ὁμοροεῖν ἐκ ὅτι τὸ φιλάει*: and commended him, that in his doctrine of *Meteors* he pretended not to arise higher than a low degree of probability. That it was possible to imagine such things to our selves as were not really in the Moon, but not such as were there, except in a very general and indefinite manner. *Posse quidem excogitari nonnulla, quæ in Luna neque sunt, neque esse possunt: nihil autem eorum quæ ibi sunt aut esse possunt, nisi largissima generalitate.* That the appearance of an Earth, did not infer the inhabitation of men, much less Animals and Plants like ours: that our own Geography might undeceive us herein, some parts of this Globe being not peopled, and the animals, and plants, and nature of the soyle, differing so much from our European productions, as we could not have conceived, had not our Eyes and authentick testimonies gained us to a belief of it. That the most clear Eyes have in this case a kinde of a suffusion, and the most unbiassed persons their Intellectuals prejudicated, and had no reason to condemn the opinion of that Peasant, who imagi-

Arist. meteor.
l. 1. c. 4. l. 2.
These are the
words, and
thus the judg-
ment of Galie-
leo Syst.
Cosm. p. 7.
"Ο περὶ τῶν
μετεώρων ἡ ἀπό-
ψη δὲ γινώσκου-
μεν, καὶ ἡ
νόστος ἐ-
χει, ὅτι ἀν-
θρώπων καὶ λέ-
γοντες τοῖς
ἀλλοῖς δὲ ἡ
ἀλήθεια ἐστὶν
ἕτερον καὶ γὰρ
ὅτι περὶ ὅτι
καὶ ἐπὶ τῶν
κατα τὴν ἀ-
λήθειαν.
Hypoc. de
ver. med. sc. 31

Galileo sy-
stem. cosmic.
P. 71.

ned the *Grandeur of Rome* to be like unto his *Village*, or the *Scot* who represented *London* to be such another town as *Edinburgh*. It is an opinion wherein the *Peripateticks* and *Lyncei* are agreed: *Quicquid sub nostram cadit imaginatio- nem, id aut jam ante viderimus oportet, aut ex rebus rerumve partibus jam ante visis compositum sit, quales sunt Sphynxes, Sirenes, Chimerae, Centauri, &c.* He smiled at those who thought they had much improved *solid knowledge*, by tel- ling men of *Quasi-terra, Quasi-mare, Quasi-sylvæ*, which he supposed to be as insignificant terms as the *Canting* of *Chymists*, or the *Quasi-corpus*, and *Quasi-sanguis*, in the gods of *Epicurus*: that it was intolerable in a *Philosopher* to phrase it thus, however a *Poet* might say,

Ἰχθὺς, οἷός περ τε πέρι μανδραγόρι θεοῖσι

Vide P. Alph.
Ovagium in
relatione Chi-
lensis 5.
Rucciol Al-
mag nov. in
append. ad
part. primam
tomi primi,
P. 730.

But nothing created in him a greater *laughter*, then the *Proposals* some made of *flying to the World in the Moon*: this design he thought *superlatively* ridiculous, though the con- trivance of *wings* for *mankind* were then but projecting at *Wadham-Colledge*: It did not appear to him then that *this World* was no *Magnet*: he wished that first these *Opiniatours* would go to both *Poles*, and placing themselves there try the *Observations* of *Des-Cartes* with some dust of *Iron*: that they would consider whether the more *remote Air* would bear up their *wings* and *weight*, (perhaps there might be that dif- ference in *Air* that there is in *water*, where those *Ships* which sail in *salt-water* do sink in *fresh streams*) and how it might agree with their *respiration*, since the *Air* upon the tops of *Andes* of *Peru* is so sharp, that those *Mountains* are as dif- ficult to pass, or live upon, as *Aristotle* represents *Olympus* to have been, where men are forced to breath through *Sponges*: whether that *inhability* of the *Air* for men to breath in it did arise from the *real nature* of so *elevated* a place, or that it was occasioned by some *destructive exhalations* (since *Mount Athos* is reputed higher then *Olympus*) he knew not: but he thought they might enquire well into this particular, and into those regions (which are different) wherein *storms,*
thunder,

thunder, and snow are generated; what tempests might arise therein (of which we are not sensible here below) what provision there is against them before one arrives at the twelve Celestial houses: what accommodation of meat and drink, what money currant in those parts, all which ought to be regarded lest our Experimentators should come off as ill as the Knight of the Mancha did, when he had not wherewithal to defray the expence of his Inn: besides that, he was much afraid, that at their arrival, agreeably to what Kepler saith, they might finde their lodging too hot for them.

Having said these things, that great young man, (who died before that Ignorance and the Virtuosi grew prevalent) presented me with the works of Marcus Aurelius Antoninus, published by D. Meric Casaubon, opening it at that place where that understanding Emperour acknowledgeth it to have been the special favour of the Gods, that he never troubled himself about these Meteorologies and extravagant speculations, whereunto nothing humane can reach: He added, that in these kind of speculations he knew enough that was secured from superstition, that for a man to desert those Studies which qualifie him for a sociable life, and were of importance to the preservation of the Government and Countrey he lived in, this was a kinde of salvagenesse, had more of the Anchorite, then of Civil Prudence, and was to be encouraged in a Cloyster, or in the deserts of Thebais, then to be made a practice among wise Statesmen.

I have sometimes entertained my self with the remembrance of this Gentleman, and guessed how he would have sported at that passage of Mr. Glanvill, in his *Scepſis Scientifica*, where he complements the R. Society, to whom that book is Addressed.

We expect greater things from Neoterick Endeavors. The Cartesian Philosophy in this regard hath shewn the World the way to be happy. And methinks this Age seems resolved to bequeath Posterity somewhat to remember it. The glorious Undertakers

Concerning a
voyage to the
World of the
Moon, the dif-
ficulties of the
passage and of
the air, water,
and other cir-
cumstances
there, read
Kircher his
letter extat.
unto the
Moon; and
you will find
how just a ca-
veat I give
here.

*Scepſis Scien-
tif.* p. 133, 134

kers, wherewith Heaven hath blest our days, will leave the *World* better provided than *they* found it. And whereas in former times *such* generous free-spirited *Worthies* were as the *Rare* newly-observed *Stars*, a single one the wonder of an *Age*: In ours *they* are like the *Lights* of the greater size, that twinkle in the *Starry Firmament*: And this last *Century* can glory in numerous *Constellations*. Should *those* *Heroes* go on as they have *happily* begun, they'll fill the *World* with *Wonders*. And I doubt not but *Posterity* will find many things, that are now but *Rumours*, verified into (*a*) *practical Realities*. It may be some *Ages* hence, a *Voyage* to the (*b*) *Southern* unknown *Tracts*, yea, possible the *Moon*, will not be more strange than one to (*c*) *America*. To them that come after us, it may be as ordinarie to buy a *payr* of *Wings* to flie into *Remotest Regions*; (*d*) as now a pair of *Boots* to ride a *Journey*. And to conferre at the distance of the *Indies* by *Sympathetick* conveyances, may be as usual to future times, as to us in a *literary correspondence*. The restoration of *Gray hairs* to *Juvenility*, and renewing the *exhausted marrow*, may at length be effected without a *Miracle*. And the turning the now comparative *desert World* into a *Paradise*, may not improbable be expected from late *Agriculture*.

Now those that judge by the narrowness of former *Principles* and *Successes*, will smile at these (*e*) *Paradoxical Expectations*: But questionless, those great *inventions*, which have in these *latter Ages* altered the face

a God forbid.

b 'Tis very cold going thither, if you believe Sir

Fr. Drake; as I have shew'd afore in my discourse of the *North-west-passage*.

c Yes a little more; the *Ancients* had been there before; besides, the difficulties ingoing to the *Moon* are more insuperable.

d *Pacoler's* *Horic*; *Fortunatus's* *withing-Cap*; the skill of *Medea* in restoring *youth*, all ancient and modern fables shal be really achieved!

e They that do not so, laugh at you, and think such expectations thence *paradoxical*.

face of all things, in their naked *Proposals*, and meer *Suppositions*, (i) were to former times as *ridiculous*. To have talked of a *New Earth* to have been *discovered*, had been a (e) *Romance* to *Antiquity*: And to sail without sight of *Stars* or *Shoars* by the guidance of a *Mineral*, a storie more absurd then the flight of *Dædalus*. That men should speak after their tongues were *ashes*, or communicate with each other in *differing Hemisphere*s, before the invention of *Letters*, could not but have been thought a *Fiction*. *Antiquity* would not have believed the almost incredible force of our (h) *Canons*; and would as coldlie have entertained the wonders of the *Telescope*. In these we all condemn (i) *antique incredulity*, and 'tis likelie *Posterity* will have as much cause to pity ours. But yet notwithstanding this *straightness* of shallow *Observers*, there are a let of (k) enlarged Souls that are more *judiciously credulous*, and those who are acquainted with the fecunditie of (l) *Carteſian Principles*, and the diligent and ingenious Endeavours of so many true *Philosophers*, will despair of (m) *nothing*.

This is a most extraordinary *Flourish*: Yet I finde the *Rhetorick* defective in the suiting of the *Antitheses* and *Antipodeses*: but I shall not take notice of that fault now, it is so general in our *Comical Wits*. I shall now quit my *Digression*, and resume the controversie betwixt the two *Disputants*. Mr. *Glanvill*, for the credit of those *Dioptrick Glasses*, told Mr. *Cress*, "That he might try them upon *Objects* near, and easily visible, by the unassisted sight; and if he made triall, he would finde they altered the *Objects* in nothing but their proportions, which are represented larger for the ad-

f Prove that they ever did think of them: if they did not, they could not be ridiculous to them.

g Enquire into the Navigations of *Antiquity* and then say this.

h The strangeness more in the incredible force of the powder: had they known that, they would not have thought the other strange. i I know not any that condemn the ancients for their credulity about such matters, as were never proposed unto them, but for the credulity of this Age, expect scorn rather than pity.

k 'Tis a pretty philosophy indeed, it is all invention. l Not of the *Paracelsa*, nor of the *philosophers* stone, nor any thing in *Ovids Metamorphosis*, *Atlantis*, or *Utopia*.

Plus ultra;

"*vantage of vision in things small and remote; and we have all the like reasons to distrust our Eyes, as these Glasses (for their informations are the same in all things, but the mentioned difference) and there is no man such a fool as not to make allowance for that. — I see Mr. Glanvill is not only ignorant of the Opticks, but altogether unacquainted with Telescopes: for first there are some made by Mr. Smith-*

Duobus vitis convexis instructo Telescopio, habetur simul & semel objecti mediocris, vel multarum partium grandioris representatio, sed inversa: si debite addatur tertium convexus, multiplicatis adhuc refractionibus, una unius obinetur apparentia, & in situ conformis Objecto. Zucchius phil. opt. part. 1. c. 17. sect. 2. p. 180.

wick (a very ingenious and worthy man) which represent the Phases of the Moon very well, and yet invert all Objects, but that is no default or impediment where the thing looked on is round. These convex Telescopes alter the Object in some thing else besides

their proportions: nor doth any such thing happen in a well-disposed Eye upon vision. Secondly, he might have known this further difference betwixt an un-assisted sight, and what is performed by the best and longest Telescopes about ordinary Objects, that the Dioptrick Tubes do represent the light and colours of bodies more dilute and remiss then they appear to the naked Eye. Per Telescopia, praesertim longiora, objecta spectantur luce & colore dilutiora, quam libero oculo. This is granted by Zucchius and others; and the reason is given by Zucchius, because that so great an expansion or amplification

Zucchius ubi
supra p. 181.

Expansionem representativorum aequivalere remissioni, & densationem eorum intensiori, & utramque non à medio, sed à propria conditione propagationis radiorum pendere. id ibi. Si Telescopium sit extraordinariae longitudinis, ex nimia expansione, quae aequivalere remissioni qualitatis visibilis, appareret nimis dilutum: ut minus in eo varietas partium internosci posset. Zucchius phil. opt. p. 2. c. 17. sect. 3. p. 366.

Zucchius phil. opt. part. 1. c. 17. sect. 6 p. 204

of the Object, and distancing of its parts one from the other, is equivalent to a remission of those qualities therein. But to shew Mr. Glanvill a little more of his ignorance in Telescopes, I shall shew him some further differences betwixt the naked sight, and what is performed by those Glasses. For some of them represent some Objects greater then they appear to the naked eye:

Some (in the shorter Tubes) are represented no bigger, or rather less then they otherwise seem: Some Objects in the longer Telescopes are magnified indeed, but nothing so much as other Objects are by the same Glasses. The Experiments

ments are obvious: place a *candle* in the dark at some considerable distance, and the flame will appear round and encompassed with rays: then take a short *Telescope* fitly made and placed, and look through it, and you will see the irradiation taken off, and the flame represented as oblong, not round, and rather seemingly less than greater than it appeared before to the naked Eye. Then turn your eye unto any coloured Object, and take notice how big it seems: assume the same *Telescope*, and you shall find that to be magnified above what it seemed to the naked eye by much. After this, take a long *Telescope*, and view the aforesaid candle through that; and at the same distance view some other coloured Object, and you shall see that this last *Telescope* will represent both Objects much magnified; but the *Candle* less of the two by far.

But I shall adde further, that it is not to be doubted but that the *Telescopes* of *Galilao*, *Scheiner*, *Rheita*, *Gassendus*, *Grimaldi*, *Eustachio Divini*, *Hewelius*, *Hugenius*, *Ricciolus*, and *Zucchi*, were good in their kind, and that they did represent Objects as truly here on earth, as

any could; yet when they come to be applied to the *Celestial Phenomena*, what difference is there in their Observations? How do they complain either of the default of the *Telescopes*, or want of care or skill, each in the other? *Simon Marius* boasts

of his accurateness: *Scheiner* in his *Apelles* tells us, *Observationes omnes factæ sunt summo studio cælo serenissimo, semper cum observatum est, & obscurissimo, plerumque in absentia videlicet Luna: talis vero variis & excellentissimis, quorum uno meliorem adhuc ad stellas non vidi.* But enough may be collected to this purpose out of the foregoing discourse, so that I need not repeat it over again: out of all which as I would not be understood totally to discredit the use of *Telescopes* in celestial discoveries, (I do not

Si Lunares discos, post tot inspectiones, & inspectiones, publicatas videas, neque numero, neque conformatione sibi correspondenti: quam multa partes vel præ aliis circumpositis illustres interj. & & suamulto minori illustrationis exhibitione illas interruptentes, aliquot latuerunt, & in angustissimis, vel nimis accuratè expressis. Discis omnes, q. a. verè interos itiles sunt in Luna, & ab a. iis consignantur? quantum totius Disci lunaris termin. tio. & insigniorum in ea partium, variata? Zu. chius phil. opt. part. 1. c. 17. sect. 8. p. 233.

Vide Sciti. n. Claramont. de Univers. l. 1. c. 8.

deny but *some things* and *some motions* are observed by them, which a *naked Eye* cannot discern; but this knowledge arrives to a slender degree of certainty, when the *Phænomena* come to be particularly explicated; and *theoremes* or assertions framed there) so I would not have them too much relied on, nor men be too confident in *principles* and *Conclusions* which have no *surer Foundation* then those *probabilities*: and I do herein joyn with *Claramontius* in that *Epiphonema*, *In tanta diversitate, quid certi ex tubo Optico habemus?* If I must suspect the skill or accurateness of *Galilao*, *Scheiner*, *Gassendus*, *Hewelius*, *Fontana*, *Ricciolus*, and *Zucchi*, and such like; pardon me, if I know not *whom* to believe.

I have been the more large in this Point because of the insolence with which Mr. *Glanvill* persecutes that Reverend, and otherwise learned person, whom he represents to the world as *He* pleaseth, and accordingly treats him with that contempt and scorn which is less allowable towards a *Divine*, and such a one as is, and always hath been in that Country very much esteemed by several honourable Families, as well as others. However God hath so providentially ordered the dispute, thereby to check the pride of our *Virtuoso*, that *The Man of Words* cannot triumph over the *Man of Axiomes*. And if it be true, that our *Aristotelean* was amazed at the hard words of *Dioptrick Tubes*, &c. as if there had been *Magick* in them: I doubt not to justify Him in it; for the insolent *Virtuoso* made use of them, not as became a knowing person, but as *Conjurers* use strange termes, and of an uncouth sound, though perhaps really *Hebrew*, *Latine*, or *Arabique*.

Besides all this, perhaps Mr. *Cross* seems to have been offended at something in that mixt discourse or dispute, that might derogate from the Authority of the Scripture: many sayings are not innocent, but as they are worded or uttered. To say the Scripture was written to mens fancies is an expression very unwary in a *Divine*: although a convenient interpretation may excuse it. To say it is not written according to vulgar Methods may so be spoken, that the action may render the words culpable. And in another Age they might

have passed better then now, when men are prone to vilifie the Scripture, especially the little Wits. I perceive Mr. Sprat is not over-tender of the dignity of the Scripture: for although there be an ancient Canon of the Church against the applying the Sacred Word of God ad scurrilia & adulatoria (which Canon is authoris'd even by the Council of Trent) yet doth he encourage men to apply it to ordinary Raillery. "The Wit that may be borrowed from the Bible is magnificent, and as all the other Treasures of knowledg it contains, inexhaustible. This may be used and allowed without any danger of prophaneesse. The Ancient Heathens did the same. They made their Divine Ceremonies, the chief subjects of their phantasies: by that means their Religions had a more awful impression, became more popular, and lasted longer in force then else they would have done, And why may not Christianity admit the same thing, if it be practis'd with Sobriety and Reverence. What irreligion can there be in applying some Scripture-expressions to Natural things? Why are not the one rather exalted and purified, then the other defiled by such Applications? — The Case is clear Gentlemen, Hath not the Lord said, What hast thou to do to take my words into thy mouth since thou hatest to be reformed? Besides, methinks our Divine might have remembered the feast of Belshazzar, and the resentment that the Lord expressed upon the applying of the consecrated vessels to the serving in a festival banquet, though to a Prince. He might have called to minde the hand-writing upon the wall, and very probably have inferred with himself, that if God was so concerned at the misapplication and abuse of those Temple-Vessels, he would much more severely interese himself where that Word of his, which he hath so many ways hallowed and recommended to our Veneration, is abused to raillery: This Humour is no part of the words or works in which the Man of God is to be perfected by reading of the Holy Scripture. I fear the great Judge will one day say unto these Drolls, Ye are weighed in the ballance, and found too light. To conclude, the generality of Raillery amounts to no more but so many idle words, and they become doubly criminal by being profane.

Plus ultra
Page 414.

But this practice of theirs was the ruine of their Religion, as any man may judg who sees what use Clements Alexandrinus and Lactantius make of it against Paganism. And the Greeks thought so when they punished one, *ὁμολογῶν τὴν εὐσχημίαν*. *Id est Eushecia.*

Of the *Antiquity* and *Use* of *Chymical* *Physique*.

Plus ultra,
Page . 10, 11.

“*Chymistry hath indeed a pretence of the great Hermes for its Author, (how truly I will not dispute.) From him 'tis said to have come to the Egyptians, and from them to the Arabians; Among these it was infinitely mingled with vanity and superstitious devices: but it doth not appear at all in use with Aristotle and his Sectators: Nor doth it appear that the Grecians, or the disputing Ages, were conversant in these useful and luciferous Processes.*—

Our *Virtuoso* is not willing to dispute whether *Hermes* were the Author of *Chymistry*, or not: It had become one that is encharged with the Cure of Souls very well, to have declined all these other disputes, as being remote from those Studies, by which he ought to qualify himself for a befitting discharge of the Ministry. But to tell him further, what I am sure he is ignorant of, the *Egyptians* did never attribute to *Hermes* the Invention of *Physick*, or any part of it, but to *Apis* and *Æsculapius*; and as for that *Chymistry* which they practised, which consisted in melting down and

*Chymia nomine olim haud legas quid aliud significatum, quam χρυσοποιαν, aut vero μεταλλουργικην, nam quæ vi-
riorum metallorum lapdumque in me-
lius commutationem pollicetur Ne qui-
dem legere est vel medicamentis prepa-
randis operam aliquam impendisse pri-
mos Chymia profissores. Conring. de
Med. Herm. c. 3. p. 15.*

improving of *Metalls*, or making of *Gold*: the *Egyptians* did never reckon the discovery of that *Art* amongst the praises of their *Hermes*, though they were very forward to magnifie him, and to ascribe unto him a great many *Elogies*. Nay, when they do recount the *Authors* of their *Chymistry*, though they do not agree about them, yet there is none that transfers that honour upon this *Trismegistus*. But whether *Æsculapius*, or the wicked *Angels*, (to both which the Invention is attributed) were the discoverers of *Chymistry*, I think I may allow the *Egyptians* to have been the first *Practisers* of it, and that there wanted not those

those who did mention *Hermes* amongst them that used that *Art*, and were esteemed *Philosophers*. Nor is the *Egyptian Chymistry* of any great Antiquity, there being no mention of it in any *Greek* or *Latine* Writer, till almost the fourth Century after *Christ*. Neither is the name only of *Chemia* or *Chemistry* of so modern a date:

but there is not any record of any book written, or work performed, that imports any such thing. Yet have the *Alchymists* (it is true) pretended to a greater Antiquity, entitling several spurious books to *Hermes*, *Moses*, (and *Miriam* his Sister) *Democritus*, *Plato*, *Aristotle*; and made as if their *Art* were intimated in the fable of the *Golden Fleece*, the *Hesperian Orchards*, and the *Song of Solomon*. In which I cannot but take notice of the different procedure of those *Chymists*, and our *Experimental Philosophers*:

the one attributed all glorious discoveries to the *Antients*, their *Predecessors*; these will not allow them those praises which indisputably belong unto them. But however, that I may grant our *Virtuoso*, that *Chymistry* did flourish in *Egypt* in such manner and at such time, as I have declared out of *Conringius*, (to whom I refer the inquisitive Reader) yet I must not gratifie him with this other concession, that from them it came to the *Arabians*, the followers of *Aristotle* not being at all acquainted with it, nor the *Grecians*, or those disputing Ages, being at all conversant with it. For it is made evident by *Conringius*, (c. 26. p. 368.) that it passed from the *Egyptians* to the *Greeks*. There are of

Greek Writers, *Zosimus Panopolita*, *Olympiodorus*, *Stephanus*, *Synesius*, *Michael Psellus*, *Blemmydas*, and many others, which are instanced in by the same Author, and deduced through the several Centuries antecedent to the *Saracen Empire*. The very name of *χημεία* or *χυμεία*,

In the time of Constantine A. D. 320. Firmicus is said to be the first that is recorded to have named Alchymia; he saith, that Saturn disposeth to Alchimy. Whence Libavius argues that it was then an Art, and had been long practised, or else how comes it under Astrological Prediction? But there is no consequence in that reason of his it being usual for Astrologers to accommodate the Stars as to have an influence upon novel inventions. Under Theodosius the Great, A. D. 38. Heliodorus writ a book to the Emperour about the Chymiceia; and something about that Art to Eripius, as Cedrenus witnesseth. Libavius Exam. chem. Parisiens.

Several of these Greek Writers were seen by Salmatius in the King of France his Library and by Reynsius, (vide var. lect. n. l. c. 5 p. 156.) who transcribed this passage as the Conclusion of an Epistle. Γίνεσθαι δὲ φίλε. καὶ τὰ ὀνόματα τῶν πρῶτων Ἀρχὴ Πλάτων Ἀε. στέλης, Ἰωάννης ἱερεὺς Διμοκεύς, Ζώ-

σμερὶς ὁ μέγας ἀλχημικός Στέφανος
 ὁ φιλόσοφος, Σοφὰρ ὁ ἐκ Περσίδος, Συνέ-
 στος, ὁ δὲ ἀπὸ Αἰγύπτου, lest any one
 should think that by σοφιστὰς were meant
 our Wise, and Poets, and Inventors. I
 must add, that it is a name long ago fix-
 ed upon the Chymists, and Chrysopore-
 ticks, as Reynsius de clares.

is Greek, as Vossius observes, *de Philos.*
 c.9. The Moorish particle *Al* being
 prefixed. Nor is the word *Alembex*
 of any other original, being compounded
 of the said *Al* & ἀμβλιξ, a term used by
Dioscorides to signify a vessel, not much

unlike our *Limbecks*. *Diosc.* l.5. c.64. vid. *Conring.* & *Voss.* ubi
 supra. From the *Greeks* together with other Learning, even
Chymistry was transmitted: and *Geber* himself (as *Leo Afer*
 relates it, lib.3. pag.136.) was but an Apostate *Grecian*. This
Geber is the most ancient of *Arabian Alchymists*, their *Idol*,
 and styled *Magister Magistrorum*. I am not ignorant that
Conradus Gesnerus (in præf. ad *Evon.*) and some others
 have reckoned upon *Geber* as if he had been originally a
Saracen, and the Nephew of one *Mahomet*: some say he
 was the Grandchild of the Impostor *Mahomet*: but their
 credit is not equal to that of *Leo Afer*, who appears a most
 learned person, and inquisitive even to *Curiosity* into the
Lives as well as *Customs* of the *Moors*, his Countreymen.

*Geberus quem
 valunt circa
 annum Por-
 tugini (ex-
 centissimum
 in vivis fu-
 isse Liban ex-
 am. censur. Pa-
 rificat.*

*Leo Afer Hist.
 Africa l.3.*

*Conrad Gesn.
 in præf. ad Et-
 onym.*

*Habent Fessani Arabes multa Chémica artis opuscula a viris
 doctis conscripta, inter quos potiore locum habet Geber, qui
 centum annis post Mahometen vixit, quem natione Gidum aiunt
 fidem abjurasse.*—*Gesner* cannot tell at what time he lived;
 but he saith he was not the *Inventor*, but *Illustrator* of the *Art*
 of *Distillation*.—*Quamquam non illum primum hujus Artis
 Inventorem, sed Illustratorem fuisse existimo. Hoc in opere
 quod summæ perfectionis inscribitur, de distillatione in Ge-
 ner. Multa pulchre differens, varios distillandi modos
 fere omnibus notos esse scribit: nimirum ut vetus quoddam suo
 seculo, non recens quoddam inventum.*

But though the *Greeks* were not free of the *Metal-
 lurgical* part of *Chymistry*, yet did they not prepare any
Medicines Chymically (that I know of,) except it were
 the *Alcalisate Salts*, and *Ecchylomata*, or *Juices* formed
 into *Extracts*, and *Oyls* drawn per descensum. This seems
 manifest in that *Oribasius*, *Aetius*, *Paulus Aegineta*, *A-
 lexander Tracheanus*, *PAULUS & JOANNES Patrophi-
 sta*

phista of *Alexandria*, *Simeon Sethus*, *Actuarius*, *Nonus*, and others mention no such Medicaments: no, nor *Michael Psellus*, though he writ a peculiar Tract about *Chemistry*. Neither hath *Nicolaus Myrepsus* (though a modern *Grecian*) any *Chymical* Preparation.

Conringius
c. 26. p. 370.
Gesner. in p. e.
fat. ad Euo-
nym.

The *Arabians* seem the first that ever accommodated *Chymistry* in an eminent manner to *Physick*; if it be true, as *Libavius* imagines; that *Abulchasis* did live in the time of *Muhauia* the *Saracen*, that settled their Empire at *Damascus* Anno Dom. 660. *Chymistry* then seems to have been regulated into an Art; He writ a Book of *Physick* called *Servitor*, which principally treats of *Medicines Chymically prepared*, and useth the terms of *reverberation*, *calcination*, *coagulation*, *distillation per ascensum & descensum*: and many such like expressions, together with *Processes* purely *Chymical*. It was then that *Alchymie* was called *Perfectum Magisterium*; and that which we call *Oyle of Bricks*, did bear the name of *Oleum Sapientia & Perfecti Magisterii*.

Libav in em.
am. sent. Paris.

So *Avicenna* speaks not only of *Rose-water* distilled: but of *Mercury* and *Arsenick* sublimed: after him *Joannes Mesues* shews how to make several *Chymical Oyls*, as of *Amber*, *Wheat*, *Oleum Philosophorum*, &c. Neither is it to be doubted, but that there were an infinite number of *Chymical Processes* latent in the hands of particular *Artists*, since *Joannes Mesues* refers us unto them, viz. *de quibus loquuntur, qui quæ sunt occulta in rebus manifestant & detegunt. Hos quoque aggredere rei hujus cupidus tam famosa apud illos.* After that the *Western Christians* were civilized and instructed in the *Sciences* by the *Moors* inhabiting *Spain*, and that *Physick* superstructed upon the principles of *Galen*, *Avicenna*, and *Averroes*, was derived unto them, those *Sectators* of the ancient *Philosophy* improved *Chymical Pharmacy* very much.

Conring. ubi
supra. p. 374.

Vid. Conring.
ubi supra.

Reade Liba-
vius more sul-
ly upon this
subject in Ex-
am. censur.
Parisens.

Nor

Conring. ubi
supra, c. 27. p.
379. 380, &c.

Conring. ibid.
c. 28. p. 387.
Erastus de
metall. p. 34.

nor were *Albertus Magnus*, *Aponensis*, *Gentilis de Fulgineo*, *Arnoldus de villa nova*, *Raymundus Lullius*, or *Joannes de Rupe-scissa*, or *Isaacus Hollandus*, or *Basilus Valentinus*, or *Antonius Guainerius*, or *Michael Savonarola*, or *Montagnana*, or *Hieronymus Schallerus*, and *Magenbuchius* (Chymical Physicians at *Norimbergh* before *Paracelsus*) or *Guilielmus Varigana*, or *Antonius Fumanellus*, or *Wolfgangus Talhenferus*, or *Hieronymus Brunsvigus* (the first that writ of Chymistry in the German tongue) any other then Pretenders to the ancient Physick and Philosophy. There was no faction betwixt the Physicians in those days; nor did they undervalue or decry each other; They rather represented themselves to be Adherents and Sectators of *Aristotle*, then his Enemies; and chose rather to sophisticate his fourth book of *Meteors*, to shew that great Man knew all things, then condemn all his other works, as if he knew nothing. Nor were they only followers of the *PERIPATETICKS*, but I finde the Chymists that did precede *Paracelsus* to be accounted Hippocratical Physicians: witness this passage in *Caspar Bravo*, who inquired more into them then I have had leisure to doc.

Caspar Bravo Resolut. Medic. part. 1. disp. 1. sect. 1. resol. 3. sect. 2.

With him agrees *Libavius* in the fore-cited Treatise.

Resolvendum, artem *Spagiricam* veterum *Spagiricorum*, quam *Avicenna*, *Geberus*, *Rhasus*, *Arnoldus de villa nova*, *Raymundus Lullius*, *Blemmydas*, *Braceseus*, *Virceanus*, *Joannes Augustinus*, *Panterus*, *Isaachus Monachus*, *Morienus*, *Zosymus*, & alii *Hippocratis* Sectatores professi sunt diversam esse a Secta *Paracelsistica*. With this agrees that passage of *Conringius* de Med. Herm. c. 28. Certe ante *Paracelsum* haud est observare in *Chemicorum* scriptis singularem aliquam sive *Hermeticam*, sive *Chemicam* Medicinam. Observata autem est plerumque medendi illa via quam *Hippocrates*, *Galenus*, horumque Sectatores cum Gracis tum Arabes, interq; eos *Avicenna* calcaverant: quod unum *Arnoldum Villanovanum* legenti non potest non Sole videri clarius. So *Prinxrose* de vulg. Error. l. 4. c. 1.

c. 1. *Hac medicamenta præparandi ratio non a Paracelso inventa est: sed multis ante Paracelsum natum seculis exculta fuit ab iis etiam Medicis qui Galeni doctrinam sectabantur, ut Raym. Lullio, Villanovano, &c.*

But when Paracelsus was seized with the same spirit that seems to sway some of the *Virtuosi*: then did he begin to decry the study of *Languages*, as loss of time; our *Wits* call it *Pedantry*. He vilified *Logick* as that which caused endless disputes, and darkened rather than discovered *Nature*: He calls it *matrem odii, rixarum & litium*; He prohibited the reading of other good and *Ancient Authors*. He seemed to be of no *Religion*; and if for any, it was to be without *Metaphysics*, without the mixture of *Glosses* and *Interpretations*, *Solum textum Scriptura legendum, interpretationem nullam adhibendam*. He calls upon all *Universities* and *Countries* to resort unto him, to follow him and his new discoveries, his real *Philosophy*, his *Essential Anatomies*, all other performances being but empty and verbose.

Because I observe som resemblance betwixt the invitations of Mr. Sprat and his, I will set one of his passages down in the Preface of his *Paragranum*, viz. *Me sequimini; Non ego vos sequar. Me, me, inquam, sequimini, Avicenna, Galen, Rhases, Montagnana, Mesue. Me sequimini; non ego vos sequar, Parisienses, Monpelienses, Suevi, Misnici, Colonienses, Viennenses, qui Danubium & Rhenum accolitis. Vos item Insula marina, Italia, Dalmatia, Athenæ, Græci, Arabes, Israelitæ, me sequimini, non ego vos sequar. Mea enim Monarchia*. Hereby any one may see that He was as conceited of himself, and as great a contemner of all ancient Learning, and of Aristotle, and Galen, &c. as some of the *Virtuosi*: and as ignorant of Latin and other tongues; and as false and imperfect in his relations; as variable in his hypotheses, as if he held nothing but with the power of revoking it, which is a great qualification of a modern *Philosopher*. He was not for the particular methods in vogue, but for a general Enquiry into the Experiments of old Women, Mountebanks, Hangmen, Husbandmen, &c. He could make use of the writings and inventions of others, concealing their names, and boasting them for new and his own,

H

Sed in primo de pestilente tractatu primo, ubi de Chelidonia contra imaginationes Magicas amuleto disserit, adeo non rejicit Galeni & Hippocratis decreta, ut etiam amplius videri velit Galeni ius, quam omnium scholæ professorum publici. Libavius ubi as supra.

as becomes a modish Experimentator. To evince this last assertion, I shall set down some passages of *Crato*, and others, to shew that the disputing *Ages* were not so ignorant of *Chymistry* as *Mr. Glanvill* pretends. *Crato* in a Letter to *Erasius* writes thus; *Remedia quibus aliquando usus esse dicitur, non illius esse ex eo certus sum, quod librum vidi ante ducentos fere annos a Monacho quodam Ulma scriptum, in quo eadem medicamenta, quæ ille frustillatim, nunc in has nunc in illas chartas sparsit, perspicue sunt scripta.*—And elsewhere, *Fuit in bibliotheca viri optimi & integerrimi Marci Singmoseri Sacratissimi Imp. Consilii a Secretis primi, liber ante ducentos annos a Monacho quodam exaratus. Eo multis mensibus usus sum, & omnia quæ isti (Paracelsici) tanquam in Eleusiniis sacris mussitant, tam evidenter tradita, ut neminem fallere possent animadverti.* He himself confesseth who were his teachers in *Chimistry*, and that he was far from being the first *Inventour* of it. "*Theophrastus Paracelsus natus anno Christi 1493. mortuus 1541. Hic non erubuit confiteri se remedia in Chymicis accepisse, & his ipsis Scientiam Artis Chymicæ debere. Antiqui Philosophi (ait in 2. parte Chirurgia mag. tractat. 3. c. 1.) studiosi indagandarum longæ vitæ causarum (recitamus breviter sententiam) destituti vero perfectæ præparandorum componendorumque medicamentorum scientia ab Alchymistis eam petere non sunt veriti, atque sic utronemque laboribus conjunctis genuina præparandorum remedium Scientia exorta, & variis Chemicis experimentis in medicinam transfusus est aucta, maxime vero tincturis & floribus metallicis, quarum tincturarum quanta fuerit efficacia, antiqui ea de re Codices testantur, quos diu a Pseudomedicorum turba suppressos, nos publicos facere non dubitavimus. Remedia nostra ex Chymicorum Schola prodiisse non dubito fateri: & quoniam Chymica ars infinitis erroribus scatere visa est, illud quoque Augia stabulum repurgandi laborem sumpsimus: in quo felicius mihi versari licuit, quod ob ineunte ætate magna Artis studio captus summa diligentia sub excellentissimis præceptoribus Arti huic studuerim. Præceptores enim fuerunt Wilhelmus Hohenheimius Pater, & alii infiniti: præter hos quoque scriptis adjutus sum Setthagii Episcopi,*

Erasius part.
4. p. 300.

Plafad Ex-
ercit. Scali-
ger.

Hartman &
Crollius pub-
lished no new
medicines.

Cæterum neq;
Crollium neq;
me aiquid
novi protulisse
libenter fateremur, neq; ea
unquam viri-
usq; nostrum
mens fuit.

Hartman, in
not. ad *Croll.*
p. 138.

Libavius ubi
sup. 12.

“*piscopi, Erhardi Laventalii, Nicolai Hipponensis Episcopi,*
 “*Matthaei Schechtii Suffraganei Treisingensis, Abbatis Span-*
 “*heimii, aliorumque doctissimorum Chemicarum: Quin & va-*
 “*riis eorum experimentis factus sum locupletior, inter quos ho-*
 “*noris causa nominandus mihi venit nobilissimus vir Sigismun-*
 “*dus Fueger Schwathensis, qui magnis sumptibus pluribus mi-*
 “*nistris sustentatis Chemicam accessione locupletavit. Hæc ibi*
 “*Paracelsus. Neque vero falsa scribere est putandus,*
 “*quandoquidem seculum istum & exercitiis Chymicis &*
 “*voluminibus scatuit, cum jam plures tractatus typis*
 “*publicis sint impressi, nihilominus cernimus, subinde ex*
 “*tenebris prodire plures, ita ut ne Thesauri quidem multi*
 “*videantur sufficere cupiendis, nec Theatra.*

His followers confess, that he borrowed much out of *Basilii Valentini*, and more out of *Isaacus Hollandus*, as *Penottus* declares, *Cum incidissem in Isaaci librum de opere vegetabili, reperi de verbo ad verbum doctrinam de tribus principiis, & de separatione quatuor Elementorum ab eo desumptam, Unde constat illum præcipua sua Opera suffuratum fuisse, atque hinc inde expiscatum: ut de gradationibus medicinarum ab Arnoldo, Archidoxa a Raymundo Lullio ex sua Arte operativa: de Arcanis a Rupefcissa; nihil prorsus a seipso præter convitia: & maledicta: a Trithemio varia.*—The same is confessed by *Quercetan* somewhere as I remember, and he himself intimates it by adding to many preparations the words, *Ex nostra correctione, ex mea emendatione.* Out of all which it is evident, that neither the *Grecians*, nor the *disputing Ages* were so ignorant of *Chymistry*, as *Mr. Glanvill* asserts; as it is certain that the *Arabians* as well as the *Grecians* were *disputers* and followers of *Aristotle* and *Galen*, and that particularly *Albertus Magnus* and *Roger Bacon* were *Schoolmen*. Nor can any man doubt the same of those other *Bishops* and *Monks*, who knows with what perfect *Veneration*, in those days *Aristotle* was regarded. How useful and how *luciferous* their *Processes* were, it is not for *Mr. Glanvill* to judge, who is ignorant of them: but any one will allow them, both the one and the other, *recommmendation*, who considers that their *Chymical Processes* which passed amongst them gave occa-

De dezar. me-
dic.

Vide Con-
ring. de med.
Hem. c. 24.
p. 252, 253.

fion to all, and make a great part of the improvements in Chymistry, in Dioptricks and other Subjects, wherein our Virtuosi pride themselves. Particularly as to Chymistry, it is as clear that the disputing Ages and followers of Aristotle were acquainted with it, and eminent for it, as that there were Monks and Schoolmen. Those men whom Mr. Glanvill so explodes, and with whom the Historian disports himself, had of late years before Paracelsus, in a manner, solely the knowledge of this Art by which Nature is unwound, &c. This Sennertus granteth. *Proximis seculis fere inter Monachos latuit Chymia, quorum non pauci illud, quo abundabant, otium post sacras meditationes & orationes, arti huic prestantissima honeste tribuerunt: inter quos fuerunt Raymundus Lullius, Albertus Magnus, Joannes de Rupe scissa, Savanarola, Morienus, Rogerius, Trithemius, & Frater Basilius Valentinus: quorum scripta multa hoc seculo in lucem edita sunt, & multa adhuc manuscripta passim latent.* I hope there is no exception against Sennertus, how partial soever Erastus or Crato may seem. And to affront our Virtuoso a little more, it was a follower of Aristotle, and those Disputers, a pitiful School-Divine that discovered the making of Gun-Powder, which single invention out-does all that our Collegiates boast of. In the year 1354. Bertholdus Schwarz a Benedictine Monk discovered it, and I dare warrant him in those days no enemy to the man of Stagyra, the Idol of disputers; A very ancient Manuscript gives him this Character. *Bertholdus Schwarz Goslarieus Monachus ordinis Sancti Benedicti, cum mire Chymicis delectaretur, atque eorum peritia jam magnam sibi nominis existimationem acquisisset, &c.* Any one may read the rest in Kirchers *Mundus subterraneus* l. 12. sect. 5. part. 4.

De Conf.
Chym. c. 3.

Vossius de
philosoph. c.
12. sect. 12.
Gessner in præf.
ad Euonym.
Vossius de
philos. c. 13.
Conring. de
med. Herm. c.
26. p. 371.

I shall relate some particular processes in Chymistry, which are mentioned by such as were not Arabians, but of a much more ancient date. In the time of Julianus and Valentinianus Emperours lived Aetius Amidenus; he and Nicolaus Myrepsus (who is indeed later then Mesue) do mention the distillation of Oyls per descensum, as Gesner shews; and Vossius together with Conringius avow —

Nicolaus

Nicolaus Myrepsus (or Præpositus) in quo illud miror nullam ab eo aquarum oleorumve Chymisticis instrumentis paratorum mentionem fieri. Capnistum tantum oleum, quod per descensum distilletur, describit, ut Aetius quoque. As to the ways of making Chymical Extracts, let any man judge whether the Grecians were ignorant of them, by these passages, as they are cited by Gunterus Billichius, viz. Chylismata extrahuntur aut exprimuntur. Extrahendi nec ars nova est, nec novus modus, quanquam Heurnio ita visum sit Method. ad praxin. lib. 1. & lib. 2. c. 25. Rationem ejus a Dioscoride accipe, verbis interpretis Ruellii lib. 3. c. de Gentiana. Contusa, inquit, radix quinque diebus aqua maceratur, postea in eadem tantisper decoquitur, dum extent radices, & ubi refrigit aqua, linteo excolatur: mox discoquitur, dum mellis crassitudo, fiat fictilique reconditur. Similia cap. 9. ejusdem libri de Centaurio minore habet.

Dabo tibi ipsissima Dioscoridis verba; Χυλίζεται ἢ ἢ πύα συλλεσμένη ἑκὶ μὲν ἑσά σπέρματι, καὶ ἀποβρεχόμενῃ ἡμέραις ἑ. εἴτα ἐφέται ἄλλοις ἢ ὑπὲρ ἑχοι τὸ ὕδωρ ἑπειτα τὸ τε ψυχρὸν, ὕλίζεται δι' ὀθονὶς θλασίσης ἢ πύας, καὶ πάλιν ἐφέται μέχρι μελιώδους συστάσεως. Nequid ad plenitudinem artificii deesset, subjungit; Quod siquid concretum faucibus vasis adhærescat, deradunt, reliquoque humori permiscent. Item hac; Quæ autem siccis radicibus aut herbis liquamenta exprimuntur, decocta (ut in Gentiana mentione retulimus) præparantur. Ita Lycium & Abscynthium, hypocistis, & consimilia coguntur. De Lycio vide cap. 135. lib. 1. de hypocistide libri ejusdem cap. 128. Chylismatis denique absynthini, cap. 26. meminit. Nec aliter Extractum Melampodii clarissimus Raymundus Mindeferus concinnavit, quod in Pharmacopœia Augustana inter Ecchylismata Cathortica locum non postremum reperit. Ut liqueat, extrahendi artificium, dignum omnino fuisse, quod & erudita antiquitas inveniret, & non degener posteritas imitaretur. Nec quicquam Chymia novi, præter liquorem attulit.

Observat &
paradox.
chym. l. 1. c. 2.
p. 2.

Dioscorides
lived in the
days of Cleo-
patta and
Marc. Anton.
whose Physi-
cian he was, a
foe lower of
Herophilus,
and conse-
quently of
Hippocrates
and Aristotle.
Vide Voss de
philos. c. 11.
l. 2. 40. &
Jansium de
script. hist. &
p. 1. l. 2. c. 6.
p. 145.

Concerning fixed and Alcalifate Salts, the Chymists and Chymical Physicians make a great noise: and undoubtedly the Invention is very extraordinary, and their use very singular in Medicine. Yet both

See the antiquity of the use of Alcalifate and other Salts by the Ancients, largely proved by M. Rulandus progymn. alchym. qu. 14, 15.

Vide Galen, de Theriaca sub finem, & Pharmacop. Augustan. in append. ad antidot. class. de Salib. Theriacal.

G. Bellichius observat. & paradox. chym. l. 1. c. 2. p. 30. & in Thessalo chymicum. c. 7. p. 90.

the preparation and the use of them is set down by Dioscorides, Galen, and Aetius, in their discourses about Theriacal Salts; Though latter days have reformed the preparation, as Galen

endeavoured to do that which he found in use in his time. Besides, I observe out of Gunterus Bellichius, that Aristotle was not ignorant of it. Aristoteles auctor est, Umbros cinerem harundinis & junci decoquere aqua solitos, donec exiguum superesset humoris: qui ubi refrixisset, salis copiam fecerit, lib. 2. meteor. cap. 3. Hoc se apud Theophrastum invenire Plinius testatur, lib. 31. cap. 7. Idemque non harundinei tantum juncique salis meminit, sed colurni insuper, & querni. Amborum auctoritate (nam de Theophrasto nihil mihi constat) Chymicorum castigabitur temeritas, quæ suis inventis salem cineritum annu-merare ausa est.

G. Bellichius
obliv. chym.
l. 1. c. 5. p. 49.

G. Bellichius
ib. l. 2. c. 1. p.
119.

The preparation of Salt-peter with Sulphur, in order to the making of what the Chymical Physicians call Sal prunella, was known to Hippocrates, and others of the ancients, and they used it in Squinosses in Gargarismes for the tongue and throat. Desinant in posterum Chymici de lapide Prunellæ magnifice gloriari. Nam & apud Hippocratem τὸ νίτρον ὀπλὸν quater invenimus. Semel quidem in tertio de morbis: bis in de internis affectionibus: denique semel in lib. de morb. mulier. Ac ne dubites erudite antiquitati cognitum cum lapidem fuisse, Plinius auctor est, nitrum frequenter liquatum cum Sulphure coqui in carbonibus, sulphuri concoctum in lapidem verti. Hac recognosce ex lib. 31. cap. 10. And the same Author saith elsewhere, Præ aliis omnibus inclaruit νίτρον ὀπλὸν Hippocratis seu lapis Plinii nitrarius, dictus a barbarorum pruna seu angina, cui singulariter mederi perhibetur. Nec nova est quæcunque ea laus. Nam & Hippocrates abstergendæ Salivæ & muco, ac facilitandæ excreationi nitrum anginosi obtulit, inditque

ditque collationibus Oris. Lib. 2. de morbis, sect. 49.

Neither is the way of subliming Flowers of Benzoin, any thing else then the imitation of that way which the Ancients had of condensing Soor. So Bellichius informs me, Fuligo, definiente Scaligero, cujusque rei pinguis crematilis pars est, ac demum aliarum rerum fumus condensatus, Exerc. 56. Modus conficienda ejus, siquid artificii subest, apud Dioscoriden extat, lib. 1. c. 85, 86, 94, 97. imitatio apud Beguinum, quando Benzoinum desloravit, l. 2. c. 18.

Id ib. l. 1. c. 1.

p. 31.

It may perhaps be granted by most intelligent persons, that the making of Extracts, and fixed Salts, and such instances of Vegetables being prepared as I have given, and the glory of those inventions cannot justly be denied unto those disputing Ages; but that the preparation of Minerals, and the medicinal use of them inwardly, is a discovery the ancient times were not acquainted with. And this is the judgment of many learned men. But in refutation of it, seeing that the inward use of Antimony, as it is several ways prepared, refers to Basilus Valentinus, and before his days; since that, sundry preparations of Mercury are more ancient then the humour of Novellism; since Paracelsus, Hartman, Crollius did but publish the processes of Aristoteleans, Avicennists, and such like Monks and Physicians; all that our Virtuoso can derive from this Plea is, that the Arabians, adherents to the old Philosophy and their followers, did improve the extent of Chymistry, and added thereunto as they did in the other practice of Physick, the use of Rhubarb, Cassia, Manna, Tamarinds, and other benign medicines: and this demonstrates that Philosophy and those notions not to be so sterill, as they are represented in comparison of the Fecundity of the Cartesian Principles, from whence Physick hath received little (if any) benefit or advantage. But to raise this Enquiry beyond the times of the Saracen Empire, it is manifest out of Pliny, that mineral-waters were drunk in those ancient times: and that the Stomoma or rust of iron, as also that drinks in which Iron was quenched, was given in the time of Dioscorides and Galen. That Brimstone was given inwardly by Hippocrates to asthmatick persons. That the Squama

Disc. l. 5. c.

53.

Galen. l. 1. de

art. supor. l. c. 17.

Hippocr. de
vict. in morb.
acut.

Vide Doring.
de medicina,
p. 217. Ru-
land. pro-
gymn. qu. 20.
Brassavol. de
med. purg. p.
177. Riverius.
Pharmacop.
Spagir. l. 2. c.
6.

Doring. de
medic. &
med. p. 119.
Vide & Ru-
land. pro-
gymn. Alch
qu. 20.

æris was given inwardly, as a *purge* and *vomit* by *Hippocrates*, *Galen*, *Dioscorides* and *Celsus*: and the Experiment happily tried by *Brassavolus*, that great *Experimentator* again of later years. So the giving of *Sandaracha*, or *Orpiment* inwardly for old coughs; and the *suffiment* made out of it, are recorded by *Dioscorides*: the *trochises* of it recommended anew by *Mesue*, and the more modern trials in *Riverius*. Even *Chalcitis* is an ingredient in the ancient *Treacle* of *Andromachus*. I shall conclude all with the passage of *Doringius* in the place already cited, *Præter Sandarachum Isidorus, Athenæus, Idius, Eubulus, Heras, Gemellus, Agathius, Nicostriatus, Menander, Thanyros, Deletius Epagathus, Asclepiades, & alii: Alumen scissum, Auripigmentum, Æris squamam, Æs ustum, Calcem vivam, Sulphur vivum, facies unde ustas, Cadmiam, Cerussam, Gypsum, Stibium sive Antimonium in pastillos redacta dysentericis præscripserunt: quorum præparandi rationem & utendi modum vide apud Galenum lib. 9. de compos. med. sec. loc. c. 5.* Out of which passages any Reader will guels what President later Authors had out of the more remote *Ancients* for the giving *minerals* inwardly; and if we are just to the *Arabians* and their followers, we shall scarcely allow them any further honour, then to have found out some new ways to serve up old dishes.

I shall adde, that in *Egypt*, at such time as the repute of the *Egyptian Priests*, and their phantastical *Philosophy* had given way to the followers of *Hippocrates, Aristotle, Herophilus*, and others, that introduced the *Grecian Learning* there, that is, in, and somewhat before the days of *Dioclesian*, the *Egyptians* were *Masters* of that Secret of making *Gold*, which our inquisitive *Moderns* have so vainly sought after. Before that Age there is no mention of it, and then it is said they had such knowledge of the Art of making *Gold*, that thereby they were enriched and impowered to make War upon the *Romans*; and being overcome by the Emperor *Dioclesian*, he burned all the books which they had, containing the *Mysteries* of that Art, to prevent any future commotions of that Nature. So *Suidas* in the word *Χημεία*, ἡ τῶ χρυσοῦ καὶ ἀργύρου καὶ ἄλλων μετασκευῶν, ἥτις τὰ βιβλία διερέυνησα.

ησαμην. ὁ Διοκλήσιανος, ἔκαυσε διὰ τὰ νεώτερά ἐν τῇ Ἀι-
 γυπτίῳ. And in the word Διοκλήσιανος he says, ὁ δὲ
 δὴ καὶ τὰ περὶ χημείας χρυσῷ καὶ ἀργύρῳ τοῖς παλαιοῖς
 γεγραμμένα βιβλία διερευνησάμην. ἔκαυσε πρὸς τὸ μηκέτι
 πλεόντων Αἰγυπτίῳ ἐκ τῆς τοιαύτης προσγίνεσθαι τέχνης, μηδὲ
 χρημάτων αὐτὸς διαρρύντας. περιεσία τῶ λοιπῷ Ῥωμαίοις ἀν-
 τίσταται. The renown of this Story is not questioned by the
 Chymists, and I finde the learned *Joannes Langius* to give cre-
 dit unto it, quoting for the truth of it in his margin, be-
 sides *Suidas*; *Orosius* l. 7. c. 16. And *Paulus Diaconus* in the
 life of *Diocletian*: Neither doth *Libanius* or *Rolfincius*
 elevate the authority thereof, though he mention the pas-
 sage of *Suidas*. And to give a further colour unto this re-
 lation, I am informed that *Aeneas Gazæus*, who lived in
 the latter end of the fifth Century, when *Zeno* and *Anasta-
 sius* were Emperours, treating of the Resurrection, hath
 this passage, Παρ' ἡμῖν οἱ περὶ τῆς ὕλης σοφοὶ ἀρδύον καὶ κατ' ἰστέον
 παραλαμβάνουσιν τὸ αἶδιον ἀφανισάντες ἐπὶ τὸ σμερότερον μέτα-
 λαβόντες τῆς ὕλης χρυσὸν κάλλιστον ἐποίησαν. But these Nar-
 rations are rejected by such as deny that other metalls may
 be transmuted into Gold: It is replied by *Erastus*, that either
 those Egyptian books contained nothing but the Art of melt-
 ing down of metalls, and separating the latent Gold there-
 from: or that *Suidas* being a late writer, living but 500
 years ago, about 800 years or more after *Diocletian*, might
 have been imposed upon by the Chymists of those times (in
 Greece, and during the disputing Ages! mark that Mr. *Glan-
 vill*) who even then might have feigned some such stories as
 that (and the Allegorising of the Golden Fleece) just as they
 have within the last Centuries counterfeited the Works of
Moses and *Solomon*, and entitle them unto their Fictions.
 There are an infinity of stories in *Suidas*, which render his
 Assertions suspected: and in this he hath not the counte-
 nance of any ancient Writer to second him. It seems strange,
 that the Romans having so long ruled in Egypt absolutely,
 and their Governours, they not being to be supposed free from
 all desires of gain, how they should never apprehend the Ar-
 tifice, nor have the least mention of it in their Writers

Joan. Langie
Ep. med. l. 1.
ep. 3. de O-
rig. Alchym.
But Oros. and
Paulus Diacono-
mus were cre-
dulous Wri-
ters, and of
little repute.
Libanius in
exam. centur.
Parisiens.
Rolfincius
chym. Art. no.
redact l. 1. c.
10 & Con-
ring. de med.
Herm. c. 3. p.
21.
Erastus de
metallis, p.
103.

Conring de
med. Herm.
c. 3 p. 23.

Id. ib. p. 22.

De plant. re-
suscit. vide
Bellieb. Thef.
sal. red. v. c. 7.
Rolfinc. art.
chym. l. 6. c. 3.
& l. 7. c. 19.

(Greek or Latine) till the end of the fourth Century: and that so remarkable a passage as this should be omitted by those ancient Writers, who relate both the war and actions of Diocletian after his victory. As for that saying of *Æneas Gazæus*, it is replied that he speaks by *hear-say*, rather than certain knowledge of the operation: that there have not wanted many learned persons, who have with a great deal of confidence, illustrated the Resurrection by contemplations of the *Phoenix*, and of the forms of Plants resuscitated in their several Salts, as if both were realities: yet is there no such thing as either the one or the other.

Out of all which it is evident that Chymistry was a practice known and in use among the Sectators of Aristotle: and that the Grecian and disputing Ages were not unacquainted with those Processes, though these latter times have been more various and inquisitive, and have reduced that Art into better Method, and enlarged the Practice of Physick, with an infinity of Medicines: and indeed we must confess our selves very much obliged by the labours of ingenious Chymists, and that they have afforded multitudes of Experiments, such as contribute to the delight of all Philosophical heads, and to the Cure of many that being sick, have either better opinion of Chymical Medicines than of others, or are pleased with their small, and commonly more pleasant dose.

See this largely
disputed by
Libavius in
exam. censur.
Parisienf.

Vide Kerger.
de fermentat.
sect. 1. c. 3. p.
10. & Rolfinc.
chym. in ar.
red. l. 1. c. 19.
Conring. de
med. Hermet.
c. 22.

But that those parts into which Chymists reduce things, are latent in the compound body, otherwise then by the Aristotelean distinction of *formaliter* and *materialiter* (so much laughed at by Mr. Glanvill, pag. 119.) This is an Assertion which doth not become any man that pretends to have read Mr. Boyle in his *Sceptical Chymist*, where that Point is too amply debated to be here transcribed, or ever (I think) refuted. Having denied Mr. Glanvill, that by those useful and luciferous processes, Nature is unwound and resolved into the minute Rudiments of its composition. Which Rudiments were not made use of at the first Creation, when one Fiat created those compound bodies, which Artful Fires sometimes (and but sometimes) analyse into several parts, as Salts, Oyle, or Sulphur and Spirit, and those grosser Elements of Earth and

and water. All which are not found in many bodies, (and when they are, it is with a great discrepancy betwixt those of one Concrete, and those of another) nor any of them to be separated from Gold. Which *Libavius*, no, nor *Dr. Willis* doth not make to be the last unmixt, and simple Constituents of natural bodies, sed ejusmodi tantum substantias, in quas veluti partes ultimo sensibiles res Physicæ resolvuntur: Substances into which natural bodies are resolved finally as far as sense can judge, and when the *Analysis* is prosecuted in one sort of procedure: for another method, different Solvents, and different Fires discover different parts, and those sensible too from what the usual *Chymistry* builds upon. Having denied him this, I must further tell him, that when the Countrywoman sets her Eggs to be hatched, she produceth by those means such bodies as no *Chymical* fires with their vexatious *Analysis* ever would discover: so she doth when she doth brew and churms her butter. Nor is this more evident, then it is clear that the *Chymical* principles, when they come to be accommodated to the solving of the *Phænomena* in nature, or in diseases, have as much of darkness and dissatisfaction in them, as occurs in the *Peripatetick* way: so that now we are more dubious, not more knowing, then before: and this any man that hath considered how the *Chymical* Physicians disagree about the causes of diseases, and even about the common *Phænomena* of Nature, will easily grant me: nor will it appear less manifest, that if the *Chymical* hypotheses do take place, that it will subject the *Mechanick Philosophy*, and establish that of *Anaximander*, revived by the ingenious *Berigardus*.

But *Mr. Glanvill* adds, "That *Chymistry* directs Medicines less lothsom, and far more vigorous, and freeth the spirits and purer parts from the clogging and noxious appendices of grosser matter, which not only hinder and disable the operation, but leave hurtful dregs in the body behind them." — This Plea for the preferring *CHYMICAL* Medicines before those commonly called *Galenical*, is much insisted on by *Bequinius*, *Quercetanus*, and others of that way. Yet, first it is observable, that whether we regard taste or

De ferment.
c. 1. p. 4.

Phis ultra,
p. 11.

Freitag.
Noct. med. c.
75. p. 325.
See Mr. Boyle
of the usefulness
of Philos.
part 2 p. 148,
etc.

See this point
fully debated
in the Vulgar
Errors of
Primitiv. l. 4.
c. 2. which I
desire Mr.
Glanville to
read.
In Pharm.
accp. August.
De CC philo-
sophice calci-
nat. p. 805.

smell, those very Authors recommend as odious medicaments, and as loathsome, as ever Coerdus or Foesius in their Dispensatories, if not worse. Will any man in his Wits condemn Wormwood and Centory because of their bitter taste, or Castoreum for the smell? Secondly, every thing is not the better for being extracted. Thus the Extract of Rhubarb, though quickned with its Salt, is not so efficacious as plain Rhubarb, except it be sophisticated with Diagridium. Nor is Cinnamon improved by Extraction. Their being more vigorous and freed from grosser parts is not always a commendation, and sometimes it carries danger with it. That those grosser parts, and those natural vehicles are requisite, seems even thence clear, that their spirits & essences must be tempered and mixed often with other gross bodies before they be given. Those appendices of grosser matter are not always noxious to Nature, since in our meats we finde none to be able to live on Chymical viands, but good Kitchen-Preparations. How many ways are there of preparing Harts-horn, yet is there not one that equals the crude Horn. I shall set down Zwelfers words, whose credit no Chymist almost will extenuate. *Licet ex cornibus vel ossibus ita Philosophice calcinatis distillationi subjectis de spiritu sale volatili, & oleo ipsorum foetido nonnihil eliciatur, non tamen propterea existimandum ipsa adhuc iisdem quibus crudum cornu pollere viribus vel majoribus etiam (prout nonnulli sibi imaginantur & asserunt) vel etiam, ut alii arbitrantur, hac calcinatione nihil aliud peractum fuisse quam quod friabilia, ad pulverandum aptiora, & magis pura reddita sunt: Neutiquam, Quippe, qui ambo cornua, tam crudum quam Philosophice calcinatum, examini ignis subjiciet, reipsa deprehendet multum de nativa sua humiditate, de sale volatili & oleo huic cornu Philosophice calcinato detractum esse, & eorundem vix parte quarta adhuc gaudere, ut propterea & hanc calcinationem Phi-*

In prosecution of this point let any man consider, that Chymical oyle of Anniseeds is not so effectual as the powder. Heurn. meth. adv. l. 1. c. 5. Nor doth the like oyle of Camomile equal the infusion, as Simon Pauls Cl. quadri p. 255. practically observed. So the common Pillure de succino and Franckfort-pills transcend the minute doses of divers and the most famed Pa-

losophicam, licet totali exustione aliquanto meliorem, approbare nequeam: e contra vero ipsum crudum cervi cornu subtiliter & minutim raspatum pluris asstimem, quod tamen diversimode parari,

parari, inque virtutibus suis ex- chymagoga. This is an observation so common with
altari potest. Ut vel in substantia, all practitioners, that none but Mountebanks and
forma nimirum pulveris, vel Quacks can deny it. Crato, Steeghius, Hofman, and
 others, generally taking notice of it.

in aqua decoctum & in mucilaginem vel gelatinam conversam
tuto & sine nausea propinari possit. Nor is this more

true in Harts-horn than in Vipers, which are more effectual
 being eaten as *Eeles*, or by a common infusion in wine, or gi-

ven in powder (plain powder) than when reduced to volatile
 Salt and Essences. It is also false, that Chymical preparati-

on always amends, or doth not render some things worse:

The ingredients of sublimated Mercury are not poison; the
 result is. How much is the nature of Antimony and Mer-

cury altered by preparing, so that a few grains prove mortal

to the taker, who might without prejudice devour great quan-

tities of either of them unprepared, *Hydrargyrum, Antimonium*

crudum larga sapius porriguntur: The infusion of crude An-

timony, (a pound in four Gallons of Ale) often rectifies all

impurities of the blood, as well any viper-wine: and Mer-

cury, which being crude is not only given in Pills by sundry

Physicians, but drunk without any hurt in greater or lesser

quantities in several cases. *Non desunt qui Mercurium cru-*

dum in dolioli fundo detinent, ferunt vinum ne arescat, aut va-

porem contrahat, aut pendulum fiat, ea ratione fieri. Nos tale

vinum ad ventris lumbricos plurimum valere certo scimus.

As for the hurtful dregs which the Galenical Medicaments

are said to leave behind: I am confident, that whosoever

shall enquire into the ill consequences of the two Pharma-

ceutics, will say, that if the Galenical be not always the most

efficacious, it is always the most safe and innocent: and any

man will be more apt to dread the violent impressions which

the powerful spirits and minerals may make upon the mem-

branes of the Stomach (which may introduce an irremediable

distemper in the *torenius* of that part, whereupon depends the

nutriment, health, and vigour of the whole body) then any

noxious faces or little and remediable hurt from the genera-

lity of the Galenical Medicaments. *Qui Deum credit male-*

factorum vindicem ultoremque, is a noxiis medicamentis, cum

ad manum sunt alia, diligenter abstinebit: ne quando homicidii,

M. Ruland.
 pro gym.
 Alchym. qu.
 33.

Poterius
 Pharmacop.
 Spagir. l. 1. p.
 352. This ex-
 periment is
 not down in
 the two Trea-
 tises of the Vi-
 tuals about the
 sophistication
 of wines: but
 in short, those
 pieces (as
 much as they
 are famed be-
 fore they
 came out)
 have been
 laughed at by
 all knowing
 persons and
 Wine-coop-
 ers.

Conring. de
med. Herm.
c. 21. p. 279.
Paludan.
epist. ad H.
Smet. Ea ha-
betur in Bar-
tholini cista
med. in vita
Severini. p.
127.

accusante conscientia, reus fiat, parum profuerit novendecim cu-
rasse periculoso curationis genere, quo vigesimus, aut trigesimus
sit necatus. Erastus disp. de propr. medic. c. 65. And there
is this to be said in Justification of that Course—that those
who have most decried it, and raised their repute upon a dis-
ferent way, yet have practised with it. In ipsius Paracelsi scri-
ptis passim laudantur remedia morborum vulgari modo & com-
posita & preparata. Etiam Petrus Severinus teste Paludano,
Medicamentis Paracelsicis non semper usus est, verum & com-
positionibus Galenicis saepe. Nor are Paracelsus & Petrus
Severinus Danus singular in this action: it is the common
usage of Quercetan, Crollius, and Hartman; not to mention
Dr. Willis: I shall adde, that Chymical medicines have ne-
ver or very seldom answered their expectation, which men
raise of them: and whosoever shall inquire into the credit

Vide Conring. de med. Herm. c. 25 p. 358. &c. de
Paracelsi, de Phedrone, & Phaimacis Paracelsicis vi-
de Bernardum Dissenniam Croneburgium in def. med.
veter. c. 40, 41. &c. & de Petro Severino Dano. Vide
epistolam Paludani, ubi supra. De Scheunemanno vi-
de Rolfinc. chym. l. 1. c. 18. p. 51.

which Paracelsus, Petrus Seve-
rinus, Phedro, or Scheuneman-
nus, or Helmont gained by these
refined Medicaments, he shall
observe that either they are in-
famous for their destructive

courses of Physick, or at best atchieved nothing beyond o-
ther Mortals, except by Chance. In fine, though I have seen
very good success of many Chymical Medicines; yet dare I
not express so great an admiration for them as Mr. Glanvill
declares: and if he in all the number of his Philosophick
friends, had but one understanding Physician, or two, they
would tell him, That there are some diseases in themselves,
or by accident incurable; that men will die under the most
able Physicians, and that the most best and innocent Physick

will sometimes have effects dis-
ferent from the wishes and hopes
of the Doctor: and he would
finde that by ordinary medica-
ments not purged from their
dregs, nor exalted into spirits
and essences, as great Cures are
done by Countrey-Physicians and

Nec Paracelsi sectatores proba, qui medicina dog-
matica explosa & relicta, Alixir vita, quintae essentiae,
Axungiam Solis & Lunae, &c. & alia perniciose &
deteriora pharmaca in parva dosi, magno cum super-
cilio exhibere solent, agrorum palato consulere vo-
lentes: cum hoc titulo tenus saltem medicamenta
sint, ipsorum quidem opinione singularia, revera au-
tem mortis fereula & pocula, quibus plerumque cor-
pus humanum vehementer exagitur, & magna cum
jactatione satigatur, & ita debilitatur, ut aut rare
aut nunquam amplius, pristina vires recuperet. Ga-
belchover. Cent. 6. hist. 7. in annot. p. 24.

Con-

Countrey-Gentlemen oftentimes, as any ever were wrought by *Chymistry*. The *Physick* which is celebrated in the *Scripture*, that which *St. Luke*, *St. James*, *Cosmas* and *Damianus*, *Joannes Damascenus*, and others followed, was that which our *Divine* scruples, at least it leaves dregs in the body.

I confess that among the *Egyptians*, and *Arabians*, and *Paracelsians*, and some other *Moderns*, *Chymistry* was very fantastick, unintelligible and delusive; and the boasts, vanity, and canting of those *Spagyrist*s brought a scandal upon the *Art*, and exposed it to suspicion and contempt: but what the *Society* have done in order to its improvement, I understand not so well as *Mr. Glanvill* seems to do: the *Treatise* of *Dr. Willis* about *Fermentation* was writ before he was of that number: and I know not how he hath improved *Chymistry* much since. And in that famed *Piece*, all is not to be reckoned upon as invented (much

less is improved) that is written.

Those that have improved it most, and made it intelligible, are *Beguinus*, *Crollius*, *Quercetan*, *Hartman*, *Angelus Sala*, *Schroder*, *Zwelfer*, *Sennertus*, *Glauber*, and others, that never

conversed with the *Society*, whose *Improvements* are not mentioned by *Mr. Glanvill*, though so great, that (considering what men now write or do, is but by their *Example*, and after they had removed away all difficulties) all that our *Inventors* have done, doth not deserve to be mentioned.

I shall adde, that we owe not only the invention, and rude improvement of *Chymistry* to the *Disputative* followers of *Hippocrates*, *Aristotle*, *Galen*, those superstitious *Powers* upon the *Writings* of the *Ancients*, those ridiculous *Schoolmen*, and *Monks*, and *Physicians*, but even the present credit and esteem which it hath in the world, and upon which it hath so farre advanced it self. It was not *Paracelsus* with all his noise and Insolence, but the *Dogmatical Physicians*, who observing the benefit thereof in *Pharmacy* gave it fame, and introduced

His notion of Fermentation, as thereby he expresseth the natural and praternatural occurrences in our bodies, is taken from Bellich. de fermentat sect. 8. His notion of the fire in the heart is very near related to the doctrine of Conringius de calido innato; and the comparison of the blood with wine is derived from Carolus Pilo: so that those things (which are the principal in his book) seem rather illustrated excellently well, then new discoveries and Hypotheses.

Crato medi-
in. cp. 37.
Erast. adv.
Paracels.
art. 4. p. 285.
de metall.
p. 8.

Sennert de
chymia.
c. 2.

roduced it into the *Shops*, and *Cabinets* of *Princes*, and the use of *serious* and *considerate* Persons. *Crato* introduced it into the *Emperours Court* at *Vienna*: not a *Chymical Oyle*, or *Extract* was prepared there, till he gave *Encouragement* to the thing. So did *Erastus*, a greater enemy to *Paracelsus* than to *Chymical Physick*: as appears by that saying which he uttered in the midst of his *Disputes* and animosities against the *Paracelsians*. *Equidem ne absoluta est Ars nostra sine distillatoria*. And had not *Langius*, *Audernacus*, *Gesnerus*, *Fernelius*, *Zwingerus*, *Schegkius*, *Augenius*, *Minadous*, *Matthiolus*, *Libavius*, and many other *Physicians* of the *Hippocratical* way introduced the *sober* and *honest practice* of it, and rendered it *helpful* to *common life*, perhaps our *Virtuosi* had never medled with it, at least not have been able to give it any esteem in the world. But now that the *Galenists* and *Aristoteleans*, (as they are commonly called) have refined it from its dross, and cast off the *Chrysopoietick* and *delusory designs*, and *magical intermixtures*, and *Rosicrucian vapours* and *superstitions*, all which they effected; and gave *Mr. Glanvill* the opportunity of this *Cant*, with which I conclude this discourse.

Mr. Glanvill,
p. 12.

Perhaps not so
delusory as
Mr. Glanvill
thinks: but I
am sure the
projects some
go upon are
delusory,
have much of
the Rosicrucian
humour in
them: and
the design of
introducing a
sensible Phi-
losophy is the
pretence of
Crollius, and
of the Rosi-
cruce Order.

"I confess, Sir, that among the *Egyptians*, and *Arabians*,
"and *Paracelsians*, and some other *Moderns*, *Chymistry* was
"very phantastick, and unintelligible, and delusive: and the
"boasts, vanity, and cantings of those *Spagyrist*s brought a
"Scandal upon the Art, and exposed it to suspicion and con-
"tempt. But its late *Cultivators*, and particularly the *ROYAL*
"ALL SOCIETY have refined it from its dross, and made it
"honest, sober, and intelligible, an excellent Interpreter
"to *Philosophy*, and help to *common life*. For they have laid
"aside the *Chrysopoietick*, and *delusory designs*, and vain
"transmutations, and *Rosicrucian vapors*, *Magical Charms*
"and *superstitious suggestions*, and formed it into an instru-
"ment to know the *Depths* and *Efficacies* of *Nature*. — All
"this without dispute the *Society* hath done; and without dispu-
"ting. And hereupon I do agree with our *Virtuoso*, that they
"have no small advantage above the old *Philosophers* of the *No-*
"tional way.

Of

Of Anatomical Improvements.

“VV E have another advantage above the Ancients in
 “the study, use, and vast Improvements of Ana- *Plus ultra,*
 “tomy, which we find as needful to be known a- *p. 12.*
 “mong us, as 'tis wonderful 'twas known so little among the
 “Ancients, whom a fond Superstition deterr'd from dissec-
 “tions. For the Anatomising the bodies of men was counted
 “barbarous and inhumane in elder Times: And I observe
 “from a learned man of our own, that the Romans held it
 “unlawful to look on the Entrails. And Tertullian severely
 “censures an inquisitive Physician of his time for this pra-
 “ctice, saying, That he hated man, that he might know him.
 “Yea, one of the Popes (I take it 'twas Boniface 8.) threatens
 “to excommunicate those that should do any thing of this
 “then-abominable nature. And Democritus was fain to ex-
 “cuse his dissection of Beasts, even to the great Hippocrates.
 “Nor does it appear by anything extant in the writings of Ga-
 “len, that that other Father of Physicians ever made any
 “Anatomy of humane bodies. Thus shy and unacquainted was
 “Antiquity with this excellent Art, which is one of the most
 “useful in humane life, and tends mightily to the eviscerating
 “of Nature, and disclosure of the Springs of its Mo-
 “tion.

I have set down without any interruption the words of
 this English Bravo and Hector (four Modern Philosophers,
 that my Reader might come with a greater expectation to
 the perusal of my Animadversions: so high a charge of ig-
 norance upon the Ancients, such useful discoveries of the
 Moderns render the former to be contemptible fellows.

K

and

and the latter a very *beneficial* and *important party* in this *Age*. But if it do appear that the *Moderns* have not as yet convinced us by their *works* and *great performances* in *Physick*, that the knowledge of these *new inventions* is so necessary to *Physicians*, and so *advantageous* to *mankind*, but that those which either *sight* or *ignore* their *discoveries*, acquire a *greater* *repute*, are *more* *employed* and *possessed* of a *more* *honourable* and *gainful practice*, and, in *fine*, do *greater Cures* in *general*, then our *Braggadachios*; then is there no such reason for this *Triumph* of *Mr. Glanvill*, as he *imagines*. The better to judge hereof, I desire all considering men to look back upon the several *Physicians*, who have flourished in *Greece*, *Rome* and *Barbary*, and to view the present state of *Physick* in *Italy*, *Spain*, and *France*, and try his most *severe judgement* if it be possible for him to condemn that *Physick* as *imperfect* and *pitifully deficient*, which gave that credit to *Hippocrates*, *Galen*, *Rhases*, *Avicenne*, *Fernelius*, *Lacuna*, *Mercatus*, *Vallesius*, *Christophorus*, and *Thomas a Veiga*, *Glaudin*, *Massarius*, *Septalius*, *Rondeletius*, *Hollerius*, *Ballonius*, *Rodericus a Castro*, *Fonseca*, *Saxonia*, *Sennertus*, *Crato*, *Prosper Alpinus*, *Antonius Musa*, *Basavola*, *Hofman*, and many others (whom I shall not name; as indeed I name these without any order) which they now enjoy. Let him set his most *ambitious thoughts* on work, and see if he can propose to his *desires* greater things than they attained unto, and *atchieved*. Let him employ all his *envy*, and yet condemn their *Diagnosticks*, *Prognosticks*, or that *Secretorum Secretissimum*, their *method of curing*, and their *Medicines*. If there be little or no fault in these parts, it signifies not much what *principles* they went upon in *Philosophy*, nor whether they did *mistake* or *ignore* some things in *Anatomy*, as long as they were not *such* as hindred a *Physician* from the obtaining of that end which is designed by his *Art*: And as to the improvement of the *Therapeutick* part of *Physick*, by *new Medicaments*, or *new* and *more pleasant* preparations of *old Medicaments*, if they be *no more efficacious* than the *former*, we pay to the *Inventors* those acknowledgements, which we do to the *introducers* of *new garbs* and *fashions of clothes*, the best

best contrivances whereof, howsoever they may excel in *conveniency*, cannot be endeared unto us by the representations of being *necessary*. I have named *practical Physicians*; I shall now instance in *Chirurgery*: What man is there in this Age, that would not be content with the repute of *Ingrassias*, *Vesalius*, *Fallopianus*, *Carcanus*, *Aquapendens*, *Spigelius*, *Marchettis*, *Severinus Paræus*, *Chalmetaus*, *Pigraeus*, *Guillemeau*, *Hildanus*, &c? or what man is there in this *inquisitive Age*, that any sober man would compare with *them*, much less prefer before *them*? If the Posture of *Physick* be such, and that the value we ought to place on every thing be to be regulated by its *subserviency* and *conduciveness* to some end, (*finis conciliat mediis gratiam*) it is easie to judge what *certain esteem* we are to put upon the *modern Improvements of Knowledge* in order to *Physick*, and how far we may justly censure the *Ancients*, and such as either *sight* or are *ignorant* of *them*. I profess my self not to know what disease it is that the *Virtuosi* cure *better*, or with *more certainty* than those that follow those other of the *Dogmatical* way. If it were *done*, there would not want such as should cry such *performances* up; besides the interest of the *Novellists*, the sence of their *great Cures*, would gain them all the practice that is now in the hands of such as vary not from the *ancient Method*, and *Rules of that Art*. I shall adde, that I could demonstrate by *undeniable testimonies*, and such as are confirmed by *modern trials*, that the introducing of *new Medicines*, either *Chymical*, or *otherwise*, and the neglect of a *diffused reading*, hath occasioned the *dis-use* and ignorance of several *Medicines* for *Consumptions*, the *Gout*, *Plague*, and other grievous diseases, which might be attempted with much more *assurance*, than is to be placed upon the *later Methods*. To prosecute this point further, I shall tell you, that *Physicians* hitherto looked with a great *indifference* upon the *Principles of natural Philosophy*, whether they were *true*, or *no*; so that they did but serve as convenient *Memorials* to regulate them in their *practice*, and that *they* did guide them to their wished end with *such certainty*, as if they were *true*. All disputes about *Natural Philosophy* that did not refer to

practice, they looked upon as *Curiosities*, going beyond their *Art*, and about which they would not contend, so as that the *Method of curing* were not undermined thereby. Upon this account they did allow of two sorts of *Truth*, the one in *Physick*, the other in *Natural Philosophy*, and that what was *such* in one, might not be *such* in the other. This *President* they derived from their great Master, *Hippocrates*, who in his discourses sometimes proceeds upon the *Doctrine of the four Elements*, as if that were *true*: Sometimes he goes upon the *doctrine of Atomes*, as if he regulated his *Cures* thereby: Sometimes he seems to favour the *Tenets of the Chymists*; and he cries out as *Mr. Boyle*, and other *Chymists* cite him, *Non calidum, frigidum, humidum, siccum esse quod maximam vim agendi habet in corpore, verum amarum, & falsum, & dulce, & acidum, &c.* Sometimes he proceeds as it were upon the principles of the old *Methodists*, and ascribes the origin of diseases to the altering of the texture of the body, to the different conformation of parts, the different configuration of pores, &c. This was the course that *Great Man* took: he was willing to observe in all diseases the motions and the course *Nature* took; to take those for *ill signs* and *symptoms*, which he found to be such from that great *Instructor*; however ἀπαίδευτος & ὑπαδύσας, those ways whereby *Nature* did usually terminate diseases, were the ways he thought they ought to be terminated by; and he made that the scope to be aimed at in the curing of diseases: those evacuations that had helped naturally to cure, he endeavoured to promote artificially, by such *Medicines* as *Experience* shewed to be serviceable to those ends, when administered at due times and seasons. In short, he made himself absolutely the slave of *Nature*, attended on her motions, sometimes gently leading her on, as it were a *Gentleman-Usher*; sometimes following her, as a *Page*, never pretending to command her by his *Medicines*: So cautious he was, that he would not adventure to do good unseasonably, and at other hours then his *Teacher* directed him, lest he should do harm: he would not adventure to shorten a disease, lest he should shorten his *Patients* life. As if he had foreseen the truth of that observation, which *Vallesius*, and others in these days experiment, *Celerior quam*

See Otto Tachenius's
Hippocrates
revivus, and
his Clavis Me-
dic. Hippocr.
De vet. medic.
§ 24 Concern-
ing the mean-
ing of which
place see E. 2.
Hus adv. Pa-
rac. p. 2. pag.
96 & Con-
ring. de Her-
met. med. c.
16 p. 191.

quam pro morbi longitudine curatio, detrahens plus virium quam pro morbi ratione, facit in tempore curandos ante tempus mori.

Agreeable to this Method of Hippocrates, was that counsel which Dr. Bathurst (of Black-friers) gave me, when I first seriously set my self to study and observe his practice in Physick, viz. *Nunquam ille Medicus magnus erit, quisquis patitur sese principiis Philosophicis alligari atque constringi.* It is impossible for any person to be a great Physician, who ties up himself to one sort of Natural Philosophy, as if it were really true and certain: the operation of Medicaments is oftentimes such as answers not the Principles of any Philosophy, and the digestions of Nature are so different from those of Chymistry, her fires, her solvents, her filters, her furnaces & vessels, her mixtures and degrees of heat so discrepant, that there is no arguing from the one to the other: nor is there any thing to be relied upon in Physick, but an exact knowledge of medicinal Phisology (founded upon observation, not principles) semeiotics, method of curing, and tried, (not excogitated, not commanding) medicines: where this course fails (as sometimes it will) we then try uncertain Medicines, rather than abandon the Patient to those Prognosticks, which are seldom so fatal as to destroy all hope; and where Skill is at a loss, we frequently behold Chance to be successful. And this last is the Mistress of our Reforming Physicians, it is under her conduct that they will enrich our Therapeutick part of Medicine, and alter our Method. I shal not enlarge further hereupon, being content to have shewed what esteem Physicians have had Philosophy in, and how they have had as little regard to the truth of their principles in natural Philosophy, as a man ought to have to the hand of a Dial, or which points out the way to any place: It is not requisite that it be a real hand, whatever men call it; nor would we endure the impertinencies of any that should go about to perswade us out of our way, because they that cald that an hand, were mistaken: In sum, so the way be good and certain, I am content to be one of those whom the Italian Proverb commends, for going that way which the Mules go. *Ito qua Muli eunt.* In this opinion I have amongst late Writers the learned Hofman, whose words are these, *Quæ enim necessitas est Medicum semper loqui cum Physico, siquidem usus, a quo pendet ars nostra, aliud velit, vel certe permittat? Quid enim ibi VERITAS est, hic UTILITAS est.*

Consultius esse nullus
nescit tempore paulo longiore & tuto curari, quam paulo brevior cum certa vitæ periculo sanari. Erasmus disput. de propriis. med. c. 65. sub finem.

Instit. med. l. 2 c. 7. sect. 11.
1. & c. & Ad 2. Aed. c. 1.

Nor

Jo. Ant. Van-
der Linden
de circuitu
sanguinis exer-
cit. i. sub finem.

Nor will it be amiss to propose the Judgment of the learn-
ed Practitioner *Joannes Antonides Vander Linden*, which he
passed not long before his death at *Leiden* A.D. 1659 after
a mature consideration of all the new speculations in *Natural
Philosophy*, which this last Age had produced and acquaint-
ed him with. "*Physici ab imaginariis incipiunt, per ratio-*
"*cinia pergunt, & in frivola desinunt. Cordatos obtestor, an*
"*apud se non πᾶν ὑπόληψις? Ad quid igitur Physica, ut nunc*
"*constituta est, Medico? Etiam quæ nunc docetur optima*
"*(præter quod Principiis nitatur non necessariis, & ob id*
"*certa non sit) quid ad medendum, si scitur, utile; aut, si*
"*nescitur, noxii confert? Etiam, si extaret, quæ absolute cer-*
"*tis principiis & perfectis regulis constaret, tamen Medicinæ*
"*non esset, nisi Institoria, non Institutoria. Institoria, in-*
"*quam; nam id Medicis est Physica, quod Fabris omne ge-*
"*nus taberna mercium Novicarum. Instituriam Medicinæ*
"*qui volunt, nã illi sciunt, quid velit detritissimum, ubi de-*
"*finiit Physicus, ibi incipit Medicus. Medicina non habet*
"*opus aliena; nedum a Physicis ficta & emendicata prin-*
"*cipia: habet sua, & certa, & ausa stare contra omnem du-*
"*bitationis impetum. Quæ fiducia concludo: Physica ho-*
"*dierna optima Medicinæ parum aut nihil utilis est. Qui*
"*habet aures ad audiendum audiat, mentemque sanam in*
"*corpore sano habeat. Saltem vos, vos iterum alloquor χαρί-*
"*ς αὐτοὶ παῖδες, sapite; & ab ea quæ Medicinæ larva se tegit,*
"*Physica cavete; & hoc agite, ut quam aliquando salutis hu-*
"*manæ præsidem Artem in bona conscientia vultis facere, eam*
"*ante cum certo fructu regia via velitis discere.*

Upon this account I often laugh at our modern *Virtuosi*,
when they dilate themselves with a great deal of ostentation
and confidence, about the qualities and correctives of *Opium*,
whether it be hot or cold? which controversie how great so-
ever, hath no influence upon practice, because both agree
pretty well in the cases in which it is to be used, and many
of the modern preparations and corrections are foolish, and
make it worse; And as to that *Laudanum* of *Helmonts* a-
mongst the *Virtuosi*; I have seen much more simple prepara-
tions stupifie less, and produce greater Cures, then that did
when

when made by the hands of one of the *Society*, and given by another of it: whilst the best of *Modern Chymists*, *Zwelfer*; bestows this commendation upon that old medicine of *Archigenes* and *Mesues*---*Erit sic rite preparata opiata, qua merito Laudani opiati, multarumque aliarum Opiatarum vices supplere posset.* I could enlarge here, but that Mr. *Glanvill* will think I have forgot him.

*Pharmacop.
August in
conf. Archi-
genis.*

Having made this general *Apology* for *Physicians*, which is sufficient to justify them, both as to their care of their *Patients*, and their *skill*; I shall come to apply my discourse particularly to Mr. *Glanvill*. It is hard to reconcile the necessity of *Anatomy*, with the *Mosaical Constitutions*, it seeming strange that God should make it so unclean a thing for any one to touch a dead body, and yet the knowledge of *Skeletons* should be so necessary. To supply this, the *Jewish Rabbins* say, that God Almighty did reveal unto *Moses* the accurate knowledge of *Anatomy*: and when we consider how they embalmed their dead, and that embalming doth infer a knowledge of dissection, and of the *Entrails*; when we observe (out of *Buxtorfs Synagoga*) that artifice with which the *Jews* kill all *Animals*, thereby to let out the blood exactly: when we consider that the multiplicity of accidents in war, or otherwise, would render the knowledge of the inward and outward parts necessary to them, and experience acquaint them with their nature (not to mention some *Jewish* relations about the opening of the *Os pubis* and the *partus Cesareus*) I am apt to think that the ancient *Jews* were not ignorant of useful *Anatomy*, nor so superstitious as totally to avoid the practice of it; nor dare I say (with our *Virtuoso*) such Superstition is fond, which is ascribed to God as its immediate Author.

*Vid. Riolan.
Anthropo-
gr. ph. l. i. c. 3.*

As for the *Greeks*, the study of *Anatomy* was very ancient amongst them, since it is attributed to *Alcmaeon*, that ancient Physician (a Scholar of *Pythagoras*) as the first Author of it, if we will believe *Chalcidius* upon the *Timæus* of *Plato*. From him it was derived to posterity by tradition and manual operation, children being bred up unto it, such as were to be Physicians, as also Philosophers. So *Democritus*, *Hippocrates*,

tes,

tes, and many others came to be acquainted with it. But none of the *Ancients*, until the time of *Diocles Carystius*, did write any thing about it: which notwithstanding, that *Science* seems to have been in never the worse condition, as *Mercurialis* thinks. *Anatomen* etsi a nullo veterum usque ad *Dioclis* aetatem *Scriptis* mandata referat *Galen.* in 2. de anat. admin. melius tamen sic conservata & amplificata inde intelligere possumus, quod tunc homines a primis annis *Anatomen*

These Anatomical operations of the Youth were called. ἐγχεσμός & ἀσκήσις, which Hofman thinks may be rendered fitly in a line, Exercitia Anatomica. Adding, Didiceram enim ex ejus operis (apud Galenum) l. 2. initio hæc ἐγχεσμός ab ipso artis incubulo fuisse puerorum ... tamilla Aesclepiadeæ, aliorum ad faciendam medicinam. Sciebam etiam aliunde, longe aliam fuisse tum Anatomie rationem, quam nunc est, seorsim inquam fuisse traditam historiam partium ipsarum, semperq. fultam oculari inspectione. Vide Hofman Var. Lect. l. 2. c. 12. The same is avowed by Vesalius in his Preface to Charles V.

*Lacuna Epit.
Galen. de anat.
tom. admin.
l. 2.*

*Vide Riolan.
Anthr. po-
graph. l. 1. c. 4.*

I would not be understood to justify every passage in Aristotle relating to Anatomy: he hath many gross errors & errors in longo: but have not also Harvey, Highmore, Silvius, and others, so many as may excuse his incoherence sometimes?

(ut ceteras artes,) non ex scriptis sed ex Parentum sermonibus ipsaque exercitatione addiscebant; sicque melius ipsam comparantes, non modo tenacius in animis servabant, verum etiam assiduis studiis augebant. But to put this question more out of doubt, I shall appeal to *Galen*, who could give a better account of what they did in the elder times than *Mr. Glanvill*. I have not his Works by me; but *Lacuna* in his *Epitome* thus expresseth him. "Quod veteres nihil scripserint de confectionibus administrandis, vertendum illis vitio non est: quandoquidem erat iis tum frequens tamque in communi usu ipsa Anatomie, ut domi apud Parentes etiam ab ipsa pueritia, in illa omnes olim exercerentur. Postea vero tam præclaro illo exercitio intermisso, opus certe nobis fuit Commentariis, quæ Anatomicam disciplinam Chirurgicæ medendi rationi maxime necessariam, integram conservarent. That *Aristotle* did dissect the bodies of men is manifest out of his *Hist. Anim.* l. 3. where he informs us how he made an inquiry into the nature and series of the veins in humane bodies: and as to his anatomizing of other creatures, beasts, birds, fishes, insects, (and how he had some thousands employed under him to that purpose) no man can doubt who reads *Riolanus* and *Pliny* l. 8. c. 18. How accurate he was (however his brevity doth not represent every circumstance, nor fully describe things)

we may judge by this that there are few of the new inventions, but are ascribed unto him; and Dr. Harvey is known commonly to have said, *Nihil fere unquam in ipsis Natura penetrabilibus invenisse se, quin cum Aristotelem suum pensculatius evolveret idem ab illo, aut explicatum, aut saltem cognitum reperiret.* After Diocles, I find these other reckoned as notable Anatomists by Volcherus, Coiter, viz. Polybius, Erasistratus, Callistus, all Scholars of Aristotle: And after them Marinus, and Lycus, the Master of Galen, and Satyrus, and Pelops, and Numesianus, besides several others at Alexandria all which Galen went to converse with. But I must not pass by Herophilus without an especial Character, who did not only correct the mistakes in Anatomy which his Master Praxagoras fell into, but by his industry and skill acquired a repute so great, that his name is equal to the most famous that ever were before, or since his time: This great man is preferred by Vesalius before Galen: And it was an usual saying of Fallopius, that any man might as easily contradict the Gospel, as contradict Herophilus in Anatomy. *Contradicere Herophilo in Anatomia est contradicere Evangelio.* This man is that inquisitive Physician, of whom Mr. Glanvill speaks, and who is blamed by Tertullian not for dissecting humane bodies, but for dissecting them alive, which he terms Butchery. Because, I think Mr. Glanvill never read him, and because I will make it evident that one of the Ancients did dissect more bodies of men, then all the Society put together, and that with an extraordinary caution. I shall set down the words of Tertullian, and they are these, — *Herophilus ille Medicus aut Lanus, qui sexcentos eexecuit ut naturam scrutaretur, qui hominem odiit ut nosset, nescio an omnia ejus interna liquido exploravit; ipsa morte mutante quae vixerant, & morte non simplici, sed ipsa inter artificia executionis errante.* Upon which passage, Philip le prieur notes thus, *Anatomia quae & celebris magnoque in precio fuit apud Ethnicos, a veteribus Christianis odio quam maximo afficiebatur. Quamvis hic dictum Lanium Herophilum constet, quod vivos homines diffecaret. Id autem facere solitos Erasistratum, Dioclem, & Herophilum docet Claudius Galenus 8. de plac. & 2. anatom. administ.* Agreeable to

L

this

Dr. Pearsoni in
Dedic. Laer-
tiii ad Ca-
vol. II.

Vol. Coiter in-
tro. in anat. c. 6
Galen in his
Comment upon
Hippocrates
de nat. hum.
reckons up a-
bove 20 emi-
nent Anato-
mists of the
ancients.
Vide Riolan.
Anthropogr.

Mælius fun-
dam. med. c. 1.
p. 10. & Vossius
de philos. c.
11. l. c. 2.

Tert. li. an. de
anima. c. 10.
Gagnus,
Mercurialis,
& Vossius read
it so, tingentis
eexecuit.

Celsus l. 1. in
picoemio.

of Tertullian, is that passage of Cornelius Celsus in his Preface. *Necessarium ergo esse incidere corpora mortuorum, eorumque viscera atque intestina scrutari, longeque optime fecisse Herophilum & Erasistratum, qui nocentes homines a regibus ex carcere acceptos, vivos inciderint, considerarintque etiam Spiritu remanente, ea quæ Natura clausisset, eorumque posituram, colorem, figuram, magnitudinem, ordinem, duriciem, molliciem, lavorem, contactum: processus deinde singulorum & recessus, & siue quid inseritur a teri, siue quid partem a terius in se recipit.* This Herophilus was undoubtedly a person of vast parts, great learning and curiosity. He brought the Hippocratica Physick to its height and perfection, compleating the Anatomica part, and illustrating the Doctrine of the Pulses. His followers had a School not far from Laodicea, as Strabo saith, wherein it is not to be doubted but that Anatomy was taught, and so in that other School of Erasistratus at Smyrna. Μεταξὺ δὲ Λαοδικείας καὶ Καρύρων ἱερὸν ἐστὶ μνηδὲς Κάρυ λαλόμενον. Τιμωμένον ἀξιολύτως. Συνέστηκε δὲ καθ' ἡμᾶς διδασκαλεῖον Ἡεροφιλείων ἰατρῶν μέγα ὑπὸ Σεύξιδος, καὶ μετὰ ταῦτα Ἀλεξάνδρου τοῦ φιλάλθους καθάπερ ἐπὶ τῶν πατέρων τῶν ἡμετέρων ἐν Σμύρῃ τὸ τῶν Ἐρασιτραλείων ὑπὸ Ἰκασίου. From whence it is clear, that in the Reign of Augustus Caesar (when Strabo lived) Anatomy in the East was in great request, and that the Physicians and followers of Herophilus had a great Academy betwixt Laodicea and Carura. And that before those times at Smyrna, Erasistratus that was a great Dissector of men (even alive) had another Academy of his followers: whose works though they are lost, yet Vesalius saith, that one may conjecture out of the passages in Galen that relate to them, that they were very accurate Anatomists. — Veteribus dissectionum proceribus, quos ex Galeni libris in corporum anatome sedulo versatus esse nobis persuasum est. — Not much unlike this character of Vesalius is that Elogy which Veslingius bestows upon the Ancients in an Epistle of his to C. Hofman, enquiring whether the vena lactea of Asellius were a part of the porta vena known so long ago? Sic habeas, incertum mihi esse quid primi illi qui ante Dioclis Garystii ævum privatis affectionibus in corporis humani partes inquirebant hic viderint, cum

Strabo Geograph. in fine
lib 12. citante
Mercuriale
Var. Lect. l. 2.
c. 12.

Vesalius de
rad. Chinæ, p.
168.

cum nihil eorum quæ cognorant scriptis divulgant. Vixere fortes ante Agamemnona multi, ait Lyricus: & proculdubio ante Herophilum eximii, & in hoc dissectionum studio exercitatissimi, quos ob monumentorum defectum longa nocte oblivio premit. Vellingius Ep. 20. edit. per Bartholin.

I shall conclude this discourse of *Herophilus*, with an observation about the time when he lived; which was not in the days of *Tertullian*, though *Mr. Glanvill* represents them as *Contemporaries*: but many Centuries before, in the time of *Ptolemaeus Philadelphus*, and he is famed for his raillery upon *Diodorus Cronus*, who denied there was any motion, yet had his shoulder dislocated. See *Conring. de medic. Hermet. c. 9. p. 83.* Some make him more ancient, but none ever brought him so low as our *Virtuoso*. Vide *Voss. de Philos. c. 11. Fonsium de Script. Philos. l. 1. c. 15.*

As to the *Romans*, and their skill in *Anatomy*, I cannot say much of it, except it be to their disparagement. They were a military sort of people, rough-bewen, and thought all that below their studies or serious thoughts, which our *Experimental Philosophers* boast of, and recommend unto our care with so much vanity. All the *Mechanick*, I had almost said (the *Liberal Sciences*, they thought to be excellent qualifications in their slaves, not in themselves: And they who gave Laws to all the world, scorned to be instructed by their vassals, and a conquered Nation. Upon this account, not onely in the time of *Tully*, but afterwards to the days of *Quintilian* and *Tacitus*, (I know not which writ the Book *De Oratoribus*) it is evident, that however many Gentlemen did inform themselves of the several parts of ingenious Learning, yet did that haughty people behold those persons with indignation, and some thoughts of hatred, in so much as that those who were best versed in it, pretended ignorance and scorn of it. Things being in this condition, and the *Romans* having no other *Physicians* then their Slaves, it is not to be wondered if they were not eminent for *Anatomy*. *Cato* had banished the *Physicians* long ago, and after-ages gave them little encouragement.

I do not at present remember any *Physician*, whose name hath any thing of the Roman till *Cornelius Celsus*, and after him *Veetius Valens*. *Pliny* saith, that even to his time, in the reign of *Titus Vespasian*, the Romans did not care to profess and practise *Physick*. *Solam hanc artium Græcorum nondum exercet Romana gravitas in tanto fructu: paucissimi Quiritum attingere, & ipsi statim ad Græcos transfuga: imo vero autoritas aliter quam Græce eam tractantibus, etiam apud imperitos expertesque linguae, non est.* Nat. hist. l. 29. c. 1. In the time of *Augustus Caesar*, his freed man *Artorius Musa*, and his brother *Euphorbus* gave some credit to *Physick*, and afterwards several eminent *Greeks* are said to have flourished; but whether it were that the Romans were impatient to learn so much as was requisite (or thought to be so) to make a man eminent in the *Hippocratical* and *Herophilian* way; or whether they thought it more becoming their grandeur, rather to learn (with all the world) a new *Method of Physick*, then seem to have been so long as it were brutish and ignorant in

Ideo deserta
est hæc disci-
plina, quia
necesse erat in
ea literas sei-
re. *Pliny.*

During the flourishing of the Roman Empire, the study of *Physick* was principally pursued at *Alexandria in Egypt*. There *Herophilus* and his Scholars had given it credit, and the *Empiricks* and *Methodists* had their Academies, and the *Jatrotophists* were endowed professors. The repute of *Alexandria* being such even in the days of *Valentinian*, that it was credit enough for any Physician to say he had been bred there. *Ammian. Marcell. lib. 22.*

Plin. l. 14. c. 17.

comparison of the *Greeks*; or whether that the new principles and method were more agreeable to that *Empirical* way, they had been accustomed unto (See *Plin. nat. hist. l. 26. c. 3.*) and so more easily received by the populace then that of *Hippocrates* made up of a *Grecian* dyet, and medicaments; whatever was the reason, I finde that the Romans did generally incline to that Sect of *Physicians*, called the *Methodici*, begun by *Asclepiades* and *Themison* in the time of the *Triumvirate*, or *Veetius Valens*, and compleated by *Thessalus* in the time of *Nero*: This Sect seems to have had the advantage over all other the *Physicians* amongst the Romans from the time of *Augustus*, to the reign of *Severus*, which is near three hundred years. *Pliny* calls *Themison*, *Summum authorem*, and by that place in *Juvenal* one would guess him to have been a man of great notice and general practice in the days he lived.

Mer.

*Morborum omne genus, quorum si nomine quæras,
Promptius expediā quot amaverit Hippia mœchos,
Quot Themison agros autumnō occiderit uno.*

Theſſalus, againſt whom *Galen* and *Pliny* inveigh, was certainly a man, not only of great *Eloquence*, but alſo of extraordinary *Learning* and *Judgement*, as we may gueſs by thoſe parcels and fragments of that excellent man, which are all that remains of him, and they preſerved in the works of others. His Books *de Communitatibus & Syncriticis* are peeces whoſe loſſes I much lament. The Memory of his *Tombe* is not loſt upon which he inſcribed himſelf, *ιατρονικῶν*, or, *The Conquerour of Phyſicians*. His Letter to *Nero* had ſomething of a gallant confidence in it, which may become *Heroes*, and is juſtified in men of great *Learning*. *Cum novam ſectam condiderim, & quæ ſola vera ſit, propterea quod qui ante me fuerunt omnes nihil utile prodiderunt, vel ad ſanitatē tuendam, vel ad morbos propulſandos*---. The generality of his followers ſeem to have been excellent *Phyſicians*, as *Dionyſius*, *Proculus*, *Archigenes*, *Soranus*, *Attalus*, *Julianus*, and others. I ſhall not inſiſt upon a particular relation of *their tenets*, Proſp Alpin. de medic. methodica. which one may ſee excellently illuſtrated by *Proſper Alpinus*. This ſect of *Phyſicians* ſeems to have left impreſſions of its *method* and *principles*, in all places where the *Roman Empire* ſwayed. They placed little value upon the exact knowledge of *Anatomy*, being content with a general ſkill therein, and enquiring no further than was neceſſary. They knew that the *Romans* had formerly baniſhed the *Phyſicians* (as *Archagathus*) from amongſt them, for uſing their *Patients* with much cruelty, cutting and burning them; and underſtood the humour of the people ſo well, how they diſliked the diſſections of humane bodies,

Quintilian being to deſcribe *Phyſick*, renders an account of it agreeable to the *Methodiſts*. In declam. 8. *Gemini Languentes*.

Thy called *Gallen*, when he put himſelf forth in the world by the oſtentation of *Anatomy* and *Philosophy*, *Logiater*: *Logiatri* autem nomen ſui temporis medici *Romæ* *Galeno* per contemptum imponebant; ut ita eum traducerent, quaſi non reipſa, nec uſu, & exercitio artis peritus eſſet: Sed ad loquacitatem duntaxat & diſſerendum de iis quæ ad artem pertinent comparatus. *Geſner*, in *Scholiis* ad *Cassium* p. 57.

bodies, especially alive, and therefore they closed with that popular prejudice, and turned it to their advantage; neither dissecting of bodies, nor tormenting them with those odious or cruel methods of Cure, which were practised by the followers of Hierophilus. Nor do I doubt that those objections in Celsus against Anatomy, were put into his mouth by the Methodists, as well as Empirics, viz. that all Anatomy of bodies was a nasty performance; but to dissect the living, most barbarous and cruel: that as much of Anatomy as would instruct one sufficiently, might be learned in a Camp, where the Physician need not make wounds, but learn at once and practice Cures. Hence it was that the study of Anatomy was so much out of request at Rome in Galens time, that I think he mentions not one curious Anatomist there, though he tell how Satyrus taught him at Pergamus, and Pelops at Smyrna, and Numesianus at Corinth, and others. There were some that were excellent Ostrologists at Alexandria. And I am apt to think, that even he durst not for fear of publick odium, dissect any living men there, because, as Celsus saith, most people held it to be cruelty, and perhaps would not have thought well of him, who should have dissected any dead men. Whereupon he set up with Apes, dissecting them, as being

Vesalius in his Treatise de rad. Chinae sheweth how Galen dissected Apes, and was thereby led into sundry mistakes. But even such as did blame Galen were themselves faulty, as Vesalius and Columbus; which appears by what they say about the kidneys; which they describe out of brutes, not men, as Piccolomineus and Beverovicus observe. Beverovic. de calculo, p. 3. Read also Fallopius Observations

nearest to men in resemblance, and imagining the fabrick of their bodies to have as great an affinity with the parts of men, as their shapes had; that this was the cause of many mistakes in him, is certain; and demonstrated by Vesalius.

But that he never made any Anatomies of humane bodies, or considered any as they came in his way, is a calumny which might be refuted by sundry instances out of his Works, and some thereof are to be seen in Riolanus Anthopogr. l. 1. c. 12.

Vesalius in dedic. lib. de fabric. corp. hum. ad Carol. V. Imper. In the same place he calls Galen, dissectionis professorum facile primum.

Vesalius never raised his imputations to this height; all that he saith of this nature, is, *Nobis modo ex renata dissectionis arte, diligentique Galeni librorum praelectione, & in plerisque locis eorundem non poenitenda restitutione constat, nunquam*

quam ipsum nuper mortuum corpus humanum refecuisse. At vero sui deceptum Simiis (licet ipsi arida, ac veluti ad of-
fium inspectionem parata hominum cadavera occurrerint) crebro veteres Medicos, qui hominum confectionibus se exercu-
erant, immerito arguere. Nay, it is evident out of Galen, that
the Roman Physicians which were in the Army of Antonius did dissect the Germans that were killed by him in bat-
tel. As for that Learned man of our own, out of whom he tells us, That the Romans held it unlawful to look on the En-
trails: I know not who it should be. Mr. Boyle indeed doth say, that in Galens time it was thought little less then ir-
religious, if not barbarous, to mangle the bodies of men: which how far it is true, one may guess out of what I have said; But that Honourable Person speaks in such a manner as gives us little of exception; Mr. Glanvill is so peremptory, that I wonder that he did not deny, that the Romans did not use any Augury from the inspection of the bowels, heart, and liver of beasts; or that they did not eat the Livers of Geese, and other Guts of several Animals. This is so well known to every School-boy that hath read Martial, or Horace, or Virgil, that I need not speak of it. Had the Romans held it so unlawful a thing to behold the Entrails of Animals, I wonder they gave the name of Visceratio to those distributions of flesh which they publicly used: to such unlawful customs, Virgil would not have alluded, when he brings in Dido her self,

Galen. l. 3. sec.
gen. c. 2.

— Pecudumque reclusis

Pectoribus inhians, spirantia consulit exta. Æneid. l. 4. v. 64. & Georgic. l. i. v. 484.

Tristibus aut Extis fibra apparere minaces.

Nay, they carried the bodies of beasts open with their Entrails displayed to be sold publicly, as Mart. shews l. 6. ep. 64.

Ne valeam, si non multo sapit altius istud,

Quod cum panticibus laxis, & cum pede grandi

Et rubro palmone vetus, nasisque timendum,

Omnia crudelis Lanius, per compita portat.

But perhaps he will confine his discourse to the Entrails of men, why then did not he speak more plainly? And even in this case, that some superstitious persons might hold it impious and unlawful is possible:
and

I believe that
place in Pliny
relates onely
to Augury,
that it was
not lawful a-
mongst men to
make use of
humane bo-
dies, and
search their
bowels to
those ends:
this was ne-
fas: but no-
thing else.

and that others out of enmity to the *Anatomical Physicians*, (as *Pliny l. 28. c. 1.*) *Aspici humana extra nefas habetur*, might call it so, I deny not. But what Law was there against it? How comes it to pass, that *Gelsus* in his debate about the lawfulness of *Anatomizing* even *living bodies*, saith (or maketh others to say) that it is only *cruel*, or *nasty* and *abominable*; not *impiety* or a *breach of Religion*? Besides, how could any *Physician* in those days have dressed such wounds in which their *Entrails* either *gushed out*, or were hurt, in case it had been *unlawful to look upon them*? It is manifest that *Gelsus* saith, a prudent *Physician* may from such accidents learn *Anatomy*; *Ita sedem, positum, ordinem, & figuram, similiaque alia cognoscere prudentem medicum*, and adviseth him to improve the occasion: And he was a Person learned not only in the *Physick*, but *Civil Laws* of his *Country*.

To convince our *Virtuoso* a little more, out of *School-books*, in which he ought to be conversant. Is there not a controversie agitated in *Seneca*, *Controvers. l. x. contr. 6.* about *Parrhasius* the *Painter*? how he brought an old *Olynthian*, and dissected him *alive*, thereby to draw the picture of *Prometheus* with a *vulture* preying upon his *Liver*? Is it not agitated *pro* and *Con*, by *Romans* and *Grecians*? Is there any one that saith it was *unlawful* for him to behold the *Entrails*? Nay, is it not said in the midst of *Rome*, that it was always *LAWFUL*? *In argumentis dixit, quantum semper Artibus LICUISSET, Medicos ut vim ignoratam morbi cognoscerent, viscera rescidisse HODIE cadaverum artus rescindi, ut nervorum articulorumque positio cognosci possit.* In *Quintilian* is there not a *Declamation Declam. 8. (Gemini languentes)* in which the *Mother* accuseth the *Father* for permitting the *Physician* to dissect one of the sick *twins*, thereby to discover the disease of the *other*? Doth not the *Mother* there bid him dissect the bowels of the *dead youth*? *Differ saltem, pater, hanc calamitatem: quicquid ex filio facis, facies ex cadavere. Si deprehendi potest languor dum occidit, facilius cum occiderit.* Doth she not describe the cruelty of that *Anatomy* very tragically? *Passus est miser discurrentem per omnia reaserati pectoris improbum vagæ artis errorem.*

rem. Contentum fuisse medicum toto homine discurrentem primo putatis aspectu? Egesta saepe vitalia, pertractata, diducta sunt: fecerunt manus plura, quam ferrum. Stat juxta medicum pater apertis visceribus inhians, stillantem animae sedem cruentis manibus agitantem: ne festinet, hortatur; jubet altius diligentiusque scrutari: Interrogat, dubitat, contendit, affirmat, & accepit de filii morte rationem — Inter hæc reficiebatur miser haustibus, detinebatur alloquiis, comprimebatur residuus cruor, claudebantur aperta vitalia. Nemo unquam tam nova pertulit commenta sevitiae, tanquam sanaretur occisus est— Vos tunc putatis illius tantum languoris medicum quæsisse causas? quæsit quicquid nesciebat, & usus occasione rarissima in omnem voluit proficere novitatem. After this she tells in what manner she gathered up his bowels, and by closing up his Corps fitted him for the Funeral. Corpus quod medicus, quod reliquerat pater, hoc sinu misera collegi, ac vacuum pectus frigidis abjectisque visceribus rursus implevi, sparsos artus amplexibus junxi, membra diducta composui. If any one can imagine, that this great Oratour in so solemn a Declamation would have omitted so important an objection as the unlawfulness and impiety of beholding the entrails of the youth, certainly he thinks too meanly of the judgment of Quintilian, and too well of his own. It appears out of that Oration, that they had seldom opportunities of dissecting men alive, and therefore he calls it rarissimam occasionem. And that they were not ignorant of Anatomy and the inward fabrick of humane bodies, it is evident further out of that Oration, where the Mother says the Physicians must needs already have learned that part of their Art.

Sufficit quod aliquando jam facta ex unius hominis inspectione, ad totius intellectum naturæ medicina profecit. Quid allaturus huic agroto es, quod non tot seculorum, tot languentium experimenta deprehenderint?

How could they behold the Ludi Circenses, the Gladiators fighting in the Theatre, and at the tombs of the deceased; or those sad spectacles described by Martial? I profess I think it as gross a mistake to say they held it unlawful to behold the entrails of men, as to deny the Augury by beasts.

As for what Mr. Glanvill saith about Democritus, that he was fain to excuse himself to Hippocrates for dissecting of beasts; this is as true as all the rest. Never was there a fitter second

M

for

Pag. 800. rom.
2. edit. Van-
der Linden.

for Mr. Sprat, then Mr. Glanvill. They do not cite, but invent stories, and that with so much confidence, that a man must be assured by his own reading, before he can suspect theirs. That Hippocrates was a diligent Anatomist, is a thing every one must confess who either knows the manner of their education then, or hath looked into his Anatomical books *de locis in homine, de fracturis*, and sundry other pieces of his. That he not only contemplated the seat and action of parts in the dead, but living, appears by this passage, *De Articulis* sect 43. where he speaks about the setting of the Sphondyles of the back; *Itaque si tale contingat, palam est quod neque concutiendo, neque alio quodam modo reponi possit, nisi qui dissecto homine & manu in ventrem injecta, inquisitionem faciat, ut ex interna parte ad externam manu retrudat: atque hac in mortuo quidem facere possent, in vivo autem non ita.* But I shall give an account of the Anatomy of Hippocrates, in the words of the learned Riolanus Anthropograph. l. 1. c. 2. *Testatur Galenus Comment. in lib. 3. de artic. Hippocratem potissimum rationi corporum incidendorum sedulam operam dedisse, cum Anatomen mirum in modum ad artem medicam conferre sciret, quod nunc aperte docet cum spinæ naturam intelligi voluit, quam Empirici non secus atque cæterarum partium contemplationem inutilem esse dicunt. Ipsemet Hippocrates lib. 3. de artic. Commentarios de venis & arteriis pollicetur, quos nunquam videre potuit Galenus. Præterea librum de dissectione conscripsit, quem imperfectum habemus. Ipsemet Galenus libros de Anatome, secundum Hippocratis doctrinam composuerat, quorum deploranda est jactura. Hippocrates canes dissectuit ut pulmones observaret. lib. de corde. Ibi dem monet quod dissectio accurata hujus partis non est opus cujusvis, sed periti artificis, & appellat istud opus Chirurgical. l. 6. Epidem. scribit hominem habere cola intestina cani similia. Idem lib. de intern. affect. testatur se in bove, in cane, & sue, quod impedibus dissectis tubercula in pulmone aqua referta invenisse, unde natus fuerat hydrops thoracis. Idem testatur se ex hominis ossibus ossa descripsisse: primus spinæ admirabilem figuram descripsit: primus vesiculas seminarias, earumque situm, omenti usum, valvulas venarum, ortum nervorum, lienis actionem,*

actionem, uteri conformationem. Atque ut extaret aliquod monumentum aeternum & immutabile suae diligentiae, laborisque in hoc studio exantlati, sceletum are fabricatum Apollini Delphico consecravit: ut Author est Pausanias lib. 10. And is it credible that ever Democritus should be forced to excuse himself to Hippocrates for cutting up of Animals, as if it were so uncouth and strange to him? I cannot answer for the Intellectuals of our Virtuoso, but no man of an higher capacity can believe it. The pleasantest part of this Narrative is, that there appears no such thing upon record. First of all the story of Democritus, how Hippocrates came and found him busie in dissecting of Animals, is called in question by Cortesius in *Miscellaneis*, as Riolanus tells me. And indeed I cannot perswade my self that those Letters in the end of Hippocrates works are genuine. But to pass by this exception. All that Hippocrates writes in his second Letter to Damagetus amounts to this. That at the request of the people of Abdera, he came to cure Democritus of his supposed madness, that being conducted to his house, he found him sitting under a Plantanus tree in a garb not much differing from a madman, and postures that had something of the same humor: Ipse Democritus sub ampla & humillima plantano sedebat, in veste crassa citra humeros desinente, solus, discalceatus, super lapidea sede, valde pallidus ac macilentus, promissa barba — Ipse vero cum inculto ornatu, super genibus, librum habebat, sed & alii quidam ex utraque parte adiacebant. Accumulata etiam erant Animalia multa per totum resecta. Et ipse quidem aliquando concitate incumbens scribebat, aliquando quiescebat, diu multumque se continens, & in seipso meditans. Deinde non longe post, his peractis, exurgens deambulabat, & viscera animalium inspiciebat, & depositis ipsis digressus, rursus desidebat. — When Hippocrates approached near him, he was busie writing, and even then his deportment had something odde and Enthusiastical in it. Ταῦτα ἐμείδιε, τὰ δ' ἐξέγνεα — ὅτι δ' αὐτοῦ γεγράφειν ἐνθυσιώδως, & μὴ ὀρεῖται. After the first complements (which are great and not usual in those days) Hippocrates demanded of him what he was writing? He replied about madness: and what

about that, said the great Physician? To which he answers again thus. Τί γὰρ εἶπεν, ἄλλο πλὴν ἐῖς τὸ εἶναι, ὅσας ἀνθρώποις ἐγ-
γίνεται, καὶ τίνα τρόπον ἀπολοφείλο. Τάτε γὰρ ζῶα ταῦτα, ὅσος, ἔφη, ὁρῶν, τέτε μὲντοι γε ἀνατέμνω εἵνεκα, καὶ μισέων Θεῶν ἔργα, χολῆς
ἢ διζήμην. Ὁ φύσιν καὶ θέσιν. *Quid enim, inquit, aliud quam quid sit, & quomodo in hominibus generetur, & quomodo allevetur.* Nam animalia hæc, quæ vides, inquit, hujus gratia refeco, non quod odio habeam opera Dei, sed bilis naturam ac sedem quaerens. How much this and the whole passage of that Interview makes for Mr. Glanvill's purpose, I see not. Hippocrates doth not blame him for anatomizing of animals, nor is surprized at the novelty, nor troubled at the impiety of the action. Democritus knowing what apprehension the people had of him, and fearing lest the garb and posture he was in might confirm to Hippocrates, the truth of the report tells him how he employed his thoughts, and that the Animals that lay there upon the ground, were not slaughtered by him in a frantick rage, out of hatred to the creatures of God; but cut up Anatomically by him, thereby to discover the seat and nature of the gall, and the effects it had upon Maniacks. Whereupon Hippocrates was wonderfully pleased with the testimony he gave of the soundness of his judgment, and after some other prudential discourses, departed, satisfied about the good condition of his Patient. But if Democritus were not out of his Wits, I believe Mr. Glanvill was to alledge such an impertinent story. But idle persons, that would upon easie termes acquire the repute of Learning, by citing quotations, are often thus imposed upon, and liable to mistakes. And perhaps there may be some person in the world that I know not of, who may have abused our Virtuoso in this case: but He should have minded the Text better.

What Pope Boniface the Eighth did, I know not. But I am apt to suspect a person that hath told me so many untruths. The place in the Canon-Law, which I am apt to believe Mr. Glanvill never saw: It is lib. 3. Extravag. titulo de sepultura. And Riolanus, whom I had rather credit, gives this account of it; *Inter Christianos Papa Bonifacius octavus barbarum*

barum & inhumanum judicavit, peregre mortuorum corpora exenterare, carnibusque spoliare, ut ossa lecta & tersa in locum sepulturae, quem vivi delegerant, commode perferri possent. It seems that Pope thought it an inhumane and barbarous thing not to dissect bodies for information sake; but to embowel them, and reduce them into Skeletons, and so to carry their bones to distant places to be buried according to the desire of the deceased. I am apt to think this Canon was never applied to Anatomy, and perhaps there is nothing of Excommunication in it, since Riolanus doth not mention it.

As for the gross errors in Anatomy which Galen is charged with, I know not one that incommodes a man in point of Practice, but that the Method he took (however founded on false principles) was secure and good. Upon which it happened that all his followers implicitly submitted to his Anatomical relations without further Enquiry, and taught his Errors for truths: And perhaps a certain vanity seized Galen to contradict the famous Herophilus out of dissected Apes, thereby to raise his own credit. However it was, from him arose most of the mistakes in Anatomy, that were translated to the Moors, and from them to our Ancestors. The Moors are said by their Religion, to forbid the meddling with dead bodies: Which Assertion, how true it is, I know not, because that Avicenne and Albucasis commend the study of Anatomy, as necessary in a peculiar manner to Chirurgeons. They practised sundry Chirurgical operations in Cauteries, and opening Arteries, which seemed to require an Experimental skill in dissections; and which were their own inventions. In fine, Averroes pleads not any scruples of Religion for his ignorance in Anatomy, but laments the Civil Wars of the Moors, which hindered him from inquiring by dissection into those controversies betwixt Galen and Aristotle, which he had occasion to debate. Yet did Averroes at all adventures, assert the credit of Aristotle against Galen, out of an emulation against Avicenne who was a Galenist. From these two great men amongst the Moors, as the knowledge of Physick and Philosophy, happened to be imparted to the barbarous Christians of the West, so was there a feud propagated betwixt the Philosophers,

Hinc [Galen] universi fidem dedere, ut nullus repertus sit medicus, qui in Galeni Anatomicis voluminibus vel levissimum quidem lapsum deprehensum esse, aut eoque minus deprehendi posse censuerint. Vesalius in dedic. lib. de Fabric hum.

sophers and the Physicians; and the controversies were the more intricate, because the Sciences had not been so well translated out of Greek into Arabick, as was requisite; and they were worse put into Latine. After the taking of Constantinople by the Turks, when some learned men had fled thence into Italy, they began to impart unto the world new books, to acquaint the West with the Greek tongue, and with the Greek Works of Hippocrates, Aristotle, and Galen; and thereby multiplied many Controversies in the practice of Physick, about Phlebotomy, and Purging, and the like; especially about bleeding in a Plurisy, on which side it should be done. The contention was fierce, and some proofs being fetcht out of Anatomy, some persons were excited to enquire into humane bodies dissection, thereby to determine this controversy, and also the others betwixt Aristotle, Galen, and others. Amongst these Vesalius was (I had almost said) the first and principal, and by his indefatigable pains prevented much the industry of others. After him Fallopius and Eustachius were the most remarkable; though many others came in with their little inventions to make up the cry, and failed not to supply the inutility of their discoveries with excessive clamor. What Apologies were made for Galen by Sylvius,

Yet neither are all the exceptions made by Vesalius against Galen allowable. Galenum aliquando in verbis potius quam in sententiis carpit, aliquando murilum (quod facere debuerat) minime excusat, ac saepe indignius, quam Anatomieum, Philosophum, ac Medicum tam insignem deceret, carpit ac accusat, Fallopius observat. anatom. p. 3.

and others, would be tedious to relate; they being so ridiculous, and repugnant to common sense, that nothing could stop the growing glory of Vesalius and his followers. The issue of all was, that as Hippocrates lost no credit by an ingenious confession of his

mistake about the Sutures in the head of Autonomus; small errors being not observable in great Authors: So Galen still retained a great repute in the world, his other Works having advanced him above the effects of petty calumnies, or defaults. And the great Guinterus Andemacus, a competent Judge of old and new discoveries in Physick and Anatomy, gives this censure upon those curious Disquisitions:

De vet. & nova med. comment. 2. dial. 5 p. 261.

Multa in rerum natura extant, quorum notitia non quidem Medicum aptiorem facit, sed medicina tantum profectum reddidit.

ait, Sic nulli ob accuratam illam, ne dicam curiosam nimis, partium corporis perscrutationem Medici excellentiores, sed ob curationes dextre sentatas absolutasque censeantur. Ideo etiam Hippocrates, Galenus, Erasistratus, & plures id genus alii, tantum ex rerum natura & corporis humani fabricatione scrutari voluerunt, quantum ad medicinam probe exercendam ex usu esse putarunt. Non eadem enim semper omnibus similem ob causam conducunt. Sic Anatome aliter physicis inseruit, qui disciplinas ipsas propter se amant; alterii, qui illam non adeo affectant, sed nihil temere a natura factum esse demonstrant: aliter his qui argumenta (ut ille ait) ad actionem quandam vel naturalem vel animale cognoscendam, ex partium humani corporis historia adferre nituntur: aliter medico qui manum aculeis, telorumque cuspidibus probe exprimendis vel alicui parti apte excidenda vel sinibus & fistulis & abscessibus incidendis adhibiturus est; quo Anatomes usn nihil aequae est necessarium.

Certainly it had been an action of greater ingenuity in our Novelists to have acknowledged the many excellent things that are in Galen, which are so advantageous to Physick, then to endeavour to render a man multi ingenii, multaque nihilominus habiturum, contemptible by the representation of a few defects in him, relating to things not much material to his profession. It must always be said of Galen, that he was the man who by his dextrous wit, happy practice, and great eloquence, as well as universal learning, did restore the glory of the Hippocratical Physick, which was in a manner extinct in his days. He again brought Anatomy into request, which had been slighted and dis-used so long: he himself dissected bodies privately, and publickly in the Temple of Peace; and amongst other Discoveries of his own, it is observable that he found out the use of recurrent nerves, whose influence upon the voice is such, that as they are pressed or cut into two, so a Dog becomes perpetually mute, or onely howls, never barks. Had that curiosity been but the discovery of some Novelists, what a noise would they have made? what boastings should we have had? But all that is good in Galen is passed by, and to make way for the glory of our new

Vide Colum-
bum Anat. l.
14. & Vesali-
um de fabrica
corp. hum. l.
4. c. 9.

In-

Inventors, *Vesalius, Fallopius, Carcanus, Eustachius, Ingrassias, Columbus, Arantius, Varolius*, are not so much as mentioned by Mr. *Glanvill*; to the end that we may (if we will) believe that it is the *genius of this Age* alone, which puts men upon discoveries, and that before *them* there were none that had merited *this remark*.

Plus ultra,
pag. 13.
Riolanus as-
serts the first
invention of
the Valves in
the veins to
Hippocrates.
Anthropogr.
l. 3. c. 49.

Riolanus An-
thropogr. l. 3.
c. 49. Mar-
quard. Slegel.
de circul.
sangu. l. 1. p. 7.
Bartholin. in
libello de
venis c. 2.
Varolius Anat.
l. 3. c. 3 Ri-
olan. Anthro-
pogr. l. 2. c. 14.
Bartholin. A-
nat. ref. l. 1. c.
11.
Plus ultra,
pag. 14.

"I instance in the most remarkable of their discoveries
"briefly: and those I take notice of are, *The valves of the*
"veins, discovered by *Fabricius ab Aquapendente*: The valve
"at the entrance of the Gut Colon, found as is generally
"thought by *Baughin*.— I cannot think these to be so re-
markable discoveries, but that he might have found out ma-
ny more, since the time of *Vesalius*, I shall name one who
gave a great light to the Circulation of blood, and that is the
discovery which *Realdus Columbus* made, that the blood did
pass through the Lungs out of the right ventricle into the
left, and so into the Aorta, and all the body. As for the val-
ves in the veins, I believe there are few that think that *Fabri-*
cus ab Aquapendente, was the first discoverer of them: for
they were shewed to *Fabricius* by father *Paul*, that famous
Venetian Monk, as appears in his life written by *Fulgentio*,
and extant in English. Neither indeed was Father *Paul* the
first Inventour of them, for they are described before by *Ja-*
cobus Sylvius, Professor of Physick at Paris, as *Riolanus*, and
Slegelius, and *Bartholinus* do inform the world. And as to
the valve in the beginning of the Colon-gut (if there be such
a one, and that it be not rather a protuberant circle, arising
from the joyning of the Ileum and Colon, as *Pavius, Falcobur-*
gius, and *Riolanus* hold) whatsoever it be, it was discovered
by *Varolius*, and called the *Operculum Ilei*, before that ever
Baughin was born, as *Riolanus* doth demonstrate: there
are two others that may as justly pretend to it, to better me-
rit the credit then *Baughin*, and those are *Solomon Albertus*,
whom *Bartholin* inclines unto: and *Joannes Pothius* of *Mont-*
pelier, whom *Riolanus* also favours.

"The Sinus of the veins, and their use found out by Dr. *Wil-*
"lis— I wonder Mr. *Glanvill* should not acquaint us with
those particular Sinus which Dr. *Willis* should finde out; for
since

since in common discourse, when we speak undeterminately of the *Sinus*, we understand those of the *brain*, it did become him to tell us which others he meant: lest a man that knew his skill, should apprehend him so ignorant as to think that Dr. Willis had newly found out those *Sinus*, one whereof hath for above two thousand years born the name of *Herophilus*, and was called *Torcular Herophili*, in Greek *Ανρός*. But I shall be so favourable as to think that these are not the *Sinus* he meant, Dr. Willis having tried nothing more in prosecution of them, then to pursue the *Circulation of the blood* there by the injecting of *Inkish liquor*, whereas *Wepferus* used a *tincture of Saffron*; and *Bartholin* evidenced the same thing by a pair of bellows, or tube and winds insufflated. I do beleieve that He, or they that suggested this to him, did mean the *Sinus* or *vena vertebrales*, which are described exactly in the Doctors Book, in the thirteenth Table. But I must tell him, that whatsoever there is in that Piece, which is *Anatomical*, the glory thereof belongs to Dr. Lower, whose *indefatigable industry* produced that *elaborate Treatise*; and any man that knows the *great practice* of that other Doctor, will grant, that although he could not want *abilities*, yet he wanted *leisure* to attend to such painful and tedious inquiries. Dr. Willis indeed candidly doth relinquish this honour to Dr. Lower, and his pains deserved your commendation (Mr. Clavill) if that be of any value, so much more then those other inventions that are celebrated by the *Virtuosi*, by how much the subject was more minute and subtle which he was to trace. All that Dr. Willis contributed, that I hear, was the *discourses* and *conjectures* upon the *Anatomical deductions* of Dr. Lower, which as *ingenuous* as they are, I am sure neither are, nor ever will pass all for *inventions*. But in the case I now mention, I am confident that Dr. Lower is so ingenuous, as to acknowledge that what He exhibits there, is taken out of the *Cuts* of *Varolius*, as far as where they empty themselves into the *subclavian veins*: but I think that as to the *Synus*, or *veins*, and *arteries* all along the *Spine*, as there is not any *Cut* of them extant before that I hear of, so I allow them to pass as his invention: but the accurateness of his *Neurology* equals to the best Inventors.

N

But

Dr. Willis de
cerebro c. 6.
p. 82, 83.

Jo. Jac. Wep-
ferus Apo-
plex. p. 116.
Bartholin. A-
nat. l. 3. c. 7.

But if Mr. *Glanvill* injur'd Dr. *Lower* in attributing what he invented unto Dr. *Willis*, he will not conceal his own discoveries, you shall see what a *Divine* can do in *Physick*. 'St. Sr'! I adde the *origination of the Nerves*, which were of old supposed to arise out of the substance of the *brain*, but are found by late *Anatomists* to proceed from the *medulla oblongata*. This is such an *Addition* as becometh our *Novelists*, most that they pretend unto being no more then Mr. *Glanvill* here boasts of; and which is so pitiful an accession in *Anatomy*, that none ever bragged of it, or upbraided the *Ancients* about it, that I remember, except *Bartholin* may be said to do it. As to the late *Anatomists*, unto whom he ascribes this *invention*, I would he had told their names. The difference betwixt the *cerebrum*, *cerebellum*, and *medulla oblongata*, is a modern (but not very late) distinction. Some have made the *medulla oblongata* and the *spinal marrow* to be but productions of the *brain* and *cerebellum*, from whence it raiseth it self by four *foundations* or *roots*: the discrepancy betwixt that and the other parts whence it is *originated*, not being such as to justify any great contest about it: since it is the usual course of *Nature* in its progress from the union of two different bodies, to produce an *intermediate substance*, participating of the nature of both. *Spinalis medulla ortus*

Vol. Coiter. observ. anatom. miscel.
Ex substantia cerebri & cerebelli quatuor
radicibus oritur primum truncus insignis.
Medulla Spinalis appellatus, ex quo multi
emergunt surculi, nomine nervorum insi-
gati. *Varolius* Anatom. l. c. 12. p. 12.

*principium rectius cerebro atque cere-
bello acceptum fertur, unde non immerito
caudex, sive processus, sive soboles cerebri
appellatur: nam vix in ullo, nisi in du-
ritie (est enim cerebro aliquanto solidior*

& firmior) videtur a cerebro differre. Some have made the *brain* & *cerebellum* to be productions of the *spinal marrow*, which enlargeth it self within the *skull*, and generateth those two *Apophyses* called the *cerebrum* & *cerebellum*. In fine, it doth not appear that the *Ancients* mistook much the place of the *origination of nerves*, if you reckon amongst them *Vesalius* and *Fallopianus*: but they said they rose all from the *brain*, understanding by that word all that which is included within the *skull*, and termed that to be the *spinal marrow*, which was without the *skull*, and whence those other *paria nervo-
rum*

rum seem to rise, which *Anatomists* describe. And this subtilty of Mr. *Glanvill* is so little regarded by late *Anatomists*, that *Mœbius* (a man of as great note as most are) slights it by the example of *Hofman*, whose sense I shall here report :

Monendi sunt adolescentiores, ne forte morentur illos qui neglecta veteri distinctione dicunt, Omnes nervi sunt a medulla, sed alii ex illa, antequam cranio excidat, alii ex eadem, cum jam in spinam delapsa est, & Spinalis dicitur. Quid enim hoc aliud est, quam frustranea nominum

novatio? Cum dico me de nervis ex cerebro ortis acturum, intelligo totum id quod cranio continetur. There is another Origination of the nerves, which is as ancient as Aristotle, and which Hofman and Vander Linden assert, whereby they are deduced immediately and formally from the brain, but immediately and materially from the heart; for so much as they hold each nerve to be an Artery vested with the membranes of the brain, and so issuing to several parts. This opinion is very agreeable to the observations that occur in the practice of Physick, and their arguments seem to me so plausible, that I am soaverse with Mr. Glanvill to proclaim a new origination of the nerves, that I much doubt whether the followers of Galen were not deceived, and the Peripateticks in the right. See Vander Linden Disp. 38. de vasis & nervis, and Hofman de partib. similar. in thes. de orig. nerv. sec. Aristot.

It is clear now that Mr. *Glanvill's* new addition amounts onely to this, that the *Ancients* did some of them hold that the nerves had their original from the brain; others deduced them from the heart. Some (perhaps before *Varolius*) did subdivide the brain into several parts, and said that the nerves had their origination from the medulla oblongata, and not from the cerebrum and cerebellum. This nicety Dr. *Willis* makes some use of, but since he explicates no-

Mœbius fundament. med. c. de ulu nerv. p. 606. Caspar Hofman. Instit. med. l. 2. c. 65. sec. 1.

So Dr. *Charlton* in his Discourse to the Royal Society concerning the Brain, takes the liberty to understand by the Cerebrum as well as others, totum illud corpus quod Calvaria concavo continetur (pag. 67. de Propr. cerebri humani) though afterwards, when he comes to speak more accurately, he treats of the Medulla oblongata thus: Cerebro proxime subjicitur anima nervorum ad sensus spectantium mater, & funis argentei (sicut Sapiens in Ecclesiaste eleganti sed obscura Allegoria vocat Medullam spinalem) principium Medullae scilicet intra cranium oblongata. Behold the addition of Mr. *Glanvill*!

Vide Varolium l. 1. c. 3.

If *Varolius* found it out, as I believe he did, by a peculiar way of dissolving the head, what is it that Mr. *Glanvill* then ADDS? I am sure that *Bracassatus* saith, *Varolius* primus principium Spinalis medullae vel intra cranium sibi obolescere in nervos, quorum origo olim a cerebro petebatur, docuit.

thing of the brain with a mechanical accurateness; I shall only subjoin, that whosoever shall view or eat that which they call *Medulla oblongata* & *spinalis*, and compare it with the marrow that is in the bones otherwise, he will think it a less impropriety of speech, to say the *Medulla oblongata* is a part of the brain, then to term it a *Medullary substance*.

"And though the *Succus Nutritius* be not yet fully agreed upon by Physicians, yet it hath so much to say for it self, that it may not unreasonably be mentioned amongst the new Inventions—— It's strange Mr. Glanvill should entitle this opinion about the *Succus Nutritius* to so great a degree of probability, as he doth. Physicians are so far from being fully agreed upon it, that, excepting Dr. Glisson, Dr. Charleton, and perhaps one or two more, the rest do generally reject it. Dr. Highmore, Dr. Willis, and Bartholine have written against it; and so hath Deusingius writ a particular discourse against it. Nor do I doubt, but whosoever peruseth those Authors which I refer unto, will be so far from imagining it reasonable to ascribe the *Succus Nutritius* to the number of modern Inventions, that he will term it at best but an ingenious Paradox, which when the first surprise is over, vanisheth with the appearance of being ridiculous. How much doth our *Virtuoso*, and Bartholine differ? *Prodeat Herophilus, ex antro educatur Democritus, advocentur prosectores cujuscunque fortis & aetatis, si in dissectione corporum nervis ullum invenerint liquorem nutritioni opportunum, nolim inter eos locum mereri.*

"But of all Modern Discoveries, Wit and Industry have made in the Oeconomy of humane nature, the noblest is that of the Circulation of the blood, which was the invention of our deservedly famous Harvey. 'Tis true, the envy of malicious Contemporaries would have robb'd him of the Glory of this Discovery, and pretend it was known to Hippocrates, Plato, Aristotle, and others among the Ancients; but who ever considers the expressions of those Authors, which are said to respect the Circulation, who finde that those who form the inference, do it by a faculty that makes all kind of Compositions and Deductions, and the same that assists

"the

Highmore de
affect. hypo-
chondr. c. 4.
Willis in Ana-
tome cerebri
c. 20.

Bartholin spi-
cileg. 1. c. 3.

Bartholin.
spicileg. 1. de
vafis lym-
phat p. 23.

Plus ultra,
pag. 15.

"the *Enthusiasts* of our days, to see so clearly all our altera-
 "tions of *State and Religion*, to the *minuteſt particulars* in
 "the *Revelation of Saint John*. And I think it may be as
 "well concluded from the first chapter of *Genesis*, as from
 "the *remains* of those *Ancients*, who if *they* had known
 "this *great and general Theory*, how chance they speak no
 "more of a thing, which no doubt they had frequent oc-
 "casions to mention? How came it to be lost without
 "Memory amongst their followers, who were such *su-*
 "*perſtitious Poters* upon their Writings? How chance
 "it was not shewn to be lodged in *those Authors* before the
 "days of *Dr. Harvey*, when *Envy* had *impregnated* and de-
 "termined the *Imaginations* of those who were not wil-
 "ling any thing should be found anew, of which themselves
 "were not the *Inventours*? But 'tis not only the re-
 "moteſt *Ancients*, whom time hath *consecrated*, and di-
 "ſtance made *venerable*, whose *Ashes* those *fond men* would
 "honour with *this discovery*; but even much later *Au-*
 "thors have had the glory fastned upon them. For the
 "Invention is by some ascribed to *Paulus Venetus*; by o-
 "thers to *Proſper Alpinus*; and a third sort give it to
 "*Andreas Gaſalpinus*. For *these*, though either of them
 "should be acknowledged to be the Author, it will make
 "as much for the design of my discourse, as if *Harvey*
 "had the credit: and therefore here I am no otherwise
 "concerned, but to have *justice* for that excellent man:
 "and the World hath now done *right* to his *Memory*,
 "Death having overcome that *Envy* which *Dogs living*
 "*vertue* to the *Grave*; and his *Name* rests quietly in
 "the *Armes of Glory*, while the *Pretensions* of his *Rivals*
 "are creeping into *darkneſs* and *oblivion*.

Whether those that have gone about to deprive *Dr.*
Harvey have been incited by *Envy* and *Malice*, it is
 hard for any *conſiderate* man to judge; since those which
 first proposed the *doubt* about the *Author*, were great friends
 to the *Theoreme*; such as *Wataus*, who first mentioned it;

Riolanus,

Riolanus, Nardius, Fracassarus, and Joannes Antonides Vander Linden: All of them pay a great respect to Dr. Harvey's Performances; All of them concur with him generally in his Assertions, saving that *Riolanus* made some variation therein, and perhaps his passion might blinde his candour; though I do not think so, because I finde him zealously vindicating of Dr. Harvey from those imputations by which *Walaus* endeavoured to transfer the credit of the invention upon Father Paul.

Another thing I must take notice of is, that Mr. Glanvill speaks very peremptorily about a thing he hath not enquired into, for it is evident that he never read the passages out of the *Ancients*, which are cited by *Walaus* and *Riolanus*, to shew they were not altogether ignorant of that motion of the blood which is called *Circulation*. He thinks it may be as well concluded from the first chapter of *Genesis*, as from the remains of the *Ancients*. And why so? Is there any thing mentioned in the first chapter of *Genesis*, that sounds like the *Circulation of the blood*, or any words that can be applied unto this late discovery? not one. But any man that understands Greek, must confess that the words ἀνὰ πῶλιν, πλὴν μύελων, and περίοδοι in *Hippocrates* (whatever he meant by them) do most emphatically signify the *Circulation of the blood*, as it is now proposed. If I merit not to be believed herein, take the judgement of *Julius Caesar, Scaliger* upon *Aristotle* de insomn. xiiij. 1444. Ποταμοὶ ὅ μὴ κατὰ τέρας γινώσκονται ἀπὸ ἀμαλῶν περιόδον σημαίνουσι. I shall not from this place deduce the mystery of the *Circulation of the blood*, by saying that rivers circulate under ground thorough that sandy earth, which those that dig in Wells, when they come unto, they can descend no further: (which *Helmont* in the *Brabant* Dialect calls *Quellem*, other *Dutch-men* name *Well-ground* and *Well-sand*, and after return unto the *Sea* again by open Channels: But whatever the intent of the *Philosopher* was, that ἀμαλῶν περιόδοι, properly imports such a thing, and that we have the name given it by *Aristotle*, this *Scaliger* confesseth, Ejus ad apotelesma xxxi. hæc sunt verba Αἷματι περίοδος, motum; ut in febribus accessionem. Circuitum Galvus

Galvus cum dicit, fideliter, non plene explicat. Neque enim.

circumducitur sanguis, ut περιόδῃ impleat significationem

Nam in febribus idcirco dicitur περιόδῃ, quia revertitur pa-

roxysmus: quasi circumductus ob diem parum & vacuum a

morbo. From which it is evident, that if Scaliger had known

that the blood had circulated, he would have granted it to

have been properly expressed here in the Text: which is more

then He would say of any Apocalyptical discoveries, or de-

ductions of that opinion out of the first Chapter of Genesis.

And if the word περιόδῃ be so significant, it is hard to deny

that Hippocrates did not set down the thing it self in this pas-

sage, Αἱ φλέβες διὰ τὸ σῶμα ἑκχυμῶσιν, πνεῦμα, καὶ ῥεύμα,

καὶ κίνησιν παρέχονται ἀπὸ μῆς πολλαὶ διαβλαστάνουσι. Καὶ αὕτη

μὲν ἡ μία ὁθεν ἤρξαται, καὶ ἡ τελευτήκεν, οὐκ οἶδα. Κύκλῳ γὰρ

γεννημῶν, ἀρχὴ καὶ ἐντέλει. Vena per corpus fusa spiritum,

& fluxum, & motum præstant. Ab una multæ propagantur:

sed illa una unde incipiat, ut ubi desinat, non scio. Circulo enim

ducto, principium non invenitur. And in that other; Εἰς τρεῖ-

χας τροφὴν, καὶ εἰς ὄνυχας καὶ τὴν ἑσχάτην ἐπιφανείην ἐνδοθεν ἀφικνέσθαι.

Ἐξωθεν τροφὴν ἐκ τῆς ἑσχάτης ἐπιφανείης ἐνδοτάτω ἀφικνέσθαι. Εὐρροια

μία, ξύμπνοια μία, ξυμπαθεὰ πάντα. Καὶ ἡ μὲν ὀλομελίην πάν-

τα κάλα μέρῃ. ὁ δὲ τὰς ἐκαστὴν μέρει μέρει πρὸς τὸ ἔργον Ἀρχὴ

μεγάλῃ εἰς ἐσχάτον μέρῃ ἀφικνέσθαι. Ἐξ ἐσχάτου μέρους εἰς ἀρχὴν

μεγάλῃ ἀφικνέσθαι. In pilos alimentum [id est, sanguis nutri-

cens] & in ungues, atque extremam superficiem intus advenit:

feris alimentum ab extrema superficie intus revertitur. Corri-

vatio una, conspiratio una, consentientia omnia. Certe quod ad

communem naturam omnia: in quavis parte partes ad opus.

Principium magnum [id est Cor, per transmissos spiritus &

sanguinem] ad extremam partem pervenit: ab extrema parte

ad principium magnum revertitur. There are more passages

in the same Authour which seem to import the same thing,

though his usual brevity and obscurity is such, that had not

Harvey and others dilucidated the point, we had never, I be-

lieve, fixed this explication upon him, which amounts to no

more then a new gloss upon an old Text: which yet is suffici-

ent to check the largeness of Mr. Glanvills assertion. The

περίωσις of Plato, and his making the Heart to be the original

of

Hippocrates
de off. nat. t.
7.

Ex lib. de a-
lim. t. 4 12.

Plato in Ti-
meo.

of the veins, καὶ τὸ περιφερὲς καὶ πάντα τὰ μέλη σφοδρῶς αἵματι; these are something more then is to be found in the first of *Genesis*. And that passage of *Aristotle de Gen. Anim.* l. 4. c. ult. is so unlike any thing of *Moses's*, and so like to the doctrine of *Harvey*, that any man must blame Mr. *Glanvill*, for rashness of what he says. The words are thus set down by *Riolanus*, and I have not the *Original* by me to consult: *Cum cœlestia corpora circulariter moveantur, inferiora corpora motum illum imitari debent, cumque Oceanus fluxu & refluxu moveatur ab influxu Lunari, similiter humores talem motum habere necessum est.* Which words seem clear enough, so as to justify the *Epiphonema* of my *Author*, in opposition to our *Virtuoso*. *Quid ista significant nisi sanguinis Circulationem.* He that would be informed more fully about the judgement of the *Ancients*, whether there be any thing in them that discovers the *Circulation of the blood*, to have been known unto them; or that they were not totally ignorant, and without any apprehensions of it: let him read the first letter of *Walaus*, and the several Pieces of *Joannes Riolanus* about the *Circulation of the blood*, and the disputations of *Vander Linden* about the *Circulation of the blood*, in which he vindicates it in a prolix discourse unto *Hippocrates*. I will not trouble my self to transcribe them: It is evident that all men do give unto *Harvey* the credit of having so explicated it, and Anatomically proved it, that he may as well be termed the *Author* of it, as *Epicurus* and others the *Authors* of that *Philosophy* which they derived from *Pythagoras*, *Democritus*, *Leucippus*, and *Ocellus Lucanus*. Nor hath *Harvey* any other *Plea* and *Right* to the *Invention*, then that he did more fully and perspicuously declare it, and in the most judicious and solid manner assert what others had but hinted at, or faintly insisted on.

Nor is Mr. *Glanvill* any better acquainted with the notions of the *Modern Writers*, then he is with those of the *Ancients*. He saith, that some have ascribed the *Circulation of the blood* to *Paulus Venetus*. I must inform the Reader (who may easily mistake, if he be one of the ordinary *Comical Wits*) that it is not to be ascribed to *Paulus Venetus*, the great *Travel-
weller*,

seller, who is generally understood, when *that name* is mentioned; none can say that he brought it from the Kingdom of *Cathay*. But *Pater Paulus Sarpa* (or *Serpa*) or Father *Paul*, the famous *Venetian* Monk, of the order of the *Servi*; who signatified himself during the time that *Venice* was interdicted. He was a Student at *Padoa* at the same time that *Harvey* was there, and discovered to *Aqua pendens* the valves in the veins, which discovery that great *Anatomist* appropriated to himself; and so *Harvey* was thought to have abused the same Father. But since *Fulgentio* in the life of *Padre Paolo* doth not challenge *Harvey* for this Cheat, as he doth *Fabricius* for that other; and since *Marquardus Slegelius* could not hear of any such thing upon a strict Enquiry at *Venice* and *Padua*, I know not any since *Walaus* and *Franciscus Ulmus*, that have ascribed the invention to *Paulus Venetus Servita*.

Neither did I ever read of any man that attributed it to *Prosper Alpinus*: nor is it credible that any ever did so. For that great *Physician* established his glory by being an excellent *Practitioner*, and not by any *Anatomical* curiosities, which he rather contemned, then pursued: and till I know what Author Mr. *Glanvill* follows, I believe the mentioning of him was occasioned by that way of discourse which is common to the *Wits* of this Age, to blunder out any thing: and by laughing at improbabilities (of their own suggestion) to explode substantial truths, or represent them as forgeries. But if any did deceive the world in attributing the Circulation of the blood to *Padre Paolo* and *Prosper Alpinus*, it doth not follow but that *Andreas Casalpinus* was the first Inventor of it, and proposed it to the world in his *Medical* and *Peripatetical Questions*, though not in any Set Discourse, but as it casually falls into the discussion of other Problems: Whereupon it was little regarded, and not enquired after; the book being also scarce, and he being of that faction of *Physicians* which adheres to *Aristotle* against *Galen*, whence it hapned that few read his *Paradoxes*, and one of the bravest men of the latter Age hath been almost buried in oblivion. However, an ingenious *Florentine*, call'd *Joannes Nardins*,

Vide Slegel.
de Motu San-
guinis c. 2. &
Ri lan. in
not. ad ep.
Walaui.

hath asserted the repute of *Andreas Casalpinus*, for pre-
cedency to *Harvey* in the *Discovery*; nor doth the same *Author*
doubt, but that *Erasistratus* was of the same opinion: but he
saith of *Casalpinus* this: *Fœlix cui contigit post mortem nan-*
cisci clarissimum Patronum Guglielmum Harveium Regium
Medicum, nobisque per charum, qui abortivam illam opinio-
nem excoluit adeo, ut nihil cultius nostro seculo, nilque mirabi-
lius occurreret curiosis & amanarum literarum amatoribus. To
decide this question, and to put an end to those disputes which
trouble some of our *Virtuosi* so much, by reason of that little
converse they have with *Books*, I shall draw out the opinion
of *Casalpinus*, as he expresseth himself in his *Dispu-*
tations.

Andreas Ca-
salpinus Qu.
peripatet. l. 5.
qu. 3.

As a great abettour of *Aristotle*, he avows that the *Heart* is
the principal part in man, and the original of the *veins*, *ar-*
teries, and *nerves*; which is the opinion of *Hofman*, *Van der*
Linden, and other *Aristotelian Physicians*.

Ib. qu. 4.

He describes the *Fabrick* of the *Heart* as exactly as any
of the *Circulators* in reference to the *Valves*, so much talked
of; but he declares not their shape: *Vasorum in Cor desinen-*
tium quadam intromittunt contentam in ipsis substantiam, ut
vena Cava in dextro ventriculo, & arteria venalis in sinistro:
quadam educunt, ut arteria aorta in sinistro ventriculo, & vena
arterialis pulmonem nutriens in dextro: omnibus autem mem-
branule sunt appositæ & officio delegate, ut oscula intromittentia
non educant, & educentia non intromittant.

And for the account of the *Vena arteriosa*, and *Arteria*
venosa in the *Lungs*, *Harvey* is not more perspicuous, then
he is afterwards, where he makes the one to be an *Artery*, the
other a *veine*, viz. *Putaverunt autem Medici usum hunc non*
videntes commutata fuisse vasa in pulmone, ut Arteria quidem
similis esset vena, vena autem similis Arteria: appellantes ve-
nas vasa omnia quæ in dextrum ventriculum desinunt, Arterias
autem, quæ in sinistrum: figmenta multa & absurditates excogi-
tantes ut usum invenirent. Pulsat igitur in pulmone vas dextri
ventriculi, hæc enim e corde recipit, ut Arteria magna, & si-
militer fabricatum est ejus corpus. Vas autem sinistri ventri-
culi

culi non pulsant, quia introducitur tantum, & ejus corpus simile est reliquis venis.

He holds that the motion of the Heart and Arteries depends not upon any pelfick Faculty, but that it ariseth from the *ὀρχωσις*, ebullition, or effervescency of the blood in the Ventricles; and that the Heart and Arteries are dilated at the same time, the blood dilating the Heart, and issuing out thorough the valves of the Aorta and Pulmonique Artery at the same instant, which is pure Cartesianism.

He holds that the Blood comes up from the veins to the Heart, and there acquires the last Perfection, and becomes vital and spirituous: in the mention of the Arterious Blood, he useth indifferently the termes of Blood, spirit, and natural heat, which I desire may be observed, lest the proofs seem not full enough, and he be construed to speak of nothing but spirits and natural heat in the Arteries. He saith, that this Blood having acquired its Perfection in its passage through both the ventricles, is distributed through all the parts of the body, for its nutriment by the Arteries, in which Arteries there is such a constant quantity of Blood, that the effluency of that in the Heart impells the whole continuation of the Arteries, so that they beat all at once.

Cum enim pulsatio Cordis & Arteriarum sit accidens quoddam quod ex necessitate insequitur humoris in corde effervescentiam, qua sanguinis generatio perficitur, ut in ceteris quæ igne elixantur, accidit. lib. de vita & mort. c. 2. intumescente corde necesse est simul omnes Arterias dilatari, in quas derivatur fervor: non enim repleti potest una pars, quin totum fiat majus: ubi non omni ex parte vasa quæ continua sunt fuerint exinanita. Nam nullo intus existente corpore, non contingit simul repleti principium & extrema, cum motus non fiat in instanti: existente autem per totos canales aliquo spiritu, simul ac in principio alius fuerit genitus, necesse est totum simul dilatari, unum enim sit spiritus accedens cum toto. Cum ergo totum reddatur majus simul ac accesserit pars, non potest una pars dilatari, quin eodem tempore dilatetur totum.

Mark this, where he makes the Heart and Arteries to be one continued receptacle of perfect blood: by which you must explain what he says in some places, as it only spirits or natural heat went into the Arteries or returned by the veins.

Est autem veluti totum quoddam Arteria omnes cum corde; Continuum enim est vas sanguinis perfecti. Spiritu autem efflante inhabitum corporis, & distributo particulis sanguine, necesse est tumorem vasorum desiderare, quæ est pulsus contractio. Continue autem hoc fit, quia continua est partium nutritio, & continua sanguinis generatio in corde. Elevatio igitur Spiritus a calore fit, non tamen temere, sed alicujus gratia. Nam sine hujusmodi amplificatione non fieret distributio alimenti in omnes partes.

He plants a kind of *Flammula cordis*, or fire in the heart, which causeth the ebullition, and imprints a spirituousness in the blood that issueth out into the Arteries. *Hujusmodi locus Cor est in quo secundum Naturam elementum præparatum ardere possit, & fieri spiritus: vena alimentum suppeditant, Arteria flammæ spiritum recipiunt.*

He saith, that the Blood moves towards the Heart, as the Oyle to the flame of the burning Lamp, and that the Valves as the orifice of the *Vena Cava* which immit the blood, are placed there to moderate the source of the blood, lest it should fall in too fast; & extinguish the vital fire: and that the valves at the entrance of the *Aorta* do flie open upon the effervescency of the blood, by the pressure of it every way, to get more room: it finding no out-let but by those yielding valves, which were so placed, lest upon any accident, or violent passion, the arterious blood should regurgitate into the Heart, *Motus fit ex venis in Cor caliditate alimentum trahente, ex corde autem in arterias, quia hac solum patet iter propter membranarum positionem, posita autem sunt hoc modo membrana, ne unquam contingeret contrarium motum fieri, quod accidere posset in vehementibus animi perturbationibus, aut aliis causis, a quibus sanguinis retractio fit ad Cor: Obsistunt enim huic motui membrana. Nam si hoc modo condite non essent, ignis cordis vel levi causa extingueretur. Si enim motus fieret contrarius simile esset, ac si flamma compingeretur deorsum ad alimentum, quod cum minime sit præparatum, aut copiosius quam oportet, ignem suffocat. Oportet enim alimentum præparari, & paulatim dispensari ad locum flammæ.*

He saith that this arterious blood, or spirit, is distributed into

into all parts of the body, with great *celerity*, and that it is that which *nourisheth the parts*: and that upon its diffusion into the *habit of the body*, the *spirits* are very much *exhausted*, and the *corpulent* part of the *aliment* doth remain, being coagulated partly by *heat*, and partly by *cold*.

He saith, that the variety of the *pulse*, as to *strength* or *debility*, *celerity* and *slowness*, depends upon the nature of the *vital fire*, the nature of the *aliment* with which it is fed, and sometimes upon the particular *Fabrick*, or conformation of the *Heart*, in which that *Fire* is seated.

He placeth *Anastomoses* betwixt the *veins* and *arteries* every where in the body. *Osculorum communio est non solum in corde, sed etiam per totum venerum & arteriarum ductum,*

He saith that the blood is never *extravasated*, but where it is aggregated to any part by way of *nourishment*, or else it *putrifies*: he doth not understand how it should not *coagulate* if once *extravasated*; nor can he comprehend how it should be reassumed into the *veins* in such a case. *Venam continuam esse oportet, usque ad cordis ventriculos, ut inde omnis virtus descendat: nec ullibi contingit disjunctam esse; sanguis enim calore cordis destitutus concreescit, & tandem putrescit.*

He makes the *Blood* to pass betwixt the *right* and *left* ventricle of the *Heart*; partly by the *Lungs*, and partly by the *Septum Cordis*. *Pulchre igitur condita sunt omnia. Cum enim fervere oporteret in corde sanguinem, ut fieret alimenti perfectio: primo quidem in dextro ventriculo, in quo crassior adhuc continetur sanguis, deinde autem in sinistro, ubi sincerior sanguis est: partim per medium septum, partim per medios pulmones refrigerationis gratia ex dextro in sinistram mittitur. Interim autem pulmo abunde nutriri potest: totum enim eum sanguinem absumere, quem recipit, egreditur fines rationis. Non enim rara esset ejus substantia & levis, ut videtur si tantum alimenti, vim in suam naturam converteret.* This he thus further explains. *Pulmo per venam arteriis similem ex dextro cordis ventriculo fervidum hauriens sanguinem, eumque per anastomosin arteria venali reddens qua in sinistram cordis ventriculum tendit, trans-*
misso

misso interim aere frigido per aspera arteriae canales, qui juxta arteriam venalem protenduntur, non tamen osculis communicantes, ut putavit Galenus solo tactu temperat. Huic Sanguinis Circulationi ex dextro cordis ventriculo, per pulmones in sinistrum ejusdem ventriculum optime respondent ea quae ex dissectione apparent. Nam duo sunt vasa in dextrum ventriculum desinentia, duo etiam in sinistrum. Duorum autem unum intromittit tantum, alterum educit, membranis eo ingenio constructis. Vas igitur intromittens, vena est magna quidem in dextro, quae cava appellatur: parva autem in sinistro, ex pulmone introducens, cujus unica est tunica, ut ceterarum venarum. Vas autem educens Arteria, est magna quidem in sinistro, quae Aorta appellatur, parva autem in dextro ad pulmones derivans, cujus similiter duae sunt tunicae, ut in ceteris arteriis.

He holds that the spirituous or arterious blood is cast out, and diffused vigorously into the habit of the body, that the veins and arteries being continuous by Anastomosis, it returns to the Heart again, vigorating the blood of the vena porta and Cava as it returns: which is sufficiently intimated in that he deduces all the vigour and vitality of the blood from the Heart, and that this vigour or natural heat is carried over the body by the Arteries alone, and that it is necessary that the whole venous Systeme, or contexture of Arteries and veins be continuous, lest the blood in the veins, being destitute of the cordial heat, should coagulate and putrifie. He holds that this motion, or Circulation of the blood is without intermission: and that the swelling of the veins upon the Ligature is a sufficient proof of it. But he holds, that the recourse of the blood by the veins is greater in the sleep, then when we awake; which he proves thus, in that the veins are more full and tumid during sleep, then waking: and the pulse weaker, and more slow; as any man may observe. From whence he concludes, that the natural heat (which is the Arterious blood, as I observed before, to prevent all possible mistakes) which was otherwise in great part expended upon the nerves and sensories, doth in sleep return: and fill the veins more visibly (that exhaustion ceasing) then when we are not asleep.

His opinion will be best set down in his *own words*; and I think it necessary to do it, because *Nardius* hath done it so imperfectly, that one would attribute as little to his *allegations*, as to those which are cited out of the *Ancients*; and if I had not read *Casalpinus* long before, I should have thought the *Florentine* to have intitled *Casalpinus* to the opinion out of envy to *Harvey*, or out of a partial desire to advance the glory of the *Tuscan Academy* at *Pisa*, when *Casalpinus* was Professor. Thus that learned man writ about the year 1590. or a little after.

Andreas Casalpinus Quest. Medic. l. 2. Qu. 17.
edit. venetæ secunda in 4^{to}. A.D. 1593. fol.
234.col. 1.

‘Sed illud speculatione dignum videtur, Propter
‘quod intumescunt venæ ultra locum apprehensum, non
‘*citra*: quod experimento sciunt qui vena secant:
‘vinculum enim adhibent *citra* locum sectionis, non
‘*ultra*: quia tument venæ *ultra* vinculum, non *citra*.
‘Debuisset autem opposito modo contingere, si mo-
‘tus sanguinis & spiritus a visceribus fit in totum
‘corpus: intercepto enim meatu, non *ultra* datur pro-
‘gressus: tumor igitur venarum *citra* vinculum de-
‘buisset fieri. An solvitur dubitatio ex eo quod scri-
‘bit *Aristoteles*, de Som. c. 3. ubi inquit, Neesse enim
‘quod evaporatur aliquousque impelli: deinde converti
‘& permolari, sicut *Euripum*: calidum enim cuiusque
‘animalium ad superiora natum est ferri: cum autem
‘in superioribus locis fuerit, multum simul ite-
‘rum revertitur, ferturque deorsum. Hæc *Aristoteles*.
Pro

Pro cuius loci explicatione illud sciendum est :
 Cordis meatus ita a natura paratos esse, ut ex vena
 Cava intermissio fiat in Cordis ventriculum dex-
 trum, unde patet exitus in pulmonem : ex pulmone
 præterea alium ingressum esse in Cordis ventriculum
 sinistrum, ex quo tandem patet exitus in Arteriam
 Aortam, membranis quibusdam ad ostia vasorum
 appositis, ut impedian retrocessum : Sic enim
 perpetuus quidam motus est ex vena cava per Cor &
 pulmones in Arteriam Aortam : ut in *Questionibus*
Peripateticis explicavimus. Cum autem in *vigilia*
 motus caloris nativi fiat extra, scilicet ad sensoria :
 in *Somno* autem intra, scilicet ad Cor : putandum
 est in *vigilia* multum spiritus & sanguinis ferri ad ar-
 terias, inde enim in nervos iter est. In *somno* au-
 tem eundem calorem per venas reverti ad Cor, non
 per Arteriam. Iudicio sunt pulsus, qui expergis-
 centibus fiunt magni, vehementes, celeres, & cre-
 bri, cum quadam vibratione : in *somno* autem
 parvi, languidi, tardi & rari notante *Galeno*. 3. de
 caus. pul. 9, 10. Num in *Somno* calor nativus minus
 vergit in arterias : in easdem erumpit vehementius
 cum expergiscuntur. Venæ autem contrario se-
 modo habent : nam in *somno* fiunt tumidiore, in
vigilia exiliore, ut patet intuenti eas quæ in manu
 sunt. Transit enim in *somno* calor nativus ex ar-
 teriis in venas per osculorum communionem, quam *A-*
nastomosis vocant, & inde ad Cor. Ut autem sangui-
 nis exundatio ad superiora, & retrocessus ad inferiora
 ad instar *Euripi* manifesta est in *somno* & *vigilia*, sic
 non

(III)

non obscurus est hujusmodi motus in quacunque parte corporis vinculum adhibeatur, aut alia ratione occludantur vene. Cum enim tollitur permeatio, intumescunt rivuli qua parte fluere solent.

From hence it is clear that He held that the blood did circulate continually, falling into the Heart by the *vena Cava*, and issuing out by the *Aorta* into all parts of the body: that this motion of the blood was perceivable by the *Ligatures* at any time, but most manifest in the intumescence of the veins in sleep: at what time also the blood or natural heat (which is all one to him) did pass by way of *Anastomosis* out of the arteries into the veins, as well as at other times. So that we are not to imagine any interrupted circulation in him, but that it did constantly flow night and day, sleeping and waking, though with unequal celerity. In letting of blood he tells us, that the blood which first issues out is *venous*, and blacker then that which follows, and comes more immediately out of the *Arteries*. — *Venas cum Arteriis adeo copulari osculis, ut vena secta primum exeat sanguis venalis nigrior, deinde succedat arterialis flavior, quod plerumque contingit.* And he explains the motion of the blood, and natural heat thus, to prevent all ambiguity. *At instabit quis in somno nequaquam prohiberi calorem in cerebro & sensorii: pulsant enim arterie in toto corpore etiam in somno. At presente calore innato debuisset duci in actum facultas animalis. An calor innatus in somno viget in venis & arteriis, non in nervis sine quibus, non sit sensus & motus? Extra igitur ferri est nervos petere, intra autem non solum ad viscera, sed in omnes venas & arterias; unde operationes naturales magis perficiuntur in toto corpore.*

I hope I have now determined the *Question* which hath occasioned so many heats in the world concerning the *Circulation of the blood*, who was the first *Inventor* of it? I have demonstrated that *Andreas Casalpinus*, a rigid *Peripatetick* upon sensible *Experiments & Mechanical considerations*, not notional apprehensions, did not only discover this motion of the blood

P

even

Qu. Med. l. 2.
qu. 5. fol. 212.
col. 1. lit. c.

Qu. Med. l. 2.
qu. 15. fol.
230. col. 1.
l. c.

(even through the Lungs) but gave it the name of *CIRCULATIO SANGUINIS*; which name is not so proper in it self, considering the *Fabrick* of the *veins* and *arteries*, and the *Labyrinth* in which the *blood* moves *universally*, describing a *Line* no way *circular*, as that a man would have pitched upon it in any other *Age* then when *Gesalpinus* lived, when the *knowledge* of the *Learned Languages* was less *general* then now, and such a *barbarous stile* in *fashion*, as our *Inventour* used. But it was not so in the days of *Dr. Harvey*, who published his *Treatise* in 4^{to}. at *Francfort* in the year (as I take it) 1628. I must confess I am apt to think upon' this consideration, that *Dr. Harvey* (who was a *Peripatetique* Physician, and in whose time at *Padoa*, those *Physicians* did flourish with the greatest *repute* of *Learning* and skill in *Anatomy*, as well as *Philosophy*) did take up this opinion from my *Author*. And although there wanted not occasion by reason of what *Walaus*, *Riolanus*, *Slegelius*, and others had said upon the point, for him to declare the *original* of the *discovery*, yet in his two *Answers* to *Riolanus*, and his *Book* of *Generation*, He no where asserts the *Invention* so to himself, as to deny that he had the *intimation* or *notion* from *Gesalpinus*; but leaves the *Controversy* in the *dark*: which *silence* of his I take for a *tacite Confession*. His *Ambition* of *Glory* made him willing to be thought the *Authour* of a *Paradox* he had so illustrated, and brought upon the *Stage*, when it lay *unregarded*, and in all probability *buried* in *oblivion*. Yet such was his *Modesty*, as not to vindicate it to himself by telling a *Lie*. And such his *Prudence*, as rather to avoid the *debate*, then resolve it to his *prejudice*. Had *Dr. Harvey* been a *Chymist*, I should have guessed that he might have fixed upon the word *Circulation*, upon other reasons, and those congruous enough to his *Hypotheses*: but since (especially in the

days when he writ) those *Studies* were unknown to him, and not valued by him, I am inclined to think that He did receive his first *Intelligence* from this *Professour* at *Pisa* (where *Harvey* also was) and so improved those *hints*, that

Narravit mihi. Nobiliss. & Ampliss. Nicolaus Oudart, illustrissimi Principis Auriaci Confiliarius, meminisse se audire ipsum Harveium profitentem se revera primam circuitus sanguinis notitiam, & in eum sectione viventium inquirendi occasionem ex Herioto accepisse. Fuit is serenissimi quondam Regis Jacobi gemmararius, & Ma-

that in the divulging of his *Opinion*, they are as little to be seen, as the first *indeclines* which *Painters* draw in *Pictures* that are lost, when the *Pourtrait* is finished: or as in the first *Appearances* of *Plants* above-ground, where those *leaves* and *buds*, which often give growth to the succeeding *stemme*, *flower*, and *fruit*, are lost, or altered so

as not to be known. Let it suffice, that *Dr. Harvey* had parts and industry enough to have discovered it, had he not been prevented therein. And I should have imagined that our *Countreyman* had found it out, without any communication with those other books (a thing possible enough, and of which we have instance in the case of *Rudbek*, *Bartholine*, and *Folice*) but that the reasons I have alledged render the case suspicious. Had *Casalpinus* writ a distinct *Treatise*, I doubt not but much of the *Glory* had been his: since there are as great differences between one *Circulator*, and another, and greater, then betwixt him and *Harvey*: but his notions being confusedly laid down here and there in his *Peripatetick* and *Medicinal Questions*, and he being not ambitious to pretend to any new discoveries, only to illustrate *Aristotles* tenets. I shall allow *Harvey* the possession of his present reputation: nor do I give my self this trouble of collecting up into a method these confused assertions of *Casalpinus* out of any envy to the dead, but out of animosity to Pretenders to Wit and Learning, that brave it thus amongst us; yet if to be ignorant of what hath passed in the world heretofore, be an argument of childishness, there is not any thing more puerile then this sort of *Virtuosi*.

I might not dismiss my *Reader*, but that the great noise which this *Circulation of blood* makes in the *World*, enforceth me to speak a little more about the utility of this discovery, which our *Authour* describes to be the most noble of all those discoveries in the *Oeconomy of humane nature*, which *Wit and Industry* have made. I do confess I think the Arguments for it to be such as admit of no Answer in general;

theseos perius, eoque nomine Londini celeberris. Si verum hoc, verisimilius quoque est, vel ipsum, vel Sarpium, vel Heriotum, a Casalpio accepisse. Nemo enim mihi persuaserit, ab eorum nemine visum fuisse scriptum. [venetiis impressum] quod vel titulo se, nedum eruditionis varietate atque sublimitate commendat. Jo. Artor. Vander Linden disput. de circuit. sangu. exercit. 9. sect. 196. & exercit. 16. sect. 182.

but when we come to debate *how it passeth through the Lungs*, (which *Riolanus* almost invincibly disproves) or *through the Septum Cordis*, (which *Riolan* and *Bartholin* asserts, but *Harvey*, *Slegelius*, *Vander Linden*, and others, reject it on good grounds) what it is *that causeth the pulsation of the Heart*? what continues on the *motion of the blood* in the veins, even when a *Ligature* is made betwixt the *antecedent* and *subsequent blood*. Whether the blood be *diffused into the habit of the body*, and *reimbibed by capillary veins*, or *conveyed on by Anastomoses*? whether there be any difference betwixt the *venous* and *Arterious blood*? How the *Phænomena* (which undeniably are observed) about the pulse can be made out; and particularly *how some have lived without any Pulse*, others (which I have known) in the *palpitation of the Heart*, suffer no change in their *Pulse*? How upon *dissection* or *wounds* sometimes both ends of the *veine* divided do bleed? How some bleed at the *arme* without any *Ligature*; some upon a *double Ligature*? These, and many other questions, when I come to dispute with my self, methinks I am forced to constrain my judgement in the assent I give to that *Probleme*: and what I am ashamed to deny, I finde I cannot own without some *reluctancy*, which is daily encreased in me by *scruples* arising from the *Practick Part of Physick*; nor do I blush to declare my self an Abettour only of such *Tenets*, as are consistent with, and illustrated by *Practical Physick*: it was thought at first that this *Circulation of blood* would overthrow all the *usual Methods of Physick*, and introduce new and *beneficial discoveries* in that part of *Medicine* which is *Therapeutick*. But *Harvey* denieth that it varieth the *Medicine of the Ancients*; and *Slegelius* asserts the same opinion, avowing it to be rather an happy illustration, then a *subversion of the former praxis*, though it alter the *Theory* much. In fine, those little *advantages* and *Diorismes*, which we derive from that *Invention* merit not our notice; nay, any man shall with more assurance bleed in many diseases in sundry manners and different places, upon diverse indications upon the old observations and rules, then on the new hypotheses, wherein as to the use of parts, and nature of humors, there

is as little of *clearness* and certainty; as there is *efficacy* in that *practice*, which is *regulated* most thereby.

I had forgot to take notice of the *vena lactea* ascribed to *Acellius*, the invention of them is thought a great discovery, and such as *signat* a man in this Age. Yet even those vessels were known to *Galen*, as *Nardius* proveth out of his book against *Erassistratus*, c. 5. and out of the last chapter of his *Anatomical Administrations*. It is true, he calls them *Arteries*; he saith they were in the *Mesentery* filled with *Milk*, and that he observed them in young *Kids*. And *Hofman* in his *Variae Lectiones* doth produce out of *Galen*, de usu part. l. 4. sect. 19. a place so evidently shewing that *Galen* and *Herophilus* did recover those *Vena lactea*; that *Veslingius* cries out in a Letter to him, *Existimo aut nihil cum Herophilo Galenum vidisse, aut has 'Idias μεσεντερικὰ φλέβας, hos ipsos ductus esse, quos lacteos cum Acellio nominamus. Quae ad Pancreatis αδενωδὴ σώματα (ex multarum enim glandularum compage constructum videtur) pertinent.* The place in *Galen* is this, as *Hofman* represents it. *πρῶτον μὲν ὅτι πάντι τῷ μεσεντερικῷ φλέβα: ἐποίησεν ἰδίας, ἀνακεχυμένας αὐτῶν τῇ σπέρματι ἢ ἐντέροις, μὴ περραιμένας εἰς τὸ ἥπαρ. Ὡς ὅτι Ἡρόφιλος ἐλεγεν εἰς ἀδενωδὴ τινὰ σώματα τελευτῶσιν αὐταὶ αἱ φλέβες, ἢ ἄλλων ἀπ᾽ αὐτῶν ὅτι τὰς πύλας φερομένων.* Which proof as it is perspicuous enough to ruine the discovery of the *Vena Lactea*, and the deducing of them unto the *Glandules* of the *Mesentery* (beyond which *Herophilus* and *Galen* did never trace the journey of the *Chyle*, but imagined those veins to nourish the *Mesentery*) so I think that the invention of the *Ductus Thoracicus* belongs to *Andr. Vesalius*, and *Barthol. Eustachius*: the one more obscurely proposeth it, the other more openly.

Nardius. 7
noct Genial.
4-P. 412.

Epist. xxi.

C. Hofman
var lect. l. 2. c. 2.

Andr. Vesalius de fabrica corporis humani l. 3. c. 7.

p. 291. Edit. Venet. 1568.

—“*Aleo ut mihi etiam persuasum sit, quamvis id nunquam viderim; interdum a sinistro coenae caudicis latere, ubi jugulum contingit, venam depromi, quae secundum sinistram vertebra- rum latus declivis ducta, sinistris costis samos offerat: illa quam sine pari nuncupamus, dextris costis alente. Atque huiusmodi vena ortum, non tantum a jugulo primum posse fieri,*

Jo. Ant. Van-
der Lind n
de circuitu
sangu. exerc. 9

“sed paulo infernis, etiam agnus attestatur: in quo tale aliquid
“semel observavi.

“Viden’ venisse in rem, & quasi in manu jam habuisse il-
“lud Ariadnæ filium, quod secutus penetrare in naturæ La-
“byrinthum, majoremque sibi gloriam comparare potuif-
“set? sed quo fructu? Audi sis, & disce, quam homini, sci-
“entias sectanti, necessarium sit, etiam in naturalibus cum,
“qui sui juris & muneris fecit, docere homines scientias &
“artes, Ps. 94. v. 10. Jer. 28. v. 26, precari, Revela oculos
“meos ut cernam mirabilia in operibus tuis, ex Ps. 119. v. 18.

“Verum, inquit, ejusmodi non nisi rarissime occurrentes ve-
“narum series, anatomes studioso non aliter expendendas pu-
“tarim, quam si interdum sextus in manu digitus, aliud ne mon-
“struosum se spectandum offerret. Adeo ut si quando in publicis
“sectionibus hac observo, ea tanquam non essent, tacite prater-
“eamne artis candidati in omnibus corporibus hac observari ar-
“bitrentur.

“Quanto egregius, & propter hoc non unam atque im-
“mortalem laudem meritis Barth. Eustachius: qui non so-
“lum candide exponit, quod vidit; sed et præmissis, quod res-
“merebatur, præloquio conatus est posteriorem studia ex-
“citare ad ulteriorem inquisitionem et perfectiorem cogni-
“tionem. Neque enim ignorabat, rei quidem inventionem, &
“eurythias munus esse: at vero ejus plenam cognitionem
“eurythias opus esse. Sed audiamus ipsum.

“Ad hanc naturæ providentiam quandam equorum venam a-
“lias pertinere credidi: quæ cum artificii & admirationis plena
“sit, nec delectatione ac fructu careat: quamvis minime sit ad
“Thoracem alendum instituta: opera pretium est ut exponatur.
“Itaq; in illis animantibus, pergit ab hoc ipso insigni trunco sin-
“stri juguli, qua posterior sedes radicis vena internæ jugularis
“spectat, magna quadam propago germinat: quæ præterquam
“quod in ejus origine ostiolum semi-circulare habet, est etiam
“ALBA ET AQUÆ HUMORIS PLENA; nec longe ab
“ortu in duas partes scinditur; paulo post rursus coeuntes in u-
“nam: quæ nullos ramos diffundens, juxta sinistram vertebra-
“rum latus, penetrato septo transverso, deorsum ad medium usq;
“lumborum fertur: quo latior efferta, magnamq; arteriam cir-
“complexa, obscurissimum finem, nihilq; adhuc non bene perce-
“ptam, obtinet.

Since

Since the writing hereof, I have met with a book containing certain Letters of *Marcellus Malpighius*, and *Carolus Fracassatus*; in which it is observable that *Fracassatus* (the Anatomy-Professour at *Pisa*) doth ascribe the Invention of the Circulation of the blood to *Casalpinus*; and of the *ductus Thoracicus* to *Eustachius*: His words are these: "*Adeo oscitantia Autorum quædam tam male præponuntur, ac tanguntur, ut oporteat alios eadem repetere, ac ditare novis elucubrationibus, ac si nunquam fuissent. Sanguinis Circulatio, Galaxia in Microcosmo humano, scilicet via Chyli Cor, nonne Cæsalpinum agnoscit Authorem, ac Eustachium de vena sine pari? Et tamen soles in Scholis Autores crepare Anglos Harvæus, & Dispenses Pecquetos: non tamen spernendi, qui verum rudimenta ponunt, etiamsi infecto nec absoluto opere cessaverint: qui invenit anticipavit laborem & curam querendi: & ad minora vocatur, si quæstionis sollicitudo & jactatio tollatur: par tamen decus manet & illum, qui primum invenit, & qui postremum perfecit, nescio enim an præstet invenisse, an ditasse.*"

*Fracassatus
de cerebro.
p. 202.*

Having said thus much, I leave Mr. *Glanvill*, to answer those little quilllets of his, which can convince none but *Shallow-brain'd* and *Comical Wits*. — "If they knew these grand Theories formerly; how chanceth it that they speak no more of things, which no doubt they had frequent occasions to mention? How come they to be left without memory among their followers, who were such *superstitious porers* upon their writings? How chanceth it not to have been shewn to be lodged in those Authors before the days of Dr. *Harvey*, &c. when Envy had impregnated and determined their imaginations? Let illiterate persons and Mathematicians be swayed against plain proof by these Arguments. I think in stead of Temples and Altars to be erected to these Inventors, there is more need of a Schoolmaster and an Antiquary, the one to teach them humane learning, the other to instruct them in past discoveries; least, with much trouble and pains our new Philosophers should finde out again the Art of Printing, or Etching: the use of Gunpowder, or the Load-stone.

Of

Of Transfusion of Blood-- into Animals.

Plus Ultra.
Pag. 17.

“ **T**Hus, Sir, I have done with Instances of Anatomical
“ Advancements, unless I should hitherto referre the
“ late noble Experiment of Transfusion of the Blood,
“ from one living Animal into another, which I think very fit to
“ be mentioned; and I suppose it is not improper for this place:
“ Or however, I shall rather venture the danger of impropriety
“ and misplacing, then omit the taking notice of so excellent
“ a Discovery, which no doubt future Ingenuity and Practice
“ will improve to Purposes not yet thought of; and we have very
“ great likelihood of advantages from it in present Pro-
“ spect.

“ For it is concluded, That the greatest part of our diseases;
“ arise either from the scarcity, or malignant tempers and
“ corruptions of our Blood; in which cases Transfusion is an
“ obvious Remedy; and in the way of this Operation the pec-
“ cant blood may be drawn out, without the danger of too much
“ enfeebling Nature, which is the grand inconvenience of meer
“ Phlebotomies. So that this Experiment may be of excel-
“ lent use, when Custom and Acquaintance have hardned men
“ to permit the Practice in Pleurifies, Cancers, Leprosies,
“ Madness, Ulcers, Small-Pox, Dotage, and all such like
“ Distempers. And I know not why that of injecting prepared
“ Medicines immediately into the blood, may not be better and
“ more efficacious then the ordinary course of Practice: Since
“ this will prevent all the danger of frustration from the loath-
“ ings of the Stomach, and the disabling, clogging mixtures
“ and alterations they meet with there, and in the intestines, in
“ which no doubt much of the spirit and virtue is lost. But in
“ the way of immediate injection they are kept intire, all those
“ inconveniences are avoided, and the Operation is like to
“ be more speedy and successful. Both these noble Experi-
“ ments are the late Inventions of the ROYAL SOCIETY,

okw

"who have attested the reality of the former, that of Transfusion
 "of Blood by numerous trials on several sorts of brute Ani-
 "mals, Indeed the French made the Experiment first upon
 "humane Bodies, of which we have a good account from Moun-
 "sieur Dennis. But it hath been practised also with fair
 "and encouraging success by our Philosophical Society. The
 "other of injection, if it may be mentioned as a different in-
 "vention, was also the Product of some generous Inventors;
 "though indeed more forward Forreigners have endeavoured
 "to usurp the Credit of both. This latter likewise hath suc-
 "ceeded to considerable good effects in some new Trials that
 "have been made of it in Dantzick, as appears in a Letter
 "written from Dr. Fabricius of that City, and Printed in the
 "Philosophical Translations.

I shall not quarrel with Mr. Glanvill for misplacing this
 discourse about the Transfusion of Blood, but I think all the
 World will condemn him for ascribing either the invention
 of Transfusing blood, or of injecting Medicaments into the
 veins, unto the Society. That the latter was a thing much
 practised by Dr. Wren and others in Oxford, before the Re-
 storation of his Majesty, and before that ever the SOCIETY
 was thought upon, is a thing known to all that were at those
 days in that University. I saw my self in those days the
 Dog into whose veins there was injected a Solution of Opium,
 at the Lodgings of the Honourable Robert Boyle, of which
 he makes mention in his second discourse of the Usefulness
 of Natural Philosophy, and Borrichius in his Letters to Bar-
 tholinus.

As for that other of Transfusing the blood out of one Animal
 into another, if the Question be who first proposed it into the
 World to be tried, it is certain that Libavius first did that, at
 least I know not any more ancient then He. That Learned
 man above Fifty years ago, so plainly describes the Transfu-
 sion, that one can hardly discourse of it with more clearness,
 then there is done in these words. *Adsit Juvenis robustus, sa-*
nus, sanguine spirituosus plenus: Adstet exhaustus viribus, tenuis,
macilentus, vix animam trahens. Magister Artis habeat tu-
bulos argenteos inter se congruentes, aperiat arteriam robusti &
tubulum

Those For-
 eigners will
 rectifie here-
 after their
 mistakes, and
 not attribute
 the injecting
 of Medica-
 ments to their
 invention: as
 Caspar Schot-
 tus in Mirab.
 Art. I. xi. c.
 21. p. 891. &
 Phil. Jac.
 Sacks in O-
 cean Micro-
 microcosm.
 ff. 155 have
 done, unjust-
 ly magnify-
 ing Solertif-
 firam Indu-
 striam & Ex-
 perientiam of
 these Preten-
 ders
 Andr. Libav.
 defens. Syn-
 tagm. arca-
 nor adv. Hen-
 ning. Scheu-
 nemem alt 2.
 c. pag 8. e-
 dit. Franco-
 fourt. A. 1615.

tubulum inserat, muniatque mox & agroti arteriam findat, & tubulum fœmineum infigat: jam duos tubulos sibi mutuo applicet, & ex sano sanguis arterialis calens & spirituosus saliet in agrotum, unaque vita fontem afferet, omnemque languorem pellet. This allegation was made use of by an Italian Philosopher, and silenceth all those in England, or France, that pretend to the Glory of having first proposed: So that the Author of the *Philosophical Transactions* confesseth it in these words". This indeed is clear enough, and obligeth us to averre a greater Antiquity of this operation, then before we were aware of, though 'tis true, Libavius did not propose it, but only to mock at it (which is the common fate of new Inventions in their Cradle) besides that, He contrives it with great danger both to the Recipient and Emittent, by proposing to open Arteries in both, which indeed may be practised upon Brutes, but ought by no means upon Man. Till that learned Italian had instructed the Virtuosi in the point, there had been a great Controversie agitated between the French and English Societies about the Invention. The former pretended, that it was mentioned first amongst them about eleven years ago, at the Assembly, in the house of Monsieur de Montmor, and that the publick is beholding to that Monsieur for this discovery, and the benefits and advantages that shall be reaped thereby. But about the person that should first mention the design, the French vary. Monsieur de Gury fathers it upon the Abbot Bourdelot: but the Author of their Journals upon a Benedictine Friar. Our Society having given the world occasion to take notice of it publikely, and having otherwise long before pursued the Oxford-Invention of injecting Liquors into the veins, thought themselves injured in this, that the French should usurp the Credit of such a discovery as had its first birth in England, upon a pretence that it was conceived in France: it being notorious, the French took occasion to try it by the Example of the English Virtuosi: and there being no publick record cited, declaring the time and place of the Invention proposed the Method to practise it, and the success of the Execution, Thereupon began a Paper-scuffle betwixt the Gazettiers of thef

Philos. Trans-
act. Numb. 37.
p. 740.

Ly his leave
it infers only
the mention
of it to be
more ancient,
not the Ope-
ration.

Libavius pro-
poseth it out
of some Para-
cellian Magi-
cal Writer,
and not

from his own
Fancy: ad-
ding that the
Physician
who practi-
seth it in Trans-
fusion, desires
Hellebore
himself.

See Mr. J.
Denny's Let-
ter in the
Transact.
Numb. 27.
ib. Num. 28.

the *Curienſe* which any man may read with ſome pleaſure, becauſe they had on both ſides ſuch little *Logick*, as to argue from the mentioning of a *deſign*, to the effecting it. If the way of *Argumentation* be good and ſolid, then *Ariſtotle*, and ſuch of the *Ancients*, as propoſed the ſquaring of the Circle, muſt not be denied the glory of being *Inventors* of it: So they which firſt propoſed a *perpetual motion*, or the *North-weſt Paſſage*, may go for *Inventors* of them: yet are none of theſe things yet diſcovered. Oh! new *Correlates*, and worthy of our *Inventors*! Long ago *Ariſtotle* and the *Common Dialecticks* told us, *Datur ſcibile de quo non datur Scientia*. But none like our *Anti-Logicians* ever taught, there were a ſort of *Inventors* whoſe *Inventions* were yet to ſeek. All that our *Inventors* did, was, that after *Dr. Lower* had firſt diſcovered and practiſed the *Transfuſion* at Oxford in February 1665. They on the ſeventeenth of May following 1665. gave order that there ſhould be trials made for tranſfuſing the blood: but their trials proving lame for want of a fit *Apparatus*, and a well continued Method of Operation: the *Dr.* ſent them a convenient Method for effecting the thing. Before this, there never was any mention or propoſal made at the *Society* concerning the *Transfuſion*, as I am certainly informed by one of their Number, who hath examined their *Journal Books*, in which ſuch *Propoſals* and *Experiments* are recorded. Nay, they were ſo far from pretending to it at firſt, that when it was mentioned unto them by *Mr. Boyle*, there were ſome as well ſevere as ingenuous Criticks, who thought it ſomewhat ſtrange and bold for him to affirm that the *Dr.* had made it ſucceed. And beſides, I obſerve that *Mr. Boyle* in his Letter to *Dr. Lower* (who hath vindicated the *Invention* to himſelf in his late Book *de Corde*) doth not ſay that ever the *Society* had thought of or attempted, or deſigned to attempt the thing. He calls it *inſolitum & inſperatum conamen*. June 26. 1666. and deſires He would acquaint the *Society* with the manner how he atchieved it. Now ſince that neither was *Dr. Lower* then of the *Society*, nor any way entitles them unto it, but himſelf, and that in a Treatiſe wherein he doth not ſo much as call him-

See Transact.
Num. 28.
pag. 514.

In the Transactions numb. 37. pag. 371. The Gazettier affirms, that upon further investigation it was by good proof (which is in his hands) proved, that the invention had been known to some ingenious persons in England thirty years ago. If so, then it is not the Society the Inventors of it, except we will say, that Societies as well as individual men do pre-exist! But may not a man ask our Gazettier, where is the publick record of this invention? what Account is there of the Method with which it was practised? with what success? How comes all this to be concealed till after Dr. Lower achieves it, and the French pretend to it? would any man have concealed their claim to the Discovery, after that it was become the talk of Europe, the Darling of the Society, and worthy to be disputed for by the French? why did they not put in their Claim, being within hearing, till about three years after,

self a Member of that Assembly, let any man judge with how much truth this other Discovery is ascribed to these **NEW EXPERIMENTATORS**, by our Virtuoso. But least I should seem to deal too severely and maliciously with them, rather than it shall be said That they invented nothing, I grant, that They invented a LYE; and shall conclude the Debate by representing the words out of their Transactions, by which they assume to themselves the Credit of the Invention, and by a dubious wording and pointing of the Period, insinuate as if Dr. Lower as well as Dr. King had been encouraged to the Attempt by the Society.

Philosoph. Transact. Numb. 27. pag. 490.

“How long soever that Experiment may have been conceived
“in other parts (which is needless to contest) it is notorious that
“it had its Birth first of all in England; some ingenious persons of the Royal Society, having first started it there, several years ago, (as appears by their Journal) and that detestable Anatomist, Dr. Lower, reduced it into practice, both
“by contriving a Method for the Operation, and by successfully executing the same, wherein he was soon overtaken by
“several happy Trials of the skilful hand of Dr. Edmund King, and others encouraged thereunto, by the said Society, which
“being notified to the World Numb. 6. 19. & 20. of these Transactions printed Novemb. 19. & Decemb. 17. 1666. the Experiment was soon after that time heard of to have been tried
“in forreign Parts, without hearing any thing of its having
“been conceived ten years ago.

In which relation, I must take notice that it doth not really appear in their Journal-books, that ever any such thing was started by any persons how ingenious soever of their Society; Dr. Lower being not then, nor long after in the History of the Royal Society reckoned as a Member of it. Next
tha

that the *interpunction* of the period is so *equivocally* placed and penned, that the *unwary Reader* may think that Dr. Lower, as well as the *others* was encouraged to the *trial* by the *Society*. Whereas he was not, whatever the *others* were. Again, it is *disingeniously* said, that he was soon overtaken by *several happy Trials* of Dr. Edmund King, and others, encouraged thereto by the *Society*. Since it appears by the letter of Mr. Boyle, that the *Society* knew not how to do the thing in *June*, which Dr. Lower had effected in *February*, and the fame thereof at that time was spread over *England*. In *July* Dr. Lower acquainted the *Society* with the *manner of the Transfusion*, whereof Dr. Wallis had given the *Society* an imperfect account a little before of what he had seen Dr. Lower do at *Oxford*. So that for at least *four or five months*, the *Members* of the *Society* did not overtake Dr. Lower. But after they were acquainted with the *contrivance*, they invented it very clearly.

From hence it is easie for any man to judge with how much right Mr. Glanvill doth say, that both the *injecting of Medicines*, and *transfusing blood into the veins of Animals*, those *Noble Experiments* were the *late Inventions of the SOCIETY*. I shall now proceed to inquire into the *Utility of them*; thereby to discover how *noble and excellent* they are, and what *advantages* we may hope to derive from them hereafter.

Because this *Transfunding of blood* hath hitherto been looked on as the *primary Invention*, and the most *famed* of any the *Society* were ever intitled unto: and that they themselves have particularly concerned themselves in asserting it to be their *discovery*, to the end that every *Reader* may the better be able to judge of the *Controversie*, without being forced to go seek out amongst the scattered *transactions* and elsewhere, several *Histories* that are material to the passing a right judgement; I shall crave pardon if I do relate particularly the matter of *fact*, and what hath been sundry times performed by the *English, Italian and French Virtuosi*, with every circumstance, both as to *injecting of Medicines*, and of *blood into the veins*.

As to the *injecting of Medicaments into the veins*, it is an *Experiment* that I am apt to think was first tried by the *English*, and as a *curiosity*, it was not *unpleasant*; but that it should be so advantageous a discovery as *Mr. Glanvill* represents it is like to be, I do not believe. There was a time when men had regard to their *Consciences*, and what could not be administered but upon *prudential hopes* of advantage to the *Patient*, no approved *Physician* durst, or would give to any sick person: but in this *Age*, such as ought to protest against it, are as forward as any to forget these considerations, and prompt men on to practices without either regarding whether the effect be not *Murther* in the *Physicians*, besides the ill consequences to the *diseased*. In the *injecting of Medicaments*, I must complain that neither the *Operation of Medicaments immediately injected into the blood and veins* is known, nor the *dose*; and consequently the *Project* not like to improve *Physick* at all, unless our *Magistrates* will licence men to try so many *Experiments*, even to the apparent hazard or certain death of the *parties*, and may regulate and authenticate the practice in such manner as becomes a *Baconical Experiment*: and to encourage *Rational men* to this procedure, there ought to be a greater deficiency in *Physick*, then yet appears, and a more *hopeful success* then any man can yet expect, supposed by this way. A *Paynim* told us,

Nulla unquam de morte hominis cunctatio longa est.

A sober *Physician* will look upon the act to be as indiscreet, as the *Comedian* describes love to be, *Quares in se neque consilium, neque modum habet ullum, eam consilio regere non potes*. That there is no probability that this way of *Medicine* can ever amount to any thing, appears from this consideration, that *Liquors immediately injected into the blood*, have a different *Operation* there, then when taken in by the *Stomach*: and that the *mixtures of Liquors with blood* upon *Plebotomy* in a *Pottinger*, gives no light to the *Experiment*. As I shall now shew.

Seignior Fracassati Professor of *Anatomy* at *Pisa* tried these

these Experiments by injecting Medicaments.

1. Having injected into the *jugular* and *crural* veins of a Dog some *Aqua fortis* diluted, the Animal died presently: and being opened, all the blood in the vessels was coagulated and fixed: but that which was in the *Viscera* (which I dare not English *Guts*, but take it to denote the *Heart*, *Liver*, *Lungs*, *Spleen*, where the blood passes extravasated through: though the *Transactions* render it *Guts*, and destroy the antithesis betwixt *vasa* and *viscera*) did not so easily coagulate. It was also observed that the great vessels were burst, or as it were cut asunder, yet have I known who hath put *Aqua fortis* into cooling *Juleps* in Fevers, as others do *Spirit of Vitriol* without any harm.

2. There was also infused into another Dog, some spirit of *Vitriol*, which had not so present an effect: for the Animal complained a great while, and foamed like *Epilepticks*, and had its respiration very thick: and observing the beating of his breast, one might easily judge, the Dog suffered much: who dying at last, his blood was found fixed in the veins, and grumous, resembling *Soot*: whereas in the Experiment with *Aqua fortis* (which may as easily be given inwardly as spirit of *Nitre*) the blood is not said to have been changed in its colour from other coagulated blood. It was also observable (though the *Transactions* minde it not) that the blood in this last Dog was not upon coagulation continuous in the veins, but broken and severed into parcels.

3. There was also injected into the *jugular* of another dog, some oyle of *Sulphur per campanam*, but he died not of it, though this infusion was several times tried on him. And the wound being closed, and the dog let go, he went into all the corners of the room, searching for meat, and having found some bones, he fell to gnawing them with a strange avidity, as if this *Liquor* had caused in him a great appetite.

4. Another dog, into whose veins some Oyle of *Tartar per deliquium* was injected, did not escape so well: for he complained much, and was altogether swollen; and then died: Being opened, the Spectators were surpris'd to finde his

blood

Transact.
num. 27. p.
490 491.

Car. Fracas.
Ep. Anat.
de cerebro.
p. 252. 253.
54.

blood not *curdled*, but on the contrary more *thin* and *florid* then ordinary.

Dr. Lower
de motu Cor-
dis pag. 119.

Transact.
num. 27. pag.
49.

5. Dr. Lower having extracted half a pound of blood out of the *crural urine* of a *Mastiff dog*, did inject the like quantity of warm *milk* into him; within half an hour the *dog* became very *sick*, breathed with difficulty, and seemed to labour much with his *heart* and *diaphragme*, and after to palpitate, tremble and sigh grievously, and at length miserably died. Upon dissection he found the *vena cava*, the ventricles of the *heart*, the vessels of the *Lungs*, and the *Aorta* full of blood and milk *coagulated* together, and the *concretion* was so hard, that it was not easie to part it. This he tried but once. But *Monsieur Dennys* the *French Physician* saith, he tried it with a different success. For having syringed about a quarter of a pint of *milk* into the *veins* of an *Animal* (he tells not *what*) and having opened the same some time after, he found the *milk* so perfectly mixed with the blood, that there was not any place in which appeared the least footstep of the *whiteness* of the *milk*, and all the blood was generally more *liquid*, and less apt to *coagulate*.

Mr. Boyle of
the Usefulness
of Nat. Phi-
los. part. 2. p.
54, 55.

6. I received an account of some Experiments, from one much versed in these *injections* (which he may one day acquaint the world with) to this effect That the infusion of *Crocus Metallorum*, injected in a less quantity then otherwise (*viz.* $\frac{1}{3}$) will work by vomit in a *dog*, almost presently, and very strangely, and make him grievously sick. Yet Dr. *Wren* informs Mr. Boyle, that a moderate dose of the infusion of *Crocus Metallorum* did not much move the *dog* that he injected it into: but a large dose of *two ounces* or more wrought soon, and so violently, that he vomited up life and all. That a *dog* will take two drams of *Opium* into his *Stomack*, and seem never the worse, if you keep him from lying down half an hour after; but *two drams* of *Poppy-seeds* made into an *Emulsion*, and injected into his *veins*, will kill him presently.

Vid. supra.
p. 53, 54

7. Mr. Boyle saith, that he conveyed a small dose of the tincture of *Opium* into a *dog* this way, which began to work so speedily upon the *brain*, that he was scarce untied before the

the *Opium* began to disclose its *Narcotick* quality; and almost as soon as he was upon his feet, he began to nod with his head, and reel and falter in his place; but being kept awake, and in motion, by whipping up and down the Garden, after some time he came to himself again, and not only recovered but began to grow fat so manifestly, that 'twas admired.

8. A certain *German Count* coming into *England*, relates an Experiment, which he saw in the presence of *Pr. Rupert*. After some blood taken from a dog, there was injected into him a small quantity (*portuuncula*) of *Spanish wine*; within sometime after the dog was perfectly drunk, being giddy, performing sundry ridiculous actions, then vomiting with a profound sleep.

Phil. Jac. Sachs in Ocean. macro-microcosm. Sect. 155.

9 *Dr. Fabricius* Physician to the City of *Dantzick* injected purgatives into humane bodies, with this effect. A strong bodied *Souldier* being dangerously infected with the *Pox*, and having grievous protuberations of the bones in his armes, two drams of a purgative liquor were injected: he presently complained of great pains in his elbows, and the little valves of his arm did swell so visibly, that it was necessary by a great compression on's fingers to stroke up that swelling towards the Patients shoulders. Some four hours after it began to work, not very troublesomely; and so it did the next day, in so much that the man had five good stools with it. Without any other remedies those protuberances were gone, nor are there any footsteps of the disease left. Two other trials were made upon women, the one a married woman of 35, the other a *Servant-maid* of 20 years old: both from the birth had been grievously troubled with *Epileptick Fits*, so that there was little hopes of curing them. There was injected into their veins a laxative rosin, dissolved in an *Antiepileptical spirit*; the first of these had gentle stools, some hours after the injection; and the next day the Fits recurred now and then, but much milder; and are since quite vanished. The *Maid*, she went the same day to stool four times, and several times the next: but by going into the Air, and taking cold, and not observing any diet, cast her self away. 'Tis remarkable, that it was common to all three, to vomit soon after the injection, and that extremely, and frequently.

Transact. numb. 30. pag. 564. 565.

I have

I have not time to adde any more of these kind of *trials*: but from hence it is evident, that things *operate* (where they do operate in the same manner) in a lesser *dose*, then when

taken into the *Stomach*, and with more *violence*. That oftentimes such things as are *innocently* taken into the *Stomach*, are mortal when *injected immediately into the blood*. That although learned Physicians have made *little or no difference* betwixt the operation of *Oyle of Sulphur*, and that of *Vitriol*, yet by this *Experiment* there is found to be a quite different effect. So the *Salt of Tartar* (which is as innocent as

Vulgo haftenus a non paucis spiritus Vitrioli, & Sulphuris pro diversis rebus habiti sunt: adeo quidem ut nonnulli flores Sulphuris & acidum ad eosdem pulmonis morbos exhiberent: sed valde impetite cum acida omnia sint deestri inimica, & spiritus Sulphuris & Vitrioli essentia nulli modo differant, sed ex eadem re generentur, & parentur. Etenim spiritus Vitrioli & Sulphuris eundem saporem, colorem & emano easdem qualitates & effectus habent, & ad eosdem usus in medicina adhibentur: nondumque inventus est, qui peculiarem aliquam, seu manifestam seu occultam qualitatem in spiritu Sulphuris monstrare potuerit, quae non etiam in spiritu Vitrioli sit. Sennert. in Paralipomen. ad insinuat. l. 5. part. 3. sect. 3. c. 5.

Salt of Wormwood, or any such *Salt*) had a pernicious effect upon the *dog*, though *discrepant* from the others.

As to the *Experiments* of Dr. *Fabritius*, they do not give much of *Encouragement* to the *Trial*, for the one died which had the most of *youth*; and though *her* death be attributed to other *circumstances* and *neglects*, yet either those are *trivial*, or for some (*unknown*) length of time there must be greater care then ordinarily after *Physick*, otherwise *small accidents* become mortal. And the *extreme* and *frequent vomitings* (which here happen from the sufferings of the *Heart*, and not the *Stomack*) render the course more *hazardous* to *tender Stomachs*, and *weak Constitutions*, then Mr. *Glanvill* suggests. So that the *loathings of the Stomach* are not prevented by *this way*, nor the success very *inviting* (how speedy soever) upon those *Experiments* any more then from the *Churlish Physick* of the *ancient* and moderate *Chymists* of Mr. *Odores*'s party, which *wise-men* will not imitate. I wonder the *laxative Solutions* were not set down that we might judge of their *strength*: and that the way of *dieting* and *ordering of them afterwards* was omitted: whereas the knowledge thereof might avail to prevent the *ill consequence* which befel the *Maid*.

I shall now consider the effects which the *several Liquors* have

have upon a mixture with the blood, when taken warm in a Pottinger, and those affused to it. This is a Practice which the Honourable Mr. Robert Boyle imparted to the Royal Society in December 1664. and thinks that Fracassati may have taken his hint from it, to inject those Liquors: but I finde a Letter from Leyden sent to Bartholinus, Dated Jan. 9. 1662. in which there are several Experiments of that kind, which I shall set down presently. If I placed any great value upon the Experiment, I could put in for the Practiser of it at Stratford upon Avon in 1660. and prove that I made some Solutions of Salt of Ash, Salt of Wormwood, and Salt of Tartar, and received the blood of sheep into the glasses in which they were, to try the differences betwixt those Salts, whether they were of the same nature (so that it was indifferent whether one used Salt of Wormwood, Carduus Benedictus, Yarrow, or Mugwort) or that there were any difference. Which last Angela Sala denies, though other Chymists affirm it. But after that I had enquired into that Controversie by several ways, I went to Jamaica and neglected the Experiment. But since that I see that every unprofitable trifle, becomes a famous and noble Experiment, and if it bring no present Emolument, yet at least it becomes Luciferous, and (as they say) puts us in the Prospect of several great advantages; at least, more and greater things will be disclosed by it, when future ingenuity and diligence hath improved and perfected the invention. Since that time I have made many Essays about the mixture of sundry Liquors, with the blood of Sheep, Lambs, Calves, Cows, Oxen, Hogs, Poultry, and that in several manners.

I have received the blood of several creatures upon warm solutions of sundry Salts, of Allom, impure Salt-peter, Sal Prunella, Salt of Nitre, upon solution of the several Vitriols; upon Steel-wine, Vomitive wine, Sack, French wine, and Malaga, upon spirit of wine, spirit of Gider, and spirit of the grounds of Beer; upon warm Urine, upon mixtures with spirit of Vitriol, and oyl of Sulphur, and Juice of Lemons, and Oranges, upon the rare liquor of Salt-peter; upon it, after it hath passed the Ashes, and upon the Mothers of it, and many other trials with oyle of Wormwood, Amber, &c. dissolved in spirit of wine.

R

I have

Angela Sala
Tartaralop.
sect. 3 c. 2 p.
133.

I have also poured upon the *Mass*, after it hath coagulated several *acid spirits*, before and after the *Serum* was separated from it.

I have also taken the separated *Serum*, and affused *spirit of Vitriol* to some; to others *spirits of Harts-horn*, and other *spirituous waters*, and I have affused to those that had a mixture of the *spirit of Harts-horn* some *acid spirits*, and other *liquors* to see the *changes*.

I shall not now set down the several *Phænomena*, and observations I made, not having leisure to digest them all, nor being willing to dismember a discourse I intend about the nature of *blood* and *Plebotomy*, in which I shall not only treat of all these things, but adde many other observations, from the *burning of blood*, and the *Serum*, which any man may do, without feeling any thing by *sympathy*, notwithstanding the *whimsies* of *Helmont*, and that great *Virtuoso* Sir *Kenelme Digby*. I have done it fourty times in *Men*, *Women*, and *Children*, to observe those varieties in *blood*, which never entred into the heads of our *Experimentators*. Though *Dr. Walter Needham*, my learned *School-fellow*, a Member of the *Society*, deny that *blood* will burn, *Carbonibus injectus sanguis flammam non facile concipit, sed potius torretur in grumum*. Yet if any one please but to take a piece of the coagulated *Mass* of *blood*, and lay it on a *Fire shovell*, and so place it in an hot fire, that the *coales* arch round about it, but touch it not: after he hath observed the great variety of its *intumescence*, and the *crackling* of *divers salts*, as it were *decrepitating*, it will take flame commonly when dry, and burn with a great variety of *Phænomena*: some will not flame at all, though brought to *ignition*: there will be also variety in the remaining *Cinis*, as to its *saltness*. In the like manner set the *Serum* to coagulate on the *coals*, and then burn it. I have also burned the *blood* and *Serum*, after it hath been mixed with *acid liquors*. By this trial will appear more then can be imagined as to the differences of the *blood* of *Animals*, and of young and old *Animals*, I will endeavour to finish that *Treatise*, wherein there will be observations about the colour of *blood*, and *melancholique*, and *pituitous*,

Disquisit. de
sætu. pag. 130.

pituitous, and *crimson* parts; and a certain *pellicle* which generates by the *Air* on the top of most blood, if it stand 24 houres; which sometimes is as firme as those *tunicles* that encompass the *Liver*, or *Kidneys*. Observations upon that, and upon the turning of the *coagulated Mass*, and its becoming red again, though not so *floridly*. Trials upon that in *vessels cover'd*, that it is not from the *air*, in opposition to the *Fracassati*.

I will not mention any thing hereof now, but having imparted some observations to some, and knowing what *plagiaries* some men are, I thought fitting to publish *thus much*, that *they might* not pretend to the *inventions*, each whereof were enough to make one of *them proud*, and fill the *Transactions*. Yet I will say this, That I never had put my self upon these *trials*, but out of *envy* and *indignation* against *them*, and the *Transfusion of blood*, about which they made such ado every where. I shall promise one thing, that *Mr. Boyle* is very much mistaken in, imagining that there is a great difference betwixt the effects of *Medicaments*, when mixed with the warm blood of an Animal out of the *veins* and *in them*, as will appear by the mixture of *milk* already specified, and that of the *Salt of Tartar*, which will follow out of the Letter of *Borrichius*.

Experiments upon the mixture of Liquors, with the warm blood of Animals, taken out by Phlebotomy.

1. By putting into the warm blood, as it came from Animals, a little *Aqua fortis*, or Oyle of *Vitriol*, or spirit of *Salt*, (these being the most usual and acid *menstruums*) *Mr. Boyle* observed, that the blood not only would presently lose its pure colour, and become of a dirty one, but in a trice also be coagulated; whereas some, if fine *urinous spirit*, such as the spirit of *Sal Armoniack*, were mingled with the warm blood, it would not only not curdle it, or imbase its colour, but make it look rather more *florid* then before, and both keep it *fluid*, and preserve it from *putrefaction* for a long time.

Transact.
numb. 29. p.
552.

Th. Bartho-
lin. ep. Cen-
tur. 3 ep. 97.
pag. 421, 422

2. The Learned and Inquisitive Man Olaus Borrichius, having cut up a dog alive, made these observations. He took five glasses, and placed them in order, putting into the one spirit of vinegar, into another oyl of Tartar per deliquium, into a third a Solution of Allom, into a fourth spirit of Salt Armoniack, into a fifth spirit of wine; into each of the Glasses, he suffered the blood of the Crural Artery to run. After some time he came to look upon his Glasses, but the next day the observation was most perspicuous. That Glass

which had the spirit of vinegar in it, it was become black like to the blood of Melancholique persons, with a thick and copious black sediment, and that liquor which was on the top, was blackish.

Where the Oyl of Tartar was, the colour was pretty florid, but the liquor more turbid, no sediment at all, only some filements, like little fibres floated in it conspicuously, here and there.

Where the Solution of Allom was, there all seemed like a subcineritious or dirty coloured putrilage, there being no reliques of the crimson colour of blood to be seen.

Where the spirit of wine was, there the liquor was more turbid then that which had the Oyl of Tartar in it.

Where the spirit of salt Armoniack was, that was of the most beautiful colour of all, being very florid, of a thin consistence, with a diaphanous sediment like to the gelly of currants.

This observation he also tells Bartholinus, that he had in like manner made the preceding Summer.

Out of all which it most evidently appears how nice a thing the blood is, and how small mixtures alter the colour and texture of it: and what consequences may follow upon such alteration of its consistence, and particular texture, no man knows; but that they may be very bad (even where innocent, and wholesom Medicaments are affused) is evident out of what I have set down.

It

Inspeimus post intervallum & plenius postmodum omnia: Observavimus sanguinem, cui affusus erat spiritus aceti, redditum nigricantem instar sanguinis Melancholicorum, sedimento crasso, copioso, atro, supernatantem liquorem, pænetiam atrum. Cui affusum oleum salis tartari, redditum coloris sic facis floridi, sed turbidiorum liquorem, sedimentum nullum,amenta tantum fibrillarum instar hinc inde conspicua. Cui affusa solutio aluminis, redditum instar putidae & subcineritiae putrilaginis, omni sanguinis colore protius abolito. Cui affusus spiritus vini, redditum turbidiorum, quam cui oleum salis tartari. Cui spiritus salis Armoniacki, redditum omnium elegantissimum, colore floridum, tenuem substantia, infundo sedimentum diaphanum instar Galatinæ rubrum.

It is also as manifest, that there are in the bodies of men and women solutions or liquors imbued with sundry salts, as *aluminous, acid, and vitriolate, &c.* which when they shall mix with the injected blood, what the issue may be, I leave the Prudent to conjecture. Certain it is, that for these considerations specified (reserving my own Experiments to my self) none but inconsiderate Quacksalvers would put a Patient upon the trial of injecting of Medicaments, or transfusing of blood. It is a course Nature (whose Servants and Imitators Physicians hitherto were) never prompted us unto: Having taken so many courses whereby blood might at any time of need issue out of the veins and arteries in sundry parts of the body: But especially provided that nothing might immediately come into the veins. Whatever comes into the veins by the Stomach, suffers a great alteration first, and whatsoever is noxious, either separates from it there and in the guts, or is mortified, or mitigated so as to be innocent, and agreeable to the nature of the veins. Which particular nature of the sanguiferous vessels, is that which in the dead keeps its own blood fluid; and in the living contributes so much to the motion of it, that if you make a stop and intercept the impulse of the subsequent blood, yet will the other continue its course. But what will the effect be of Heterogeneous blood? For undoubtedly the nature of the veins is agreeable to the blood, and communicates its impurities and virtue, as the cask doth to the wine. But further, since the blood is to pass through the porosities of the Liver and Lungs, and capillary veins and arteries, how will they agree with the new blood. (it being evident upon mixture of Liquors, and upon burning, that there is a difference in the fibrosity of the bloods, and consistence of the several Serums) or how will that circulate which results from the mixture, I know not, but certain it is, that the ill consequence is almost, if not absolutely past remedy.

In fine, what is it that is aimed at in this Transfusion? is it the rectifying the mass of blood (suppose seventeen pound in a body) with the affusion of a few ounces, or a pound of Lambs blood?

They

Vide ep. Walli de motu sangu.

They may as soon rectifie as much *vinegar*, or decayed *wine*, with the like proportion of *good wine*? would they amend the *impurities of the vessels*? there is the same difficulty as before. That which they *transfuse* is not a *Chymical spirit*, but an *impure*, and *heterogeneous* mixture, fitted by different *digestions* and *ferments* to a different *nourishment* of another *Animal*, with different *excrements* resulting from it. It is in the *Stomach* and *first digestion* where food is so concocted by the *Humane heat*, or *Acidity*, as to turn to a *chyle* adequate to the *nourishment of man*, and generating such blood, and such excrements, as are the result of such a concoction as is agreeable to the nature of man. And so it is in all creatures: Thus we see, that in different *Animals* different *Excrements* are generated, nor is it to be doubted but that the *concoctive* principle differs as much in a *dog*, or *cat*, as do those *excrements* which differ much from those of *men*, though both eat the same meat. *Sicut acidus spiritus quilibet animam inseparabiliter in ventre suo portat, atque in illud corpus, cui infunditur, dominium suscipit, illudque confestim juxta sui naturam format: hinc spiritus salis in Alkali Tartari fusus statim sibi format corpus salinum propria natura consentaneum, & fit sal: & aceti spiritus, vel acetum distillatum in eodem Alkali tartari sibi format corpus adequatum suae propriae naturae, & fit tartarus vini, & sic de vitriolo, & reliquis acidis: Ita quoque acidum Stomachi humani, cum apprehendit panem, vel quicquam alibile, in quod dominari possit, illud convertit & commutat in chylum, & exinde in carnem humanam: & eundem panem Acidum Stomachi canini convertit & transmutat in carnem caninam: uti & de reliquis viventibus quotidie docemur, eo quod natura in omnibus iisdem instrumentis operatur.* If the Case be such, and that the blood transfused hath received those *impregnations of vitality* which are agreeable to the nature of the *Animal* whence it is transfused, and is qualified to generate such *nourishment*, and such *excrements* as are the consequences of those *digestive characters* (if I may so call them) and *impressions*; How can we imagine that such blood being immediately transfused into

Otto Tachenius Hippocr. med. clavis c. 9 p. 201.

our veins, without those previous alimental figillations and digestions, produce those effects which are to be expected in humane bodies, and are (though irrationally) in this case wished for.

But perhaps they think to atchieve their design, by introducing a new texture in the vitiated blood, and vessels, or fermentation, whereupon should ensue the amendment. I perceive indeed by their series a new fermentation, that the dogs piss blood (no desirable or trivial accident!) But what a little time is there for the blood to pass unto the heart, and mix with those other Liquors, and ascending blood, and so to pass into the Heart and Lungs? How do they know that the blood they transfuse is good? Upon burning they shall find a difference in blood of beasts; and a different taste and coagulation in the Serum. Besides, that the blood of young Animals is generally less balsamical and inflammable, of another texture and colour, the Serum very saline; and in a word, exceeding different from what is in men and women of years. And in the blood of men and women, there are often defects not to be perceived but by coagulating and burning of the Serum and blood. I have taken the Serum of a Maid seemingly healthful, only pained at Stomach, and abounding in blood, it coagulated and looked like tallow, and would not burn at all, and smelt noisomely after coagulation, not before. I have several strange instances of this kind. If there be such indiscernable causes of distempers, and mixtures in blood of persons that are not well, if they neither know what they aim at in transfusing in, nor what they transfuse, Let Mr. Glanvill talk of great Advantages to be expected, and let them try it for me. Sure I am that the Transactions report an Untruth, in saying that Coga was ever the better for it: I am told his Arm was strangely ill after it, and difficultly cured: and if all the great likelihood of Advantages from Transfusion that are in their present Prospect, arise from no other grounds, they are very improbable. The Parliament of Paris have forbid it to be prosecuted but by the allowance of the Parisian Faculty of Physicians. A Swedish

I had an intention to have set down at large all the Stories relating to the Transfusion of blood, with remarks upon them: but I was so much pressed to conclude, and had so little leisure to dispatch it in that manner at that time, that the Reader must be content with this brief, but I think substantial reply to all that hath yet been said.

See the Stories in the Philosophical Transactions.

I remember they say that it is not expressed, how the *Transfusion* was practised upon the Baron *Bond*, nor after how long time it was repeated, when he died. But this is no excuse for them; for they have fixed no *rules* or *circumstances* whereby to regulate the *operation*, those are to be learned by frequent *Experiments*, and it may be, the death of more *Patients*. Next, it is not to be doubted, but that *He* that did it might act as cautiously as they, for his own credit, and the credit of the trial, and the quality of the *Person*. It concerns them to procure an *Authentic* Narration of the thing, and what appeared upon his being embowelled.

Swedish Baron died upon it: and to argue from the cures of *Madmen*, or from what they suffer *without hurt*, is not for a *Physician*, but for one that deserves to be sent to *Bedlam*: for *mad people* endures a thousand ills, and *strong Physick*, such as others cannot endure: and if they find any amendment sometimes by *uncouth means*, it is by *accident*, as it makes them ill, which sometimes prove their *recovery*.

As for *dogs*, they cannot declare what they suffer: but I am in haste, and refer my Reader to the perusal of the *Histories* in the *Transactions*: in which what I last objected, is all confessed: and if after all I have said, he find encouragement to try a remedy, that hath sometimes proved *not unfortunate*, (but is always *rash*) let him do it for me.

I am satisfied, That the operation carries more of *terror* (and many swoon upon bleeding) than a *potion*, or *Galenical Physick*; and that the greatest part of our *distempers* do not arise from the *scarcity*, or *malignant tempers*, and *corruption* of our *blood*, is as manifest as can be; more arise from the depraved motion, and *redundancy* of the *blood*, and *serosities* in and about the *brain*, and the *laxity* and *strictness* of the *habit* and *pores* of the *body*; and in these cases *Transfusion* is no remedy; much less in *malignant diseases*, in which to let blood is often mortal, commonly *dangerous*; and it always must be antecedent to *Transfusion*, excepting only the *scarcity* of blood; in which case what *strength* is there to *assimilate*, or ferment with the new blood.

As to the *Transfusion* of blood in *Pleurisies*, the attempt is very *ridiculous*, considering what an *Ebullition* and *Inflammation* of the blood there is then in the *Lungs*, whither the transfused blood immediately flows: what *extravasated serosities* do afflict those parts? how unfit are they for any *seasonable fermentation*? And in the *Small Pox*, how few are they

they in *England* which allow of *Phlebotomy* in that disease at all? and how irrational must that *Transfusion* seem, which disturbs and diverts nature in her present work? what hazard must the *Patient* run amidst a *Fever*, and that violent commotion of humors which afflicts his head, back, heart and lungs at that time, should he besides all other accidents fall into pissing of blood, a symptom so dangerous in that disease, and so usual a consequent of this Operation.

Having dispatched these papers thus far: the length of time since they were sent to *London* to be transcribed, perused, and several insertions made, according as my memory, amidst a constant employment, suggested any thing new unto me, and the delay of the *Printing* till *Michaelmas-Term*, gives me an opportunity to relate some Observations I made at *Bath*, during my stay there this Summer: As famous as the *Bathes* are, and of as general an use as they are (there being no better Remedy in the world for the *Scurvey* then the *Cross-Bath* regularly pursued, and as it might be, I cannot say is commonly practised) yet have not our *Experimental Philosophers* made any Inquiries into its nature and qualities: not a man of them ever so much as tried the mixing of several liquors and spirits with the water: as I did, and found no change upon the mixture of *Acid spirits*: but the urinous and volatile spirits of *Sal Armoniack* (drawn the *Leiden-way*) and *Harts-horn* did change the water of the Pump in the *Cross-Bath* (which ariseth from the hot Bath) into a lacteous colour and opacity, insomuch that it represented an *Almond-milk*, and after a time there precipitated to the bottom an insipid *Magistery* resembling *Burnt Harts-horn* finely powdered: the precipitated powder was more copious in the affusion of the spirit of *Sal Armoniack*, then that of spirit of *Harts-horn*: and the former in that mixture lost its urinous smell, (and made no unpleasant, but an unctuous, soft, emulsion-like drink) which the other retained.

Not a man of them ever tried whether the several *Bath-water* would coagulate milk: which I tried first, and found that the *Kings-Bath-water* makes *Pesset* with a soft curd, and whitish *posset-drink*, which will not become clear: the *Cross-*

Bath makes an *hard curd*, a *clean* but *whitish-posset-drink*: the *Pump-water* of the *Cross-Bath* (which ariseth from the neighbouring *hot Bath*) yields an *hard curd*, a *clear* and *very green posset-drink*; which being drunk by a woman that gave suck bred a great deal of milk (more then *fennel-posset-drink*) and made her break *abundance of winde*, which those usually do that drink the *Bath-waters*. And I believe this way of giving the *Bath-waters* might be no *small improvement* of *Physick*, were those courses taken *there*, and that *method* which those that understand the *ancient* and *modern Bathes*, and waters that are drunk, might easily pitch upon: but this is above the reading of our *Comical Wits*.

I could find no grounds to believe there was any *sulphur*,

or *bitumen* in the *Baths*: but rather some odd *Alkali* mixed with the *vitriol* of *Iron*: I extracted the *Salts* by *evaporation* of two gallons of the *Cross-Bath-water*; and having reduced them to three quarts I set it to *shoot*; but there was no appearance of *salt-peter* at all: then I evaporated it to *three-pints*, but still neither *salt-peter*, or any other *salt* appeared: then I evaporated it *quite away*; and then I had about two ounces of a *dark coloured salt*, which at first resembled *cream of Tartar* somewhat in *taste*; but having lien longer on the tongue, it resembled very much the *Vitriolum Mortis*, with some more

Mr. Ch. Hotham, when I shewed him some of the extracted *Salt*, did conceive it to be a mixture of *common Salt*, and *vitriol* of *Iron*.

When I was there, a *Spring* of the *Cross-Bath* being lost, they digg'd for it; I talted the *Earth*, but could finde nothing *nitrous* in it: opening the *gutter* by which that *Bath* empties it self, we found the passage crusted very thick, with a white *lapideous concretion*, rough and unequal in the surface, with several *crystals* fixed in it, resembling those of *cream of Tartar*: to taste, it was *insipid*, and of substance like to what precipitates with *urinous spirits* in the water: but after it had lien on the tongue a while, some peeces discovered a taste exactly like *cream of Tartar*, others an *astringtion* somewhat *vitrioline*. I thought some away, and intend to examine it further.

Alcalifate taste: I performed the *Operation* both in *Iron* and *Glass-vessels* with little difference of the *taste*, or quantity of *salt*: some of the said salt dissolving into a *moisture* in the *air* did eat off the *writing* upon such papers as it fell, and turned the paper *yellow* all over, and rotted it. I made a *Lixivium* with the *Cross-Bath water*, and evaporated *that*, thinking that if there were any *unctuous matter* in the water, it might hinder the discovery of the *Nitre* in its *shoot-ing*; but neither could I finde any thing of *Nitre* this way: but

but still there was a taste of the *Vitriolum Martis* in the salt: and one Mr. Berenclaw a Practitioner there assured me, that he had known the Bath-water drunk, and to have tinged the Excrements black, but I cannot avow the truth of that.

I inquired about the truth of what Dr. Mearn had writ about the Stone he took up, upon *Lands-down*, which being infused in water produced a resembling heat and taste to what is in the Bath: But Dr. Maplet, an inquisitive and learned Physician there, who was with Dr. Mearn then, and had some of the mineral stone, assured me it was a *lime-stone*: so did Mr. Chapman an observing Apothecary there, who likewise saw the Stone, and tasted the infusion. In fine, where Dr. Mearn took up that Stone, any man may take up a thousand, they not being cast out of the Earth, but dropped out of the *lime-carts* which pass that way into Bathe, the *Kills* being thereabouts.

The stones in the bottom of the *Cross-Bath*, many are of reddish rusty colour, others green: but concerning the Bathe, I may next Summer, during my stay there, in the midst of June and July (if God give me life and health) make a further Narrative: I only mention this to prevent the *Virtuosi* from usurping upon my discoveries and intendments. Yet to do them some justice, I was told that in some of their Transactions, they have this observation about Bathe, that if any person that is drunk go in there, the Bath will make him sober: If any that is in the Bath drink freely there, it will cause him to be presently drunk, with less drink by far than if he were out of it. This report is worthy of our Philosophers, and advanceth their intelligence above the credit that Aristotle and his Hunters deserve. The first part is defective, for it should have been added, that the drunk person must sit still, and sweat soundly: if he stir up and down or swim, he shall be more sick than if he had never come in. The second part is notoriously false, and all the Bath-Guides and others that have tried it, avow, that 'tis usual for the Townsmen to sit some hours and drink in the Parlour of the *Queens-Bath*, and never be drunk: and they say, a man that sweats there shall bear much more drink, than if he were out of the Bath: which I thought rational and agreeable to what I had observ'd in the Indies, where men sweat and have more drink than in England, and stronger.

But I come now to that Case, for which I adde this *Discourse*, and that is, Observations upon the mixture of the *Bath-water* and other *Liquors* with *blood*, and the *Phænomena* thereupon, which, though I might reserve for that other discourse of mine about *Phlebotomy*, yet I will oblige my Reader with some of those *Curiosities* here, especially since it will give him occasion to reflect how facile it is to multiply such *Experiments*, and how negligent they are who pretend to be the grand *Observers* of this Age.

When I went to make use of the *Bath*, amongst other *Preparatives* thereto (which are better taken upon the place, then at a distance) I caused my self to be let *blood*, and being willing to improve that occasion as well for my instruction, as health, I caused several *Venice-Glasses* to be filled with several *liquors*, each liquor amounting to some three ounces, and into each glass I suffered to run as much as half an ounce of blood, or little more; taking no other measure, then that the whole liquor seemed of a deep blood red. The *Phænomena* thereupon were these ensuing, being observed presently after I had bound up my arm, and was in condition to write.

1. That *Glass* which contained the spirit of *Sel Armoniac* (drawn the *Leiden-way*) kept of an equal consistence from top to bottom, being of a deep red, and not transparent, like *Tent-wine*.

2. Into two several *Glasses* I had dissolved the *Salts* of *Ash* and *Wormwood*, half a dram in three ounces of water; the solutions of these two *Salts* shewed no difference at all; the top, after some space, was of a florid red, (such as is visible in *matris* blood) for about a quarter of an inch: the bottom was of a more dark red, and resembled *Tent-wine*.

3. A fourth *Glass* held *Oleum Tartari per deliquium*: the *blood* and that *liquor* did not first mix, but were as two distinct *liquors*, notwithstanding that the *blood* had streamed into the *Glass*: After a while the *blood* and *oyle* mixed together, and it all became of a deep red from top to bottom; the surface only was transparent, and of a brighter red, as that of the other *Alcalisate Liquors*, but not so far downwards: the rest was as *Tent-wine*.

4. I dissolved half a dram of *Allom* in three ounces of water, and upon bleeding thereupon, all the *crimson* of the blood was immediately destroyed, and it became almost as black as Ink: after a little space towards the surface it cleared up: there were certain *bubbles* on the top that continued the redness.

5. Another Glass held a quantity of the *Kings-Bath water*, the blood that did stream into it, appeared of a dark red, but transparent, as deep *Bordeaux* wine shews: a little below the surface it was deeply red, not transparent, but like *Tent wine*.

6. The *Cross-Bath* altered little from the *Kings-Bath*, saving that the transparency of the surface extended itself downwards to a greater profundity then the other.

7. A Solution of half a dram of *Sal prunella*, yielded a blood on the surface like to that of *Salt of Wormwood*, but not to so deep a descent: otherwise it was of the colour and consistence of *Tent wine*.

After they had stood in the window about five houres, I returned and observed these *Phænomena*.

1. That with the spirit of *Sal Armoniack* continued like *Tent-wine*, only the uppermost part of it to the thickness of a *barley-corn*, was diaphanous as deep *Bordeaux-wine*.

2. That with the *Sal prunella* coagulated into a *Mass*, shrunk from the sides of the *Glass*, and sunk to the bottom, leaving them super-natant water of a pale citrine colour; the *Mass* it self being of a florid red on the surface, and of a deep red, not blackish, to the bottom, that I could perceive.

3. That with the *Cross-Bath water* changed not, but seemed thick as *Tent-wine*, the upper part being diaphanous, and like deep *Bordeaux-wine*?

4. That with the *Kings-Bath water* changed not; only the diaphanous surface extended not it self downwards so far as the other *Bath-water* did.

5. The Solution of *Allom* continued all fluid and black; no coagulated mass therein: but the bubbles had lost their

their *crimson-colour*, and were become *cineritious*,

6. That with the *Salt of Wormwood* resembled deep *Bordeaux* wine, but was less *diaphanous* a little below the surface: The surface extended downwards to the length of a *barley-corn* with a perfect *transparency*.

7. That wherein was the *Sal fraxini* was *diaphanous* to the bottom; no innatant *filaments* or *coagulated* mass in it: But the surface to the length of a *barley-corn* was like decayed *Claret* made with a mixture of white and red wine: the residue was deeper like that of *Bordeaux*.

8. That with the *oleum Tartari per deliquium* was *diaphanous* to the length of a *barley-corn*, and of the colour of *Bordeaux* wine: the lower part un-coagulated, and like *Tent-wine*.

9. It is to be noted, that the reflexion of the Glasses in all the *Liquors*, they being held up to the light, (except the spirit of *Sal Armoniack*) did create a *corona* of several colours, mixt with *green*, *blew*, and so as not one resembled the other. That with the *oleum Tartari per deliquium* resembled the *blew* in *Bordeaux* wine, with an eye of *green*.

I had forgot to relate how I kept some of the blood in a separate *Pottinger*; and it seemed excellently well coloured; when it coagulated, the top was of a due *red*, the bottom *blackish red*; the *serum* of a due *transparency* and *proportion*, and not tinged to *citrine colour*: and coagulated all as the *white of an egge* over a gentle fire.

I poured also upon the blood in two other *Pottingers*; upon the one spirit of *Harts-horn*; on the other spirit of *Sal Armoniack*, but not much: perhaps a dram or more: that with the spirit of *Harts-horn* at first seemed more florid, then that with the spirit of *Sal Armoniack*: both coagulated into Masses after a while, and were then both of one colour on the surface: but that with the spirit of *Sal Armoniack* coagulated its Mass so as to break from the sides: that with the spirit of *Harts-horn* did not break from the sides; whether the blood of one, and the other might differ, I know not; but both immediately followed one the other. That blood which had nothing mixed with it, after coagulation, differed

ferred not from the other two, though they were covered over with the *spirits* as soon as they were taken, and that exposed only to the *Air*.

After a while upon the *surface* of that with the *Kings-Bath-water*, there was a kind of fatty *cremor* which covered the whole *surface*; and so on that with the *Queens-Bath-water*: the others had none at all.

On *Munday* after dinner, the next day after I had bled, I came to observe again; and found,

1. That with the *Sal fraxini* to be more and more diaphanous, resembling *Bordeaux* wine: that with the *Sal absynthii* less diaphanous, but red still.

2. I observed the *Solution of Allom*, and however it looked black, yet being held in a clear light, one might discover in it visible appearances of a *deep red*. I poured on it some spirit of *Sal Armoniack*, to see if it would restore the colour: but instead of that the *liquor* coagulated presently into little *massulae* or flakes, resembling raw flesh when the blood is washed out.

3. There was no alteration in that with the spirit of *Sal Armoniack*.

4. That with the *Queens-Bath-water* continued more diaphanously red towards the top: but that with the *Kings-Bath-water*, did not lose its redness, though it were not diaphanous near the surface.

5. Of the two *Pottingers* in which were the spirits of *Harts-horn*, and *Sal Armoniack*, though both were coagulated, yet that with the spirit of *Sal Armoniack* was the most florid.

6. That with the *Oleum Tartari per deliquium* continued red, but lost its diaphaneity at the top almost quite.

7. That with the *Sal prunella* after the coagulated *Mass* had subsided, had on the top of it in the middle of the *Glass*, to the breadth of *six-pence*, a concrete gelly, exactly resembling that of the clearest *Harts-horn*, not boyled up to its greatest height; from

From hence protended certain filaments, with which it was fastned to the *mass of blood*, which was *buoyed* up thereby, so that it touched not the bottom; the *jelly* was *insipid* and stuck to my finger, when I touched it: whether that little which did so adhere took off from the *equipollency* of the two bodies; or whether I broke casually some of the protended filaments, or from what other cause I know not; but after a while the *Mass* sunk quite to the bottom, and drew the *gelatine* below the surface of the water.

8. Upon the pouring out of the blood, that with the *Queens-Bath water* happened to seem of a *pure Claret*, like *Bordeaux* wine, no *setting*, or *floating filaments*, but *something red*, which resembled exactly the flying *Lee* in bottled *Claret*.

9. That of the *Kings-Bath water* appeared as the former, only at the latter end, as it was poured out, there was a certain *gelutine* mixed with it, and sticking to the sides, that for colour and consistence exactly resembled the *jelly* of red currants.

10. That with the *spirit of Sal Armoniack* upon effusion, appeared like deep *Bordeaux* wine, and so from top to bottom without any alteration.

11. Upon the effusion of that with the *salt of Wormwood*, it appeared also like to *Bordeaux* wine; but towards the bottom there was *Gelatine* red, like that of red currants, more tenacious and in greater quantity then was in that mixture with the *Kings-Bath water*.

12. That with the *sal fraxini* poured out like common or less deep *Claret*: at the bottom there was no *Gelatine*, but it ran a little thicker like to *Tent wine*.

13. That with the *Oleum Tartari per deliquium*, upon its first effusion ran like *Claret* a little decayed: but the most of it dropped, as if it were a weak *Gelatine*, and so continued to the last, being almost of as deep colour as a ripe *Mulberry*; I poured upon some of the said *jelly* almost as much of the *spirit of Sal Armoniack*, and it immediately dissolved all the *jelly*, and made it fluid, yet so as that the *bloody crassament* appeared *unequally mixed*, some parts being more deep and opacous then others.

14. I took the Pottinger in which was the *blood* with the *spirit of Harts-horn* affused to it, having separated the *mass* from the *sides* of it, I poured out the *Serum*, which was as *black* as common *Ink*: the *surface* was *red*, but not so *florid* as that with the affused *spirit of Sal Armoniack*: most of the *melancholy blood* seemed dissolved into that *black Serum*, the *super-incumbent mass* being *thin*.

15. That *blood* on which the *spirit of Sal Armoniack* was poured in the Pottinger, appeared from top to bottom *red*, only in the bottom there were some little spots of a *blackish* and *darker red* then the other parts: on the *surface* there was a *Gelatinous pellicle* generated: the *Serum* was of a *citrine* colour: the *consistence* of the *coagulated mass of blood* here was more *tenacious* and *fibrous* then in that other Pottinger with the affused *spirit of Harts-horn*: There was no *pellicle* discoverable upon that with the *spirit of Harts-horn*, upon that with the *spirit of Sal Armoniack* so tough an one, that it would bear up a little way in your hand the whole *mass of blood* adhering to it.

16. The *blood* which was kept in a Pottinger without any mixture, being placed in an *arched fire* on a fire-shovel burned with a *bright* and *continued flame*, as if it had been *Turpentine*, but crackled like a *green bay-leaf* cast into the fire: and so it did being cast *immediately into the fire*, but the *crackling* was less *durable*, by reason of the *vivid fire* into which it was cast. It is to be noted that this pottinger having been removed into the *Sanne*, all the *Serum* was *exhaled* or *incorporated* into the *mass*, which was grown to the bottom of the Pottinger, and dried there, so that I scraped it off: whether that might adde to the *Phanomena* I know not.

17. The *blood* in that Pottinger where the *spirit of Harts-horn* was affused, being taken out and placed in an *arched fire*, rose up with an *equal intumescence*, as a *cake* doth in an *Oven*; it crackled much less then the *unmixed mass of blood*: It burned slowly, with a *continual* but not *vivid* flame, and in such a manner as if the *mass* had never taken fire, but only the *smoke* issuing from it; for one might easily see an *interstice* betwixt the *mass* and *hovering flame* all the

T

while

while, till it came to a perfect Ignition.

18. The mass which had *spirit of Sal Armoniack* affused unto it, being placed in an arched fire, did rise with an *equal intumescence*, but greater then that with the *spirit of Harts-horn*: it crackled less then that with *spirit of Harts-horn*: the flame at first resembled that of the other; afterwards instead of *hovering* about, it seemed to issue immediately from the blood, and not to appear like a smoke that took fire within the arch; the flame then was *vivid*, and continued.

19. The fire being an exceeding *quick fire*, I poured some of the serous blood that was in the Pottinger, impregnated with the affusion of the *spirit of Sal Armoniack*, and as it dried it took fire presently, the flame resembled that of the former mass, only it wasted faster then that, being cast upon so quick a fire: The black Serum of the coagulated mass with affused *spirit of Harts-horn*, though cast into the same fire, would scarce burn at all.

20. I took some of the mass that was impregnated with the *Sal prunellæ*, and placed it in an arched fire (the Serum or Solution poured off from it was *insipid*) it rose with an *unequal intumescence* coping, like a loaf, in the midst: I brought it to a perfect ignition and coale, yet did it not crackle at all, neither burn till the last, and then but a little, and with an interrupted flame which seized now on this, now on that part: nay, there was but very little sign of any *Sal prunellæ* in it to sputter as it burned.

21. I told you how I poured some *spirit of Sal Armoniack*, upon the mixture of blood and a Solution of *Allom*, and of the odd coagulation that hapned thereupon into white massula which seemed like flesh when the blood is wasted out of it: I took of those incoherent flakes or massula, and putting them to burn in an arched fire upon the fire shovell, it run all off, upon a great ebullition, into the fire: I took the red hot fire-shovell, and placed some more upon it, which seemed to burn as *Allom* doth in the like case, and so stayed on it: but being put into the arched fire, and brought to ignition, it would neither flame, nor crackle, nor left any visible quantity

tity of coale or ashes behind it, as if it had almost all evaporated.

22. These were the *Phænomena* which I had opportunity to take notice of at that time: but I also left a *Solution* of the *Alkali of Nitre* of about three ounces with the Apothecary, if any else came to bleed there in my absence: upon bleeding, an healthy young man that was somewhat indisposed, some was suffered to stream into that *Solution*: at first it was of a florid red, but paler then blood usually is, resembling a bastard-scarlet: after some days standing I found it of a deeper red from top to bottom: one half of it was transparent like to the duller and more decayed sort of Claret: the other half seemed like Tent-wine, not diaphanous: on the surface there was a cremor which extended it self almost all over it: Upon pouring it out, it appeared all to be of a blood-red, only that which ran last was of a deeper dye: at the bottom there was a kinde of *Gelatine* like to that of red Currants, which rendred the one half of it opacous: it was no way dis-coloured, nor unequally mixt: the spirit of *Sal Armoniack* being poured on it, did render it fluid presently and transparent.

Having occasion after some weeks stay at the Bath, to ride in extream hot weather above 200 miles in a few days, and being tired with watching and the journey, and being wet very much with a great shower of rain at my return, I went immediately into the *Cross-Bath* for half an hour, to prevent any inconveniences that might befall me upon such travel: but at my coming out of the Bath I felt so violent a defluxion into my throat, and the adjacent Glandules, that I apprehended some danger of a Squinency, which yet I avoided by bleeding, purging, and other means together, with the use of the same Bath after all: when I was to bleed, I was willing to try some further Experiments in Liquors, different from the former, and the Observations I made were these.

1. I caused *two veins* to be opened in the *left arm* at once, and received one Pottinger out of the *Mediana*, and the other out of the *Cephalica*: my intent in that was to observe (as I had done once before in my self) whether the blood of *two veins* in the same arm would yield *different brood*: if so, then I thought that it might not be indifferent in what *vein* a man bleeds, though they all arise from one trunk of the *vena cava*; and that we might justly have regard to those cautions of our observing Ancestors, not to bleed those veins promiscuously, but some in one case, and some in another. I was confirmed in those sentiments by the *Phænomena* I met with a second time in the trial, as other observations have satisfied me about the doctrine of *revulsion*, and its truth. Having taken one Pottinger out of the *Mediana*, and another out of the *Cephalica*, I stopped the *Mediane*, and continued to bleed into the *liquors* out of the *Cephalick*. In the first, issuing out of the *two bloods*, I could finde no difference in the colour or consistence; but after standing three or four houres, that of the *Mediane* had much less of Serum in it: the Serum thereof seemed *Limpid* in the Pottinger: but that of the *Cephalick* was *citrine coloured*: that of the *Mediane* somewhat of a *volatile saline* pungency upon the tongue, different from the taste, which the other Serum had, that being very salt: that of the *Mediane* had a *blewish Gelatine* gathered upon the top of the condensed mass of blood; the other had none, but was of a florid red on the top. After two days I came to look on them again, and upon turning the coagulated mass of blood in the pottinger, that of the *Mediana* had much more of black towards the bottom, then the other: and also a thinner surface of red then that of the *Cephalick*.

2. To carry on the Experiment of mixing several liquors with blood, I bled into some ounces of *Aqua mirabilis*, which grew deep coloured almost unto the top, which was transparent and of the colour of *Mant-wine* almost: after some houres the Liquor became of a bright beautiful *Claret-colour* almost unto the bottom, where there was an opacous, dark-red settling, with an *enaeorema* of contexted filaments pretended to

to the top. The *Wasps* flocked to *that glass* in great numbers, and drowned themselves in it, not meddling with any other of the subsequent *glasses*. After two days was little changed, only the beautiful *Claret* was somewhat darkened.

3. I bled upon some ounces of *Treacle-water*, which turned as *black as Ink* presently, but continued the blood perfectly fluid: The *red* was so destroyed, that the *Aluminous Solution* did not equal it; there not being upon inclination of the *glass* the least sign of any *incarnadine*; and so it continued for two days, no variation happening.

4. I bled upon some ounces of *Cinnamon-water*, which turned of a *pale red*; if I held up the *glass* to the light, it seemed almost to the top *opacously red as Tent wine*; but, if viewed otherwise it seemed of a *paler red*, approaching to *bastard-scarlet*. After a while it seemed as if all the *blood* were coagulated into one *mass* from *top to bottom*, subsiding a little within the tinged *Cinnamon-water*. Upon agitation and stirring with a *knife*, it appeared that the *fibres of the blood* were so destroyed, that this *mass* was no coherent thing, but broken into little *massulae*, or parcels of a *pale red*, such as the *subsiding curds* are in *whhey*. After two days I viewed it, and found the *Phænomenon* of the whole *Glass* to look *cherry-coloured*, but the *incoherent massulae* were of a *pale red*.

5. I bled into some ounces of *Aqua Bezoartica*, that did coagulate with the *blood*, so that it all fell in one *incoherent mass* towards the *bottom*: but whether there hapned to be a greater proportion of *blood* in the *glass*, or for some other cause, the coagulated blood filled almost all the *water*, much beyond what we observed in the *Cinnamon-water*: the consistence of the one, and the other *massulae* were like the *curds* in *whhey*; these were of a *pale red* retaining to *whitishness*; and so it continued two days; the *small quantity* of *water* appearing in it giving no opportunity for further *Observations*.

6. I bled upon some ounces of *Nantes-Brandy*, it gave us a more *tenacious curd* than the former, of a *pale red*: but the *mass* and *liquor* was *opacous* towards the *bottom*, so as to appear

appear like *Tent-wine*, in what light soever I placed it. After two days that of the *Brandy* which was *fluid*, (the curd not being answerable to the *Aqua Bezoartica*) was of a pretty florid red, the coagulated mass was of a brick colour.

7. I bled upon some ounces of *Anise seed water* drawn from the grounds of beer, it yielded a mixture of a deep blood red from top to bottom, somewhat transparent. The mass coagulated from top to bottom, the curd was of a deeper red then the others, and of such a tenaciousness as is to be found in the soft curd of *possets*. After two days it turned blackish, the coherent curd being of a little lighter red.

8. My indisposition, and other cares permitted me not to prosecute these Experiments as I did the other: but one curiosity more possessed me, to put two drams of *spirit of Harts-horn* into a pottinger, and to bleed thereupon, to see if it would alter the *Phenomenon* from what it is, if the *spirit of Harts-horn* be poured on the blood: I did so, and I found at this time that it kept my blood from coagulating into such masses as otherwise it would, but the blood turned blackish-red, and in it there was observed a crimson gelatine, which run off the knife as jelly of red currants would, when beginning to cool. After two days it continued still fluid, but blackish. I have sundry times tried that way of putting *spirit of Harts-horn* into the pottinger first, and then caused them to bleed upon it with this success, that immediately it spoiles the red, giving it a more dirty colour, and casts up a mucous phlegme, (such as I never saw in any blood upon other Essays) just like what many spit and blow out of their noses in catarrhs: this covers all the pottinger, without any mixture of blood in it, and would be white, but that the subjacent blood gives it another muddy colour. The blood under it was always fluid, and unequally mixed with parts of a bright and blackish red. Whether my journey, or distemper prevented that appearance in my blood, I know not.

9. I had a Patient there which had unknowingly taken much of *Mercurius dulcis* in pills at London, to her

her great prejudice several ways: and though she had taken *golden-bullets*, and used other means to discharge her body of that *troublesome Inmate*, yet found little benefit: At the Bath I let her blood, and to try an *Experiment* I cast a *Guinny* into one of the *middle Pottingers* as she bled: I could observe no difference betwixt the blood preceding, and that therein: but in the *afternoon* I came and went to that pottinger which had the most *florid* and best *coloured blood*, and searching *there* found my *gold*, and that stained with white spots from the *Mercury* on the *lower side*. Whether the separation of the *Mercury*, or some other efficacy in the *Gold* (of whose power in such cases I can give good instances) caused that difference in the *bloods*, I cannot tell, having never tried it since.

Being not well at Warwick, by reason of a violent defluxion into the Glandules of the Throat, I caused my self to bleed Octob. 20.

1. I took six drams of spirit of Harts-horn, not very well rectified, nor clear of colour, and put it into a crystal-glass; and bled thereupon about half an ounce of blood; it turned of a *dark red* presently, inclining much to *black*, though, as it stood, or as it was held on one side, you might perceive a lighter, but not *florid red* at the sides. It seemed *fluid* for two dayes; but as I poured it out it appeared to be very *Gelatinous*, and of colour like that which is become *sanious*, and degenerated into *blackishness* with keeping.

2. I bled upon the same liquor of Salt-peter, about half an ounce of blood, upon four ounces of liquor, at first the blood did turn on the surface to a *bastard-scarlet* (which is an effect every thing of Nitre mixt with blood so produceth) after-

afterwards the whole blood sunk to the bottom, the upper part being all of *one colour and consistence*, such as is observed in the *Serum* of the blood sometimes, when the *supernatancy* is whitish, and not transparent. Being poured from the blood, I found that coagulated into a *mass*, which was all of a very *natural red* all over, only *spotted* in many places underneath with *black spots*. The *concretion* was so brittle, that it would not hang together, nor endure any *light pressure*, but as it were *melted*, and seemed *gelatinous*.

3. I bled upon a *Solution of the Alkali of Nitre*; it appeared upon the first mixture like *bastard-scarlet*; then the blood sunk to the bottom, the top being transparent, yet of the colour of *High-countray-white-wine*: the bottom seemed *redder* then that of the former; the *limpid liquor* being poured out, seemed all *gelatinous*, and had incorporated with it the *serous* part of the blood: the red at the bottom was *fluid* and not *tenacious*, but of the consistence that blood is of when it is *hot*, and newly received in a vessel out of the *veins*.

N.B. After I had poured out the blood and mixtures out of the several glasses, and that the glasses had stood a while, I observed that that of the *raw Liquor of Nitre*, which remained in the bottom, did turn of a most beautiful red, as ever I saw in any thing: but that with the *Spirit of Harts-horn*, or *Solution of Alkali*, &c. did not vary: after two days all the remains of blood in the several glasses turned *blackish* and *sanious*, only that with the *raw liquor* altered not.

4. I bled upon the *liquors of Salt-peter* which had passed the *ashes*, and on that which had never passed the *ashes*: both were of the same *blackish* and *sanious* colour (after the first *bastard-scarlet* was past) both had on the top a certain *cremor*, which being cast into the fire discovered it self to be *nitrous*: both of them, though they were of such a *dirty red* inclining to *black*, yet were they of *one consistence* from top to bottom all *fluid*, nothing *gelatinous*, nor any one part *black*er, or *redder* then the other. Which is very much, considering the difference of the two *Liquors*.

5. I bled upon the *unctuous Mothers of Salt-peter*, which turned at first to a *bastard-scarlet*: the blood did never mix with

with the *eMothers*, nor otherwise ting *their* colour, then as it cast a shadow by its innating on the surface of *them*. It coagulated on the top of the *Mothers*, being of colour all thorough exactly like to *Ocher*: the concretion was a quarter of an inch thick, a firm mass to see to, like so much *bees wax* cast into a cake: I took it up in one mass with my knife but trying its *tenaciousness*, I found it as brittle as most *short cakes* are. Upon the *surface*, there was an appearance of certain *striae*, which might be *saline*. All the blood did not coagulate so, but underneath there was a quantity which in the glass was of *equal dimensions* with the *other mass*, it was of the colour of *Oker*, and *fluid*, and would not mix with the *eMothers* at all: I took of the *mass*, and tried to burn it in an arched fire twice or thrice, it boyled and bubbled up upon the fire-shovel, like impure *Niter*, and so burned with a flashing, as if it had been most of it *Peter*, it never came to flame as *blood* doth *usually*; only one blaze as it were always *hovered* over it for a moment or two, not being continued to the body, otherwise then by a parcel of *smoke* issuing out them.

6. I took also two *pottingers* of blood, the *first* and the *last* of the *blood* I took away: there was no difference in the blood of one and the other; the coagulated mass well-coloured, of a good *consistence*, less of that *black* or *melancholick* crassment then is commonly found: the *Serum* well-coloured, of taste *brinish*: I placed it in an *arched fire*, it rose up with a *globous intumescence* (but crackled not so much as at *Bathe*; though very much, and like a *bay-leaf*) it burned with a continued, vivid, and lasting flame.

I suffered a *pottinger* of the same blood with which this last *Experiment* was made, to stand ten days or more, in which time it was quite dried up into a *hard fryable* mass, the top of which was almost as black as *Ink*, the *bottom* having somewhat of a *dark red* in it. I cast a *piece* of it into a *quick coal-fire*; therein it crackled like unto a *bay-leaf*, but burned with a short and *weak flame*. I placed another part of it upon a fire-shovel in an *arched* and *quick fire*, where it crackled as much as the *other* did (and more then that part

of the same blood which was burned in the fore-going Experiment of blood newly congealed, and separated from the Serum, which was in this last case dried into the mass) and it did burn with a vivid and continued flame presently. Which accident I take notice of, to shew the different Phenomena upon the diverse way of burning the blood. I took a third portion of the said congealed and firm mass of blood, and put it to some cold water in a Glass, and it dissolved most of it therein, and tinged the water of as beautiful a red as any claret, though otherwise the mass were blackish, and had nothing of red but what was in the extimous crust of the bottom, which seemed of a most deep red inclining to black.

I suffered two or three spoonfuls of Hogs-blood to run into a large Venice-Glass, in which was halfe a pint of the Mothers of Peter; I suffered it to stand some days, and coming then to see it, I observed that the Mothers were become opacous almost to the bottom, on the top was a mass of coagulated blood exactly resembling the colour of Oker; it was so firm, that I took it with my knife in one entire piece, but I found the top and bottom of the mass (which was pretty thick) to be very soft, but not as it were fibrous; the middle was more firm: I put some of it upon a fire-shovell in an arched and quick fire, when it boyled up, and ran about, and by its sputtering discovered a mixture of Salt-peter: but it did not flame at all, though I brought it to ignition. Examining the remaining Mothers, I found a sanguine mixture to float in, and stain the liquor of an Oker-colour, and some of it was aggregated into little masses or lumps, whose particles did not cohere by any tenacious fibres (indeed I have not been able to observe any tenaciously-fibrous coagulations in the blood of Hogs hitherto) but upon the least touch of my warm hand, they dissolved or yielded unto the least pressure. Out of all which I intend to deduce, that some common Experiments may shew that, which no Chymical Fires give any light unto. That there is a great diversity betwixt the blood of other Animals, and that of Men: because that upon the same Liquors they disclose different Phenomena; and consequently that the Transfusion is a rash and unsafe attempt.

I shall conclude with this *intimation*, that neither is the blood of *several Animals*, nor the blood of the same kinde of *Animals* the same; but in *taste* and colour of the *Serum* there will be often a sensible difference, and it is rational to think the like of the blood it self: nor do they *burn* or coagulate alike, or with the like *Phænomena*: nor is the blood of the same Men always the same, though he continue within the latitude of *Health*; and in diseases *Epidemical* let two bleed, and there shall often be no affinity in the colour of their blood, or in the *Serum*, the one being *white* and *turbid*, the other *Limpid*, the *Serum* of the third *citrine-coloured*. And if so, what *regulations* shall we have for this operation: shall a *transfuse* he knows not what, to correct he knows not what, God knows how? This may become indeed that sort of men, being the worst and most irrational *Empirics* the Sun ever shined upon, as I demonstrate more fully in my Letter to a *Physician*, in a Parallel betwixt them and the *ancient Empirics*.

Let them from these *Observations* draw their *sophistical Conclusions* for and against *spirit of Harts-horn*; for, and against *spirit of Sal Armoniack*; against *Allom*, and *Treacle-water*, and such like; till all the world come to admire them as much as I: And that there be a new *History* penned to render them as *contemptible* as this *magnifies*, by a *Rhetorick* that hath more of the nature of the *Microscope*, then of *Truth*.

The other day coming into my *Apothecaries Shop*, and finding one (not otherwise very ill) going to bleed, I sent for a bottle of that *Lixivium* of *Salt-peter* which had passed the althes, and into the first portinger which he bled, which seemed to have little of *crimson* in it, but a *Serum* of a dark-blew colour; I poured a little of it, and it turned black, though it continued fluid: Into the third portinger which seemed better blood, with a red colour, I poured some of the same liquor, and it improved the colour, and kept it from coagulation awhile; what hapned afterwards I had not leisure to observe.

Miscellaneous Additions by way of Postscript.

Whatever may seem to be said from hence in favour of the *spirit of Harts-horn*, is not so valid as may be imagined: for I have mixed a little of the *Solution* of the *Alkali* of *Nitre* (which turned *Syrup of Violets* green,

and rendred it less fluid upon the blood of a man, which was blackish, waterish, and ill coloured, after it began somewhat to coagulate, and I brought it to a new fluidity, and as vivid a red as ever I saw: and so it continued for 24 hours; at my return after two days, I found the blood in the Pottinger, (by reason of the Sun on the window) all coagulated, and become friable; but even that it had visible signs of a remaining redness, which the other blood that had nothing effused retained not. Oyl of vitriol affused to the Serum of blood, tinged with the crimson part, doth improve the red for an instant or two, but then it turns black and coagulates into a soft mass, that admits the least impression; the fibres being destroyed: but yet it burns rather better, brighter, and quicker then otherwise; being poured on the surface of coagulated blood, on the top whereof was tough pellicle generated; it did not eat the pellicle, but in one night reduced the Mass, almost to the bottom, into a consistence like to Bees wax, which burnt well.

In January last 1669. I had another occasion to bleed, but though the Phenomena of my blood upon the Mothers of Salt peter were the same as at first; yet in the other mixture with Salt-peter-liquors, they were not: the blood separately taken seemed not to differ from the former, only the Serum was a little yellower: it did burn as well as before, but crackled much less. At the same time I caused an old man to be let blood for a catarrh and pain in his shoulder, which he used to ease with bleeding; the blood seemed very good and well-coloured; after it had stood a while I had the leisure to view it, and upon one pottinger of coagulated blood, I poured twenty drops of spirit of Vitriol, whereupon immediately all the top turned as white as milk, even the bubbles which seemed of blood before: whereupon I took another pottinger, and separated half the blood from the Serum, and poured on the blood and Serum some spirit of Vitriol as before: presently all the Serum became of colour and consistence like milk: the blood turned black, and hardened into a substance that cut like white-washed-wax: the other, at my return, I found of the consistence and colour of a common custard. The vi-

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vitriolated Serum would not flame: the *vitriolated* blood did burn with a *brisk* but *short* flame: the *simple blood* would scarce burn at all, but with an *hovering* and *discontinued* flame.

I took also some of the pure *citrine Serum* of my blood, which tasted not very *salt*; I set it in the window for some time: during the *frost* it coagulated into a body of the *consistence* of *butter* in the heat of *Summer*: it gathered no *ice* at all: the *colour* became less *citrine*; but still *pellucid*. I set it after some days to thaw; which it did immediately before the fire, but came not to its former *fluidity*, but like *oyle*: after that, it coagulated with the warmth *before the fire*, and seemed exactly like to *boyled Turpentine*, but that it wanted the smell: it would not flame at all (though crackled much, as *salt*) yet I brought it to *ignition*.

I did also take some *Hogs blood* again, and poured on the *Mothers of Peter*, it mixed not; only after some days some *filamentary corpuscles* subsided unto the *middle* of the liquor: the colour at first was a *pale bastard scarlet*: but after a day it turned to a *darkish red*, and so continued many days; and in its primitive fluidity, it suffering not any alteration, but being as *fluid* as when it first issued from the *veins*: it stood in the window all the *frost*, not changing or freezing at all. No more did another *pottinger* of my blood that was mixed with the liquor of *Peter* which had *past the ashes*: but that last blood turned very *blackish*.

In fire, notwithstanding any thing I have done or purposed about the *nature of blood*, I do now desist from the *Enquiry*: the result of my thoughts being *this*, that there is a continual variation in the blood upon every disease, and often without it, during a *state of health*: that the blood of *Individuals* of the same kinde differs not only from it self, but in each other individual: that no man can by reason of this consideration know what he would *transfuse*; nor what it is he would *rectifie*. In a word, that 'tis most prudent to insist upon *Experienced Methods* in *Physick*, and that all *phancies* about *spirit, salt, sulphur, fermentative fires* in the heart, occasioned by *heterogeneous mixtures*, and the explanations

lications of the operations of *Medicaments* by the new *Philosophers*, either *Chymical* or others, are all *vain*, and cannot be allowed as a *ground of practice*, till justified by *successful trials*; seeing that not only the *suppositions* are false, but whilst the *blood* is *subdiminutio animæ*, effects upon it are different from what when it is separate: and I think I may thence conclude rationally, that 'tis not conceivable that the fabrick of our bodies is purely *Mechanical*: for the *liquors* would have the same effect on the *blood* in the body, and without: which they have not.

A REVIEW of the precedent Discourse against Mr. GLANVILL.

AFTER I had written the present *Discourse*, I was so unwilling to give any offence to the world, and so apprehensive lest my just indignation for the affront Mr. Glanvill had put upon my Faculty, should transport me beyond all fitting moderation, that I desired a Friend, (without further advising with me) to blot out whatever he might in prudence think equitable; by reason of his great cautiousness, as well as thorough that great haste and continual interruptions wherein the Treatise was penned; I finde several passages either omitted totally, or not sufficiently explained; so as that I could not acquiesce in the publication thereof, without some few additions, partly to prevent some cavills that might (though weakly) be raised against it, and partly to put every thing past dispute hereafter; that so I might not have any further occasion to write against our Virtuoso, nor his Abettors have any thing to do but to call in his Libell against the Physicians, and do some reasonable justice to those he had so arrogantly and injuriously insulted over. I desire my Reader to pardon me, if I have not in some circumstantial embellishments and regularity of procedure answered his expectation, since in the main I am sure I have out-done it.

Whereas I charge Mr. Glanvill (page 2.) with not having read the Authors which he mentions. These words, *Who can chuse but smile, when he reads how Apuleius improved the Mathematicks after Euclide?* the whole passage should have run thus; *Who can choose but smile when he reads how Apuleius improved Arithmetick?* All that Apuleius did was to translate something about Arithmetick into Latine, at such time as the Latines had no other Numerals then L. M. D. C. &c.

Vossius de Sci-
ent. Mathem.
c. 51, sect. 1.

&c. And by reason of *this* performance of his doth Vossius give him a place amongst the *Authors*, not improvers of *Arithmetick*: and takes notice of him as the first that ever writ in *Latine* about that subject. Upon which account it was judiciously done of Vossius to mention him there; but Mr. Glanvill is grossly mistaken here to name him, where he treats of such as advanced useful knowledge; which a bare *Translation* doth not.

Apuleius Arithmetica Nicomachi Ge-
sæni Pythagorici Latine transtulit teste
Cassiodoro de mathem. discipl. cap. de A-
rithm. & Isidoro Hisp. Orig. iij. a Joss. de
script. Hist. phil. 1.3. c.13. p.280.

It is true, Vossius saith of Apuleius, *Primus Arithmetica Latinis literis illustravit*: which words import no more then I say; and 'tis manifest, that what He did was but a *Translation* of *Nicomachus*.

Vossius de sci-
ent. mathem.
c. 16, sect. 1.
Blancanus Ma-
them. Chre-
nol. secul. 15

Vossius de sci-
ent. Mathem.
Mr. Glanvill
p. 47, 48, &c.

So Cassiodorus de *mathem. disciplinis. cap. de Arithmetica. Reliqua disciplina indigent Arithmetica disciplina, quam apud Græcos Nicomachos diligenter exposuit. Hunc primum Madaurensis Apuleius, deinde magnificus vir Boethius Latino sermone translatum Romanis contulit lectitandum.* The same is asserted by Isidorus Hispalensis. This might our Virtuoso have observed in Vossius, when he read him: and what Apuleius performed is so meanly thought of by Blancanus, that in his *Chronicles of Mathematicians* he affords him no place, though he mention the *Arithmetical* work of Boethius. The imputation I fix upon Mr. Glanvill, for not understanding what the *Authors* he mentions had writ, and about his not having ever seen them, is manifest to any man that shall not only trace him by Vossius, but consider the *ridiculous characters* he fixeth upon the *Writers* alledged, viz. Ptolemy of Alexandria made considerable improvements in *Opticks*: and Alhazenus the Arabian is famous for what he did in it. From these Vitellio drew his, and advanced the Science by his own wit and their helps.

* S. Stevinus both invented and writ such in all parts of the pure and practical *Mathematicks*, in *Geography*, *Geometry*, *Navigation*, *Mechanicks*, &c. that never did any one, no, nor all the *Virtuosi* in England or Europe, ever equalled, or pursued: From hence 'tis apparent Mr. Glanvill, and his Abettors never read him: he was the first *Proposer* I know of, and before my Lord

* Stevinus corrected Euclid, Alhazen, and Vitellio, in some fundamental *Propositions* that were mistakes; and in the room substituted considerable inventions of his own. Roger Bacon writ acutely of *Opticks*. — Any man will grant, that he who gave so lame

an account of *these Authors*, never was acquainted with them, nor understood particularly what they writ, or added of their own invention: whether

Bacon, of a Society to carry on Experiments in order to the rectifying many errors, and improving many known truths: an Admirer of the Ancients, and their learning.

new theoremes, or different and new demonstrations of old known truths. Whereas he saith that Roger Bacon was accused of *Magick* to Pope Clement the fourth, and thereupon imprisoned: but the accusation was founded on nothing but his skill in *Mathematicks*, and the ignorance of his Accusers. — Assertions of this nature are not so easily passed by, so many learned and judicious persons having reckoned him in the number of *Magicians*; such are Joannes Wierus and other *Demonographers*. That the said Writer might declaim against *Magick*, or deny the possibility of it, and yet practise it, is an usual procedure with (a) that sort of people: and that his works have in them sundry Propositions that are superstitious and magical is granted by *Delcio*; such haply was that which *Franciscus* (b) *Picus* says he had read in his book of the sixth Science, where he affirms, that a man may become a Prophet, and foretel things to come by the means of the Glass *Almuchi*, composed according to the rules of perspective, provided he made use of it under a good constellation, and had before-hand made his body very even, and put it into a good temper by *Chymistry*.

As to what I say about *Orontius*, I adde the words of Sir H. Savile in his Lectures, p. 71. *Josephus Scaliger* — homo omnium mortalium, ne Orontio quidem excepto, ἀνευμετρον-τοτατῷ.

Whereas I say (p. 3.) that the ancient Physicians did not only cure cut-fingers, and invented *Diapalma* and other Medicaments in order thereunto. I adde (what I know not how was omitted) that it is notorious how all our *Herbals* and *Druggists* have explained the nature and use of Medicaments according to the Doctrine of the Elements, and qualities either arising therefrom, or from the peculiar mixture of the parts: and whosoever hath acted, or shall proceed according to those notions in compliance with the Ancients, shall not stand in need of

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J. Wierus de
præst. dæm. l.
c. 2.

a Vide Bodin.
in præf. ad
demonoma-
niam.

b See Gabr.
Naudæus his
History of
Magick ch.
17.

any novel Method from the *Virtuosi* to save a cut-finger.

What I have said in the first and second sheet concerning the *Barometer* (as they call it) that it doth not determine exactly, neither the weight nor pressure of the aire, winde, or clouds, is an opinion which the more I think upon, the more I am confirmed in; nor do I doubt that others will be as scrupulous as I in their assent to our dogmatizing *Virtuoso*, when they shall seriously consider what follows, and accommodate it to the *Elasticity* and gravity of the *Atmosphere*.

First, when our *Virtuoso* speaks of the *Elasticity* of the *Air*, he understands thereby a body whose constituent particles are of a peculiar configuration and texture, distinct from what can be ascribed to earth, water, or fire? "That the *Air* near the earth is such an heap of little bodies lying one upon another, as may be resembled to a fleece of wooll; for this (to emit other likenesses betwixt them) consists of many slender flexible hairs; each of which may indeed like a little Spring, be easily bent or rouled up; but will also, like a Spring, be still endeavouring to stretch it self out again. For, though both these Hairs, and the Aerial corpuscles to which we like them, do easily yield to external pressures; yet each of them (by vertue of

Mr. Boyle in his first part of Experiments of the Air: Exprim. 1.

I desire my Reader to take notice about the *Elasticity* of the *Air*, that the very names of *Elaster* and *Elasticity* are of a more ancient mention than the being of the Society: *Regius* and *Pesquetus* use the term: and that as to the expansive motion of the *Air*, 'tis proposed by several *Cartesians*, and before them by *Kircher de Maynet*. l. 2. part. 1. parag. 3. See also *Mersenn.* and *Schererus* mechanic pneumat. hydraul: So that the Society can pretend to nothing but the similitude of a fleece of wooll, and the explaining it by that way.

Page 59.

"its structure) is endowed with a power or principle of self-dilatation; by vertue whereof, though the Hairs may by a mans hand be bent and crowded closer together, and into a narrower room then suits best with the nature of the body: yet whilst the compression lasts, there is in the fleece they compose or endeavour outwards, whereby it continually thrusts against the hand that opposes its expansion. And upon the removal of the external pressure by opening the hand more or less, the compressed wooll does as it were spontaneously expand or display it self towards the recovery of its former loose and free condition, till the fleece have either regained its former dimensions, or at least, approved them as near as the compressing hand, (perchance not quite opened) will permit.

permit. — Against this I except not only that this supposition is far from a sensible Philosophy; but that whosoever would weigh the Air exactly, and estimate the accession of weight which the Air receives from winds, clouds, or vapors (the thing Mr. Glanvill promiseth us) must weigh the Air singly first, and in its utmost degree of expansion, otherwise he can never tell what its gravity is, or what accessional it receives by its Elasticity, by exhalations and different mixtures: But this is not done by the Barometer (however it be essayed in the experiment of Aristotle very judiciously) but only an imaginary column or Cylinder of Air, and its pressure upon the Mercury is considered: which procedure seems to me as ridiculous, as if a man should lay a fleece of wooll, or any other body upon any thing, and there being above that an incumbent body of lead (or the like) bearing thereon, yet should he proceed to say that he weighed the fleece of wooll and not the incumbent lead: for as yet no discoveries have acquainted the world with the nature of that *Aether* which is above the Atmosphere, whether it gravitate or press upon the subjacent Air (which a very subtle but rapid body may do) nor what effects the Libration of the Moon and other Planets may have by way of pressure upon the contiguous bodies, which pressure may be communicated to the terrestrial Air: and without the determination hereof, it is as vain to pretend to weigh the Air by this Barometer, as to determine of the weight of a board that presseth a Cheese in the Vat, without considering the superincumbent stone. Neither are we informed sufficiently what the Figure of the *Aether* is, whether it make a convex and so encompass the Atmosphere; or also be interspersed with, and differently move therein; nor what effects those motions and agitations of it have upon the grosser corpuscles of the Atmosphere, (not only in abating of their gravity sometimes, but adding to them a levitation: nor is it explicated yet what effects the corpuscular rays of the fixed Stars and Planets may have in or upon the Atmosphere, adding to its gravity, (as 'tis just to imagine, since that eminent Virtuoso, the Pliny of our Age for lying, but a Virtuoso! could wash his hands in the beams of the Moon) or Elasticity,

Thus the Moon according to the Cartesians by its pressure upon the waters, causeth the Tides on Earth.

Sir K. D. of
 Simp p 43.
 Charlton de
 fulm no.

of which those *intercurrent* corpuscles seem not void (though not *Aiery*) which constitute *Thunder, Lightning, &c.* or diminishing them both in order to the *Phænomena*, which occur daily.

If. Voss de mo-
 tu mar. &
 vent. c. 21 p.
 94.

Secondly, it doth not yet appear by any thing alledged by our *Experimental Philosophers*, that for certain the Air which encompasseth the *Earth* is a distinct body of a different structure from the *Earth* and *Water* that compose the *Terraqueous Globe*. *Isaac Vossius* doth think the *Air* to be nothing else but *matrish exhalations* drawn up by the *Sunne*. — "*Credimus Aerem esse Aquam seu humorem dilatatum, ad legem æquilibræ quaquaversum se extendentem.*" If it be so, it is a

Aeris elementum juxta sacra eloquia nihil aliud est quam humiditas quædam perpetuo occupantis subtilissimæ & spirabilis substantia. Kircher, Iter cælest. 2 dial. 2. c. 3.

The *Air* seems nothing else but a kinde of tincture or solution of terrestrial and aqueous particles dissolved into the *Æther*, and agitated by it, just as the tincture of *Cochineal* is nothing but some finer dissoluble parts of that concrete lick'd up or dissolved by the fluid water. Mr. *Hook* Microgr. obs. 6. p. 12. *Atmosphæram ex halitibus terrestribus & vaporibus aqueis actione Solis & reliquorum Astrorum concitari, inter deos convenit. Hanc eandem Atmosphæram, ab Solis & reliquorum Astrorum conversiones variæ mutari & alterari apud eosdem indubitatum est. Scheiner res vagin. l. 4. p. 1.*

g x.

vain supposition which attributes such a structure to the *Air*, as is repugnant to the *water*: Others there are which make the *Atmosphere* to be an aggregate of heterogeneous particles exhaled from this *Globe*, whose structure must be as discrepant as the *vapours* are: and what a difference there is in them we may guess by the infinite variety of *Meteors, Rains, Snows, Hail, Winds, Dewes, &c.* and their component corpuscles. If this latter be true, (as 'tis probable that it is; at least that there is no more besides but an inter-

current *Æther* or *materia subtilis* of the *Cartesians*) what becomes of this *Elasticity*, or *pressure* of this *Springy Air* so much talked of?

Thirdly, 'tis necessary to distinguish betwixt the *pressure* and *weight* of bodies: for, suppose were a man pressed under a bended stick, or other *springy body* compressed, he shall feel a great oppression upon him, and be kept down to his great pain, not with the *weight* but *spring* of the said stick, or other *springy body*: and whosoever by the violence of the compression would judge of the weight of the incumbent body, would expose himself to laughter.

Fourthly, 'tis possible for a body without any *springiness* or

or *accessional gravity*, to press downwards above its *weight*: thus a *needle* touched with a *Loadstone* declines from that line in which it hung parallel to the *Horizon*, without any addition of weight: which is demonstrable from the variety of its

declination and *restitution*: and 'tis as *indubitable* that such *declination* of it carries with it something of *pressure*.

Fifthly, we are to consider the nature of the *Earth*, whether that be a *Magnet*, or no: for if it be *such*, (however the *Magnetism* be explained, whether according to the *Cartesian* Hypothesis, or that of *Berigardus*) instead of *weighing the Air*, we deceive our selves as *grossly* as if we took the impulse with which *Iron* runs to the *Loadstone* for its *weight*: and thus in some cases we shall weigh things by *their ascent*, which is inconsistent with the *common notion* of *weighing things*.

Sixthly, to wave the *unestablished* notions of *Gravity* and *Lenity*, and to abstract from all the *preceding considerations*, I say, that even so this opinion of the *Aerial Column* pressing down upon the *Mercury* is false: since in a body so *unequally mixed* as the *Air* is often (and it cannot be disproved that 'tis ever otherwise) it is impossible to imagine that the *pressure* or *gravitation* is by way of a *Column* or *Cylinder*. Imagine the *Experiment* to be tried by *six* or more *weights* pressing at one time upon the *Mercury*, would any man in his wits say, that this *joint pressure* were *cylindrical*? consider but the variety of *mixtures* in the *Air*, (and the separate *pressures* that are *consequential* thereunto) which the contemplation of the *clouds* will lead us into, and 'tis the same thing. Were a man *swimming* in that *concourse* of *water* in *Hungary*, where the *unmixed rivers* flow in one *channel*, and his body so placed that part of it were in one *stream*, and part in another,) would you say that the *incumbent water* did press upon him in a *Column* or *Cylinder*? But to proceed further, if it be true that the *superiour part* of the *Air* or *Atmosphere*, which transcends the *mountainous asperities* of the *Earth*, hath another *motion* or *lotion* then that which is more *low*,
(explain

Acum omnino parallelum horizonti, quæ subito atque magneti affricatur, nullo modo fit gravior, tamen deprimatur, perinde ac si magnes esset acui subiectus. Finge nunc aliquem, qui hæc a magnete fieri nesciat, is profecto credet cum Aristotele acum tendere ad centrum mundi. Berigard de terra: circulo 6. par. 3.

Vide Galilei
de system.
mundi dial. 4.
1^a p. 326. edit.
in 4to.

(explain it either the *Aristotelian way*, or according to *Galileo*, and agreeably to the *motion of the Earth*) if this be true, (as I take it to be now) how can we determine of the *Gravity of the neighbouring Air* by this *Experiment*? and how vain is this notion of a *Cylinder*? for in a *fluid* agitated with *different motions* as the subject *Air* is by *repercussion* from the *Hills and Plains*, (which begets *vibrations and undulations* God knows what it suffers upon the *generation and motions* of *Meteors*; and where the *superior part* hath a *motion* different oftentimes from the *other*, of whose *rapidity* we are as uncertain as of its *structure, and texture*, (and we see that the *rapidity or swift motion* of an *heavy body* takes it from its *pressure and gravity* how can any man talk of *Aerial columns*, much less pretend to weigh the *Air incumbent*, and to determine exactly of any *accession of weight*, as *M. Glanvill* professeth to do? Besides, if *heavy bodies* do not *gravitate* in a *straight line*, but describe the *circumference of a Circle*, or some such line, (as *new Philosophers* hold in opposition to *Aristotle*) and if the *Atmosphere* be to

* Vide Galileum de system. mundi dial. 2. pag. 119. edit. in 4to. Sæctatoribus Copernici opus est dicere (quippe qui ponunt orbem magnum circulo ferri) motum gravi deorsum esse per lineam curvam vel instar quadratricis Nicomedis, vel circulari ut Galileus contendit. Scipio Claramont. de univers. lxxij. c. 20.

be reckon'd amongst the *bodies* that *gravitate*, how can we imagine this *gravitation* to be performed by way of a *column or cylinder*? Moreover, this *Atmosphere* can no way be considered to press *cylindrically*, if we consider

that in every part of it there are continual *exhalations*, and *Smoke* ascending through it, so that the *weight* of it must needs be *abated* by the *ascent* of those *vapors*: and what we *experiment* here is not the *weight* of the *Air* properly, but the *super-ponderancy* or *over-weight* of it. The *Atmosphere* seems to me constantly to resemble a *Glass* in which *water* is poured on *wine*, and the *wine* is ascending thorough each part of the *water indeterminately*; if it be thus, and that the *ascending vapours* carry a *great force* with them, (which any man

Vide Sanctorii medic. static. Hanc Aeris concitationem demonstrat vel ipsa saliva ex alto demissa, quæ dilaceratur prope terram in quam concitatus aer impingens ad salivam redit, eamque discerpit. Berigard. citc. Pisar. part. 3. circ. 6. de terra.

will grant who considers the *weight* of the *Smoke*, in comparison to what remains of the *wood and coal* that is burnt: and who *statically* regards

regards the *beams* transpiring from our *bodies*: and how that *spittle*, which in an *entire body* issues from our mouths, descends till near the ground it be *dissipated and distended* I cannot imagine how it can be said that we thus measure all the degrees of compression in the *Atmosphere*, and estimate exactly any accession of weight which the *Air* receives from winds, clouds, or vapors. To conclude, if the *Air* do thus press upon the *Mercury*, how comes it to pass that there is no difference when the *Experiment* is tried in a *chamber* (where the incumbent column is less then abroad) and in the open *Air* of the same levell? Why doth it not

press up *water* (or other *liquors*) in the like *Syphon* to an height as different as is the disproportion betwixt the gravity

Why doth not this Cylinder of *Air* which so presseth upon the *Mercury*, depress a leaf of *Gold*, but suffers it to rise up and down?

of *Mercury* and *water*: which I have not heard it doth; yet the proportion betwixt *Mercury* and *water* in gravity is 16.

34. In fine, how is that true which *Mr. Hooke* saith, viz.

"That he contrived an instrument to shew all the minute-variations in the pressure of the *Air*: by which he constantly found, that before and during the time of rainy weather, the pressure

Mr. Hooke in the Preface to his *Micrographia*.

of the *Air* is less, and in dry weather, but especially when an

"Eastern winde, (which having past over vast tracts of Land,

"is heavy with earthy particles) blows, it is much more:

"though these changes are varied according to very odd Laws.

If this be true, (as I am apt to believe it is) with what face

can our *Virtuoso* tell us, "It is concluded, that such a Cylinder

Page 61.

of the *Air* as presses upon the *Mercury* in the vessel, is

"of equal weight to about 29 digits of that ponderous body in

"the Tube. Thus it is when the *Air* is in its ordinary temper:

"but vapours, winds and clouds alter the Standard, so that

"the *Quicksilver* sometimes falls, some-

"times rises in the *Glass*, proportion-

"ably to the greater or less accession of

"gravity and compression the *Air* hath

"received from any of those alterati-

"ons: and the degree of increase beyond

"the Standard, is the measure of the

"additional gravity. Is not this pret-

If you would see how true *Mr. Glanvill* speaks, reade *Mr. Boyle* his eighteenth Experiment, and the defence of it against *Linus*: there you will finde that the *Mercurial* Cylinder did in winter sometimes correspond with the weather *Glass* and sometimes vary: and the reason *Mr. Boyle* gives, is such as takes off from the certainty of *Mr. Glanvill's* CONCLUSION.

tilly said by a man that writes a year after Mr. Hook, and more after Mr. Boyle? How unacquainted is He and his Assistants, even with the Writings of their fellow-Virtuosi? And if we may be allowed to transfer the Fool's Cap from the Ancients for concluding too soon, may we not crown the heads of our Virtues now therewith? And how careful the R.S. is in making good their promise to Olaus Borrichius, that what their Members should write, the whole Society would be responsible, let any man judge that considers how Mr. Hooke, and Mr. Glanvill (I beg Mr. Hook's pardon for the unequal comparison) disagree; and Dr. Henshaw (another Virtuoso) differs also from Mr. Glanvill, saying, That the Quicksilver Tube will not give so exact an account of every small difference in the pressing Air, as the THERMOMETER! what confusion shall we be reduced unto in time, should these contradictory Experimentators proceed as they have done! I shall here adde, that I do conceive that this notion of an Aerial column gravitating upon the Earth, or subjacent body, was framed in imitation of the Hypothesis of Simon Stevinus, the Teacher of Mathematicks to Grave Maurice of Nassau, in his fourth book of Hydrostaticks, where he insists much upon this Aqueous Column; but 'tis observable that that judicious person, the better to make out his Theoremes, presupposeth such things as give some repute to my objections about the Aerial Cylinder or Column, viz.

1. *Aquam omnibus partibus esse ponderitatis Homogeneae.*
2. *Cujusvis aquae superficiem planam & horizonti parallelam esse.*
3. *Aquae fundo horizonti parallelo tantum insidet pondus, quantum est Aqueae Columnae cujus basis fundo, altitudo perpendiculari ab aquae superficie summa ad imam demissa sit equalis.*

Out of this last Proposition, and the demonstration and consequences thereof in him; 'tis manifest, that he supposed not one of his assertions would hold (though the Phenomena were the same in nature) as he worded and explained them, if

if that he did not free his *aqueous Column* from any *oblique pressures*, and make it *rectangular*. And as for his *Postulat*^{um}, that the *surface* of the water is *plain, flat and level*; he confesses it is not so really, viz. *Quatenus pars est spherica sive mundana superficiei; mundanam autem superficiem dicimus sphaera cujusvis mundo concentrica*: he only professeth to assume it as true, because in *hydrostatics*, things happen as if it really were so; whereupon he scruples not to make use of a *supposition*, which is really, confessedly, and demonstrably false, as long as it conduceth to *practice*, and serves his turn as if it were true, without pursuing a more *tedious*, and not more useful *Hypothesis* agreeable to *Archimedes*. Which I take notice of by way of *Apology* for my self, and those who think fit to acquiesce in, or not to blame such *Methods* as are effectual, though otherwise *vain and groundless*. Another thing is, that He supposeth there that the *Earth* is the *Center of the world*. Out of all which I am more and more satisfied of the validity of my former doubts against this so much concluded upon *Aerial Column*, to the explanation whereof I finde no such *cautions*, or *previous suppositions* used, to take off the edge and force of such objections: neither indeed have I yet met with any thing of that subject proposed in a *Scientificall* way; and therefore much how it comes to be concluded upon so as Mr. *Glanvill* represents it to be.

Whereas I have said, that the *gravitation of the Air* (even *Elementary*) is an opinion of *Aristotles*, and that his Experiment was tried by *Claramontius*; I adde, that the *verity* of that *trial* (though indeed it extend only to the *impure Atmosphere*) is attested by *Ricciolus* in these words, "*Duo quarto Aquam, & Aerem nostrum habere aliquid levitatis gravitati admistum, ut villius adscendant, ut sint supra id quod est ipsis gravius; & hujus descendant. Hinc fit ut folles lusorii, & Aere addensato bene inflati, etiam sine favi- nula ac vim infusione, plus ponderent, quam flaccidi: ut exquisita trutina deprehendes: immo ego expendi vesicam bo- vinam, quae flaccida erat scrupulorum 4. & granorum quatuor, esse inflatam scrup. 4. grav. 6. quare Aer additus per infla- tionem appendebat grana duo.*" Thus the incomparable

Y

Ricciolus,

S. STEVINUS
hydrostat. E-
lem. l. 4. Theo-
rem 8.

Id. ib. postu-
lat. 6.

Id. ib. postul. 7
Et projecto
tam receptum
jureri hac ip-
sa non admi-
tere, quam
postulantibus
Astrologis ter-
ram esse mun-
di centrum si-
dem derogare.

Ricciol. Al-
magest. l. 2.
c. 5. sect. 4.

*Against
Hobbs c. 3.*

*Experiments
of Air. Exper.
6. and against
Hobbs c. 3.*

*Democrit. re-
vivisc disp 1.
c. 2. p. 14 in
4to.*

*Circul. Pisam.
part. 6. circ. 7.
de nutritione.*

*Sancto-
rius was a
Galcnist.*

Ricciolus, whom I may as well reckon amongst the *Peripateticks*, as Mr. (a) Boyle doth *Scbottus*: and how true that *Aristotelean Experiment* is Mr. Boyle demonstrates in his (b) *pneumatick discourses*. And though the works of *Galileo*, *Kepler*, *Mersennus*, *Gassendus*, *Pecquetus*, *Paschal*, were lost, and were as ignorant as some *Virtuosi* of their trials about the weight of the Air; yet would not the Assertion have seemed so strange and incredible as Mr. *Glanvill* represents it to be; for though *Maynenus* deny it, yet he brings in this Objection. "*Aer est gravis, &c. go. probatur prin-*"
"*a Mathematicis, qui de Aeris pondere scripserunt, invene-*"
"*runtque ejus ponderis momenta.*" 2. A *Francisco Mendoza*,
"*qui in suo viridario problema instituit, An in Aere navigari*"
"*possit?*" 3. *A descensu lapidum & aliorum gravium, qua*"
"*Aeris pondere pragrammata urgent suum descensum, & velo-*"
"*cius in fine quam in principio moventur.*" 4. *Experimento ad-*"
"*ducto a Bassone, qui follem inflatum citius descendere ait*"
"*quam Aere vacuum, ob additum Aeris pondus.*" 1. de motu in-
"*tent. 1. art. 3.*" *Berigardus* also asserts the gravity of the Air, and justifies it by this *Barometer*, and the unequal ascent of the *Mercury* on the top, and at the foot of a mountain. I shall summe up all, that may take off from the novelty of the thing, and deprive the R.S. of the glory of pretending to any interest in the discovery in the words of *Thomas Bartholinus* de pulmon. sect. 3. p. 60. "*Ingeniosus Sanctorius in in-*"
"*veniendis instrumentis Medicis, inter alia Com. in 1 Fen. A-*"
"*vic. Stateram ponit, qua ventorum vim & impetum ponde-*"
"*rat. Inventis aliquid addam. Vitream phialam lacri nostra*"
"*imponere, & leni balitu inflato videbis quam parum ponderi ac-*"
"*creverit. In instrumento Magdeburgico testatur Otho Ge-*"
"*riche Consul Magdeburgensis & inventor ejus, ponderari*"
"*posse Aerem hoc pacto; quanto levius est vitrum post Aerem*"
"*extractum, tantum ponderabat Aer antea in eo contentus. Varios*"
"*modos alios Aeris levitatem bilance expendendi tradit Caspar*"
"*Ens Thaumaturgus. Mathemat. Probl. 93. c. 15. Vesicam bovinam*"
"*se expendisse ait Joannes Bapt. Ricciolus Tom. 1. Almag.*"
"*nov. l. 2. c. 5. num. 4. qua flaccida erat scrupulorum quatuor &*"
"*granorum quatuor: & deprehendisse eandem inflatum scrupu-*"
"*lorum*"

(169)

"lorum 4. & granorum 6. Marcius Mercennus in *Phanone*.
 "Propos. 29. asserit se Geometris praesentibus & adjuvantibus
 "ponderasse bilance *Æolipilam* aeneam satis calefactam, &
 "propemodum candentem, omnique humore destitutam & quam
 "minimum Aeris continentem; deprehendisseque pondus fu-
 "isse unciarum quatuor, drachmarum 6. & granorum 15.
 "postquam vero naturaliter refrixisset *Æolipila*, & Aer an-
 "tea rarefactus redisset ad pristinum ac naturalem suum sta-
 "tum, iterum ponderasse ipsam, & invenisse pondus precedente
 "pondere majus fuisse quatuor gravis. Plura in hanc rem con-
 "gessit. cl. Casp. Schottus in *Mechan.* p. 1. protheor. 4.
 "c. 6.

I have not Schottus by me at present; neither is there need of any further Inquiries; for I have sufficiently demonstrated that the Gravitation of the Air is an opinion of Aristotle, Averroes, and other Peripateticks, though not generally received by that sort of Philosophers: and that it was truly and experimentally demonstrated by them, especially as far as the Atmosphere is concerned in the Question. I have also made it apparent, that the Barometer, or Mercurial Experiment doth not discover the weight of the Air with any certainty; much less, all the degrees of it: That the pressure of the Air is not by way of a Cylinder or Column; and that the Barometer had not its original but denomination from the R.S. they were, as I may term them, the God-fathers, not Parents. The World may justly say of the Honourable Mr. Boyle, that he hath improved the Experiments of his Predecessors, and represented them more accurately; and of Mr. Glanvill and his Assistants what it pleaseth.

In the marginal note (page 15.) where I say, that perhaps it is not true that Aristotle had any hand in, or was privy to the poisoning of Alexander; I adde that Pausanias after he had spoke of the Stygian water, and its strange property, doubts whether Alexander were made away by such means, or no: Σαφὲς μὲν ἐκ τῶν λεγόμενων ὅτι οὐκ αἶμα. This he says (in *Arctic*) without reflecting any way upon Aristotle as one concerned in the report. And Arrianus who writ the life of Alexander, out of the Memoires of Ptolomeus Lagides

(who was present when that great *Prince* died) avows, that he died of a surfeit: yet he relates sundry rumors about his death, one whereof is, that *Aristotle* (being fearful of *Alexander* after the death of *Calisthenes*) should prepare the poison for *Antipater*, to be sent him: but concludes thus, ταῦτα ἐμοί, ὡς μὴ ἀγνοεῖν δόξαιμι μάλλον ὅτι λεγόμενά εἰσι, ἢ ὡς πικρὰ ἐς ἀφήτησιν ἀναλεσθαρῶ. *Arrian. de expedit. Alexandr. l. 7.*

Mr. Glanvill
p. 25.

Euseb. de
prep. Evang.
l. 14. c. 4.

Whereas I reflect (page 16.) upon that passage of *Plato*, Ὁ Θεὸς γεωμετρεῖ, and what Mr. Glanvill saith, "That without Geometry we cannot in any good degree understand the Artifice of the Omniscient Architect in the composure of the great World and our selves: and that the Universe must be known by the Art whereby it was made." — There should have been a Chasme made for some passages, I know not why omitted. I adde therefore, that it is not revealed unto us that God made the Universe according to that Art, and it seems an Additional to the first *Fiat*, or let there be — in *Genesis*, to say his commands were regulated by the rules of Geometry, and his powerful and omnipotent word confined thereunto. Had Mr. Glanvill been pleased to consult the fathers, he would have found that this Tenet of his is no primitive notion: and that particularly *Eusebius* hath refuted it, denying that God in his Works is obliged to Geometrical numbers; and that *Socrates* (whose authority is greater then *Plato's*) did place no great value on those Sciences: that the first Christians did slight the knowledge of them as useless to Piety and knowledge of God; because my opinion about these things is agreeable to that of the first Christians, and of *Socrates*; I shall insert the whole passage, as it is translated into *Latine* in the *Paris Edition*.

Euseb. præp. Evangelica l. 14. c. 10, 11. edit. Paris. 1628.

Primum tamen quoniam *Mathematica* illa sua tantopere jactare solent, prorsusque necessarium esse dicunt, ut quisquis comprehendendi veri studio tenebitur, *Astronemiam, Arithmetriam, Geometriam, Musicam*, illa nimirum ipsa, quæ ad eos a *Barbaris* profecta esse jam ostendimus, persequatur:

quatur: (his enim qui carebit, *doctum perfectumque Philosophum* esse neminem, imo rerum veritatem ne primoribus quidem labris digustare posse, nisi qui *harum* ante rerum animo cognitionem imprefferit:) deinde hanc suarum artium peritiam magnificentius ostentantes, æthere sese medio *sublimies* propemodum incidere, *numerisque suis* ipsum quoque *Deum* circumferre arbitrantur: nos vero qui *similium disciplinarum amore non flagremus*, nihil a *pecudibus* abesse existimant, *deique* propterea nunquam nunquam *rei paulo gravioris notitiam percepturos* esse pronunciant: Age, hoc ipsum quam pravum sit atque distortum, vera laminis loca ratione proposita, sic tanquam ad libellam & regulam exigamus. Erit ea quidem ejusmodi, quæ Græcos, innumera- biles, infinitosque Barbaros complexa; alios tametsi *his artibus doctrinisque paratos*, nec *Deum* unquam, nec *bonæ vitæ rationes*, nec omnino præclarum & utile quid percepisse; alios, ut ab omnium disciplinarum studio destituti essent, *religiosissimos* tamen ac *sapientissimos* extitisse demon- stret. Enimvero quænam hoc in genere *Socratis* illius, qui ab istis omnibus tantopere celebratur, sententia fuerit, e *Xenophonte* intelliges, si modo ei suis in *Memorabilibus* hæc scribente fidem adhibebis.

“Docebat, *inquit ille*, præterea, quatenus cujusque rei
 “peritum esse hominem *bene institute* oporteret: principio
 “*Geometricæ* dandam eatenus operam esse dicebat, ut si
 “quando res pasceret, dimensam rite terram vel accipere ab
 “alio, vel alii tradere, vel eam dividere, vel opus aliquod de-
 “signare posset. Id porro tam esse ad discendum facile, ut
 “qui dimensionem attendere voluerit, idem simul & quanta
 “sit terræ magnitudo assequi possit, & quænam ejus metien-
 “dæ ratio breviter admodum expediteque cognoscere. At
 “ejusdem in *Geometricæ* studio, ad illas usque descriptiones
 “intellectu difficiliore quæquam progredi, *Socrati* non
 “placebat. Cui enim bono futuræ illæ essent, videre se, ta-
 “met si ne illarum quidem imperitus esset, rogabat. Enim-
 “vero, ad exhauriendam hominis vitam cum satis illas esse,
 “tum aliarum interim & plurimum & *utiliorum doctrina- rum* studia impedire. *Astronomiam* similiter eatenus com-
 plecti

" plecti solum jubeat, ut *noctis, mensis, annique tempora*
 " cognosceres, atque hujus cognitionis ope, siquando vel
 " iter, vel navigatio suscipienda esset, vel agenda forent ex-
 " cubia, vel in aliud quidlibet quod noctis, mensis, annique
 " spatio fieri solet, incumbendum, signis ad ea omnia suis
 " quæque temporibus obeunda, certioribus uterere. Atqui
 " hæc nihilo difficilius tam ex nocturnis venatoribus, quam
 " ex navium gubernatoribus, & aliis quamplurimis resciri
 " posse, a quibus eorum peritiam suæ cujusque partes offi-
 " ciumque deponat. At *eandem artem* eo usque persequi,
 " dum ea quæ non eodem motu circumferantur, stellæque
 " simul errantes & vagas distinguere noveris, adeoque in ea-
 " rum abs terra intervallis, conversionibus causisque riman-
 " dis ætatem viresque consumere, id vero graviter imprimis
 " ac serio prohibebat, quod *multum hujus etiam opere preti-*
 " *um* videret, tametsi ne in istis quidem rebus hospes ipse
 " ac peregrinus esset. Addebat, conficiendæ hominis vitæ
 " illas quæque satis futuras, quæ interim a pluribus *utiliori-*
 " *busque studiis* avocarent. Postremo quibus *cœlestia* quæ-
 " que rationibus *Numen* moderetur, investigari nolebat,
 " quod cum eo ab hominibus aspirari non posse, tum minus
 " cum diis probari existimaret, qui quæ prompta notaque
 " esse noluisse, inquireret. Nec minus illi, quem ea ve-
 " hementius cura destineret, *insania periculum* imminere di-
 " cebat, quam *Anaxagoræ*, qui explicatus a se *deorum Ma-*
 " *chinas* tantopere gloriabatur.

I shall adde, that if *God Almighty* be regulated by the
 rules of *Geometry*, and *mechanical motion* in the manage-
 ment of this world, and that the *fabrick* of things is *necessa-*
rily established upon *those Hypotheses*, I cannot any way com-
 prehend how *God* can do any *miracles*: how the *Sun* should
 stand still at the command of *Josuah*, or the *shadow* go back
 on the dial of *Abaz*: or how there could be a *general de-*
luge; or such an *Eclipse* as is related at the death of our
Saviour: or that the fire should not burn, or destroy the
three children: in which, and other cases, if *God* were not
 tied up to this *Art*, I do want proof (till he declare it) that
 at other times he acts altogether agreeably to it. This opi-
 nion

nion of mine hath been hitherto the most *Christian* Assertion, and held most consonant to *Piety*, and hath been amply maintained of late by *Dr. Henry More*, in opposition to what the *Royal Society* lays down in their History; "That Gene-

"ration, Corruption, Alteration, and
 "all the vicissitudes of Nature, are nothing
 "else but the effects arising from the meet-
 "ing of little bodies, of differing figures,
 "magnitudes and velocities. Then which
 opinion there can be nothing more pesti-
 lent and pernicious; and *Dr. More*,
 albeit a Member of this Society here-
 tofore, (for he allows nothing to it
 now) yet a pious one, professeth that
 this *Mechanical Philosophy* doth in-
 cline to *Atheism*: neither would he ap-
 prove of those deductions as necessary,
 but ridiculous, when I upbraided him
 lately with that non-sensical and illiterate
 History, *Mr. Sprat* p 348. "'Tis true,
 "his, [viz. The Experimental Philo-
 "sophers] employment is about materi-
 "al things. But this is so far from
 "drawing him to oppose invisible Beings,
 "that it rather puts his thoughts into an
 "excellent good capacity to believe them.

"In every work of Nature that he handles, he knows that
 "there is not only a gross substance, which presents it self
 "to all mens Eyes; but an infinite subtilty of parts, which
 "come not into the sharpest sense. So that what the Scri-
 "pture relates of the purity of God, of the spirituality of
 "his Nature, and that of Angels, and the souls of men,
 "cannot seem incredible to him, when he perceives the
 "numberless particles that move in every mans Blood, and
 "the prodigious streams that continually flow unseen from every
 "body: having found that his own senses have been so far as-
 "sisted by the Instruments of Art, he may sooner admit that
 "his minds ought to be raised higher by an Heavenly light,

Mr. Sprat pag. 311.

I wonder that such effects should be attributed by them to the bare concurrence and meeting of corpuseles of differing figures, magnitudes and velocities; without taking notice of that alteration of texture, and of the figures of the concurrent particles, without which *Cartesianism*, nor the other *Mechanical Philosophies* can subsist: and not so without allowing the constant assistance of God, directing and ordering lay-Mechanism. So des *Cartes* Princ. Philos. part. 1. Deus materiam simul cum motu & quiete in principis creavit; jamque per Solem suum concursum ordinatum tantundem motus & quietis in ea tota, quantum tunc posuit conservet. Oh! rare and sensible explication of things! God Almighty in a peculiar manner agitates matter! must we thus explain the secondary and mediate creation of the world in six days, whereas the like productions have not hap- pened in so many thousand years as are lap- sed since! Besides, whatever our Virtu- so thinks of the *Eternal Generation* and *Incarnation* of the Son of God; He doth not except in this Assertion the Genera- tion of mankind in the ordinary and natural way.

“in those things wherein his *senses* do fall short. If (as the
 “Apostle says) the invisible things of *God* are manifested
 “by the visible: then how much stronger Arguments has
 “he for his belief, in the *eternal Power* and *Godhead*, from
 “the vast number of creatures that are invisible to others,
 “but are exposed to his view by the help of his *Experi-*
 “*ments*? My *censure* upon this place is, that if his *Expe-*
 “*rimentator* have any skill in *Logick* or the *ways of arguing*,
 though from the *Rules of Mechanism*, and the *contempla-*
 “*tion of visible bodies*, he may proceed to the allowance of in-
 “*visible and insensible corpuscles*, yet shall he still confine his
 “*progress and ascent* within the nature of *matter and corpuscles*,
 and never apprehend (upon those grounds) the *being and o-*
 “*perations of an immaterial, omnipresent Deity* acting by the
 “*Word of his Power and Will*: nor the *incorporeal nature of the*
 “*soul of man*. Such a *Transition ad genus a genere*, or μετα-
 “*σισ εἰς ἄλλο γένος*, he that owns those principles cannot as-
 “*sent unto*, if he understands himself, and argue not so as to
 “*alledge*,

One *Proposition* for *sence*,
 The other for *convenience*.

Where I speak of *Archytas* (pag. 18.) that he was a *pra-*
 “*ctical and Mechanical Philosopher*, contrary to what Mr.
 “*Glanvill asserts* (pag. 27.) I shall adde his life; As it is
 “*briefly written in Ricciolus thus*. “*Archytas Tarentinus*
 “*Pythagoreus nobilis, Mathematicarum peritissimus, quem ut*
 “*una cum Timæo cognosceret Plato, in Italiam navigavit, ut*
 “*ait Cicero. In Mechanicis excelluit, & vi illarum quin-*
 “*quies vicit hostes in prælio, ut nihil dicam de columba lignea,*
 “*quam libramenis ad violatum compulit; sed in Cosmogra-*
 “*phia at Geometria practica excelluisse indicat illud Horatii*
 “*lib. i. odorum.*

Ricciolus in
 Chron. part.
 2. præfixo ad
 Almag. si nov.
 in Archytas.

*Te maris ac terra numeroque carentis arena,
 Mensorem cohibent Archyta.*

Neither

Neither is Mr. Glanvill mistaken there in reference to Archytas only: what he saith about Eudoxus Gnidius is false: who was a Mechanician also, and amongst other discoveries, "*Invenit etiam Arachnen, horologium videlicet solare, in quo linea horaria, & arcus signorum in modum araneae se secant.*" Blancanus in Chronol. Mathemat. Sevil. 5.

Whereas I say (page 22.) that the Royal Society were not the first that applied themselves to the observing the formes of Animals, &c. by the Microscope: I adde that Zucchius did not only precede them in the attempt, but seems to have had better glasses to that purpose then they: for whereas Mr. Hooke in his description of a Flea says of the Eyes only this, that *the head is on either side beautified with a quick and round black eye*: the more accurate Zucchius saith, "*Novissime Microscopio parato ab excellentissimo Vitrurum in omnes formas ad propositos usus formatore D. Eustachio Divinio Septempedano, spectavi meis oculis senescentibus Oculum pulicis, distinctis in eo albescente Sclerotide a Cornea, & per corneam Iridis oculi.*" And in the description of the feet of a Fly, and the feather of a Peacock, observe that there is such a difference betwixt those two Writers, that as one of them must needs be in an errour, so I am apt to think that our Virtuoso is the person: see Mr. Hooke p. 167, 168, 169, 170. and Zucchius Philos. opt. part. 2. tr. 3. c. 7. sect. 4. pag. 349, 350. If England do yield better Microscopes then those of Eustachius Divinius, then I am ready to change my judgement.

Where Mr. Glanvill speaks of going to the World of the Moon, and I animadvert upon the difficulties of the journey, and that his lodging will be too hot for him; adde in the Text these words page 43.

Besides the other difficulties of the journey, 'tis further considerable, that from the Centre of the Earth to the Moon, according to the calculation of Tycho Brahe, there is near 56 semidiameters of the Earth, which is about 192416 miles: and admit it be supposed that Mr. Glanvill lie 20 miles every day in ascending towards that world, he should be above 15 years before he could come to the Orbe of the Moon.

Z

Where

Blancanus saith of Archytas, that he was Mechanica Inventor, in Chronol. mathemat. Sevil. 5. And Will. Snellius in his Preface to the Hypomn. mathemat. et S. Stevinus, doth reckon upon Archytas and Eudoxus as eminent for practical Mechanicks.

Mr. Hook, micrograph. p. 110. Zucchius philos. opt. part. 2. c. p. 2. sect. 4. p. 39.

Van. Heurns Mathem. recreations pag. 210, 221.

Where I speak against the accommodating of Scripture to common railing, p. 49. I adde, that not only the Council of Trent (— *fas est ab hoste doceri*) hath prohibited Sess. 4. that any should apply the holy Scripture ad *scurrilitia, fabulosa, vana, adulationes*; but also that the first Council at Millain, forbids the using it ad *jocum, ostentationem, contumeliam, superstitionem, impietatem*. And, to upbraid our Divine-Railleurs a little more, an ancient African-Council decrees, *Si Glericus, aut Monachus verba scurrilitia, jocularia risumque moventia loquitur, acerrime corripatur*. The words of which Canon, (viz. *Scurrilitia & jocularia*) are by a learned Frenchman rendred raillery. — “*Nous avons le Canon d’ un ancien Concile d’ Afrique, qui parle en ces termes: Si quelqu’ un du Clerge ou si un Religieux dit des paroles de raillerie, des choses plaisantes & enjouees, qu’ il soit chastie tres severement. Qu’ eussent dit a vostre avis ces bons Peres si ces railleries eussent este terees de l’ Escriture?*” This Question hath been agitated with much wit and address in French, betwixt Mr. de Girac and Mr. Costar in sundry books, wherein any man of common reason and piety, will give the advantage to adversary of Voiture, who is justified by the concurrent opinion of Balzac in his remarks *sur les deux sonnets*: and to these Writers I refer our *Virtuosi*, such as reckon upon all other learning as *Pedantry*, may inform themselves thence as out of Writers which transcend not *their breeding and studies*.

Whereas (pag. 58.) I speak somewhat in commendation of the ancient *Aristotelean* Monks, I finde that their esteem is much advanced by the learned *Gabriel Naudæus* in these words. “*After the last taking of Constantinople, Learning began to creep out of Monasteries, which for all the time before had been (as it were) publike Christian Schools, where not only youth, but also such men as would apply themselves that way, were instructed in all manner of Disciplines, Sciences, and Morality, and that to such an height, that not content with that so famous Quadrivium of the Mathematicks, which, besides all that is now shewn in Colledges, was then taught, Medicine both as to Theory and Practice, was so well cultivated, that we need no more to convince us how expert they were therein, then the Writings of Ægidius, Constantine,* and

“and Damascene, Joannitius, Peter of Spain, and Turis-
“nus, So that it were easie for me to answer them who charge
them with illiterature and ignorance.

Where I speak out of G. Hofman and others, that it is suf-
ficient for a *Physician* that he proceed upon such rules and
methods as may most commodiously guide him in his practice,
without being solicitous whether they be rigorously and phi-
losophically true: pag. 75. I adde, that there are others as
eminent as any that ever pretended to cure, which concur
with me in this opinion. As *Avicenna* and *Riolanus*; the
words of the latter in his *Examen of Harvey*, c. 9. are these.
“ — Quapropter cum Avicenna doct. 6. cap. distingo sermo-
“nem utilem a vero; Medicus qua Medicus, inquit ille, non
“curat, quid in veritate sit, sed contentus est Phanomenis qui-
“busdam, quæ sunt satis illi in curatione morborum.

I adde unto the passages (pag. 97.) which relate unto the
diligence of the *Ancients* in *Dissections*, this: That the *Anci-
ents*, and particularly the *Peripateticks* were very curious and
inquisitive into *Anatomy* appears by this passage out of *Chal-
cidi*, in his discourse upon the *Timaus* of *Plato*; he lived
about one thousand one hundred and seventy years ago, and the
passage (which relates to the *Platonick* notion about vision)
in the *Latin Edition* of *Meursius*, (pag. 340) runs thus. Qua-
re faciendum ut ad certam explorationem Platonici dogmatis
commentum vetus advocetur medicorum, & item Physico-
rum, illustrium sane virorum, qui, ad comprehendendam sanæ
naturæ solertiam, actus humani corporis, facta membrorum
exsectione, rimati sunt: qui existimabant, ita demum se sus-
picionibus, atque opinionibus certiores futuros, si tam rationi vi-
sus, quam visui ratio concineret. Demonstranda igitur oculi na-
tura est: de quâ cum plerique alii, tum Alcmaeus Crotoni-
ensis, in *Physicis* exercitatus, quique primus exsectionem ag-
gredi est ausus; & Callisthenes, Aristotelis auditor; & Hero-
philus, multa, & præclara in lucem protulerunt. Out of which
it is manifest that the *Ancients* (especially the *Aristotelians*;
for such were *Callisthenes* and *Herophilus*) did with some curio-
sity examine the *Phænomena* of nature, and regulated their o-
pinions by sensible experiments; and that this was the practice
of most of the eminent *Physicians* and *Naturalists* of old.

The Letter of *Hippocrates* to *Damagetas* mentioned pag. 89. (though cited as genuine by *Galen*) is suspected by *Jo. Baptista Cartes. miscell. medic. dec. 1. c. 4.* "Ceterum & hac Epistola, quæ sub nomine Hippocratis circumfertur, suspecta est mihi, primum quia *Diogenes Laertius lib. 9. in vita Democriti* scribit illum nequaquam ridentem, quanquam concedat ab Hippocrate fuisse visitatum (non quidem ut ipsum sanaret) quo tempore jam Democritus erat decrepitus, nec amplius aptus sectioni cadaveram: nam Hippocrates 436 annos ante Christum natus; Democritus vero 492 ita ut ita ut Democritum nativitate secutus sit Hippocrates 56 annis: & tum sive ad videndum, sive ad sanandum eum conveniret, vigesimum quintum annum attigisse verisimile videtur: cum tunc temporis Hippocrates medici famam adeptus esset, quod non poterat nisi per longum temporis cursum & varia experimenta in Medicina facta sibi comparare. — Sed probandam provectiorem Hippocratis ætatem, & majorem senectam Democriti, ejusdem Laertii testimonium extat dicentis; Ultimum, quod in vita Democriti legitur dictum, aut factum, fuisse illam cum Hippocrate colloquutionem: atque annum agentem 109. ab hujus vitæ Statione decessisse. I find also that *Menagius* suspects those Letters, though he confesses them to be very ancient. Extant hodie Hippocratis de sua ad Democritum profectione Epistolæ, sed supposititiæ, licet perantiquæ.

Menag. in Diogen. Laert. l. 9. p. 238.

Whereas I say pag. 114. that I have observed in some that their pulses have suffered no alteration, at least kept no time, or palpitated as did their hearts. I shall illustrate this with an observation in a young Lady, which I had too fatal an opportunity lately to make: she died of a very malignant Fever joyned with the Measles: two nights before she died I watched with her, and frequently observing the variety of her pulse, I determined to minde whether there were any such alteration in the beating of the Heart, as I then observed in her Arteries: I laid my hand upon her Breast, and I found that her heart did not beat as usually it doth, the bone erecting it self, and impelling the left side, but it seemed like a great bullet (transcending any proportion that is natural

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tural to the Heart) as it rolled in the Thorax from the right to the left side (as much one way as the other) with an uniform and equable revolution, and thus it continued to do for an houre; during which time I observed all the varieties almost that are recorded about evil pulses: as quick, slow; great, small; unequal, deficient, dicrotus, &c. Nor is this new; for Riolanus saith in Exam. Harvey c. 3. Notavi multoties in palpitationibus cordis vehementibus arterias non sequi motum Cordis, sed bis terve pulsare Cor pro una diastole Arteriarum: quod indicat Arterias in sanis & agris corporibus, non semper sequi motus cordis. So doth eMercatus teach, Fit interdum palpitatio cordis nihil mutatis pulsibus. Tom. 2. de Philos. differ. l. 2. tr. 1. c. 28. & tom. 3. l. 2. c. xj.

Since the writing hercof, being casually in the shop where an old man was blooded, who upon the healing up of an old sore in his leg, was very ill: I observed his blood to have very little of what was crimson in it: but it seemed all a fluid Serum to the bottom, (which was pellucid, not of a turbid white,) in some Pottingers: in one Pottinger that ran last, it was coagulated into a thicker mass, on the top whereof was coagulated a translucent gelatine over most of the Pottinger, the rest being of a fluid Serum like to the other: I took some spirit of Vitriol, and poured a pretty quantity, (viz. about 20 drops) on that which was partly coagulated upwards, partly not: and all that part which was not blood, did coagulate into a mass like unto the white of an Egge when hardened by the fire, but without that smell which is usual to it when coagulated upon a gentle fire: the blood under it coagulated into a consistence much like wax: but of a dark red inclining to black: into another Pottinger I poured some of the salt-peter-liquor that had passed the Ashes; but this latter caused no change at all: I then poured on the same some spirit of Vitriol, as in the other, and it did immediately turn lacteous, and coagulated into a mass like to that of ordinary custards: and the blood under, which seemed but very little, and scarce coagulated, appeared thereupon as a large quantity, equalling three parts of the Pottinger, upon which all the Serum was thus coagulated. I went to burn these: that

that *blood* which had only *spirit of Vitriol* did not crackle, and scarce burn: though a little it did: the pure coagulated *Serum* did not burn at all, yet crackled like decrepitating Salt, a little: that with the *spirit of Vitriol* and *Lixivium of Nitre*, did burn with a *vivid and lasting flame* a long time.

I think my self obliged to adde one thing more where I speak as if *Dr. Willis* had had little to do in the discoveries of *Dr. Lower* about *Anatomy*: that although that great *Physician* had not leisure to attend the *Anatomical Inquiries*, yet did he propose *new matter for improving the discoveries*, and put *Dr. Lower* upon continual investigation, thereby to see if *Nature* and his *Suppositions* did accord: and although that many things did occur beyond his apprehension, yet was the grand occasion of that work, and in much the Author. This Intelligence doth not cross what I related before from good testimony; yet I thought my self obliged to declare the whole truth, and such I believe this to be. I must also profess that I think the *Sinus venarum vertebrales*, whose invention I ascribe to *Dr. Lower*, may without considerable injury be ascribed unto *Fallopious* in his *Anatomical Observations* pag. 193. edit. *Coloniens.* 1562. in 8^o. Thus much I thought fitting to annex, lest the *Virtuosi* should censure me as partial to my old School-fellow *Dr. Lower*, or swayed by any regard then that of Truth.

The *Hogs-blood* which I last mentioned as poured upon the *Mothers of Salt-peter*; after it had stood above three weeks unmixed, did at last cast down about half of it self below the *Mothers*, it continuing in that place it turned crimson: that on the top did not change its colour, but on the surface there gathered a crust or mass, not very thick (as before) nor of so solid a consistence.

F I N I S.

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To divert my *Reader* after so tedious a discourse, I shall here adde the Letter of *Gega* their *Patient*, that they may see how efficacious the Transfusion hath been on *him*, and what returnes he makes for his *Cure*.

To the Royal Society the *VIRTUOSI*, and all the
Honourable Members of it, the Humble Address of
AGNUS COGA.

YOur Creature (for he was his own man till your Experiment transform'd him into another *species*) amongst those many alterations he finds in his condition, which he thinks himself oblig'd to represent them, finds a decay in his purse as well as his body, and to recruit his spirits is forc't to forfeit his nerves, for so is money as well in peace as warre. 'Tis very miserable, that the want of natural heat should rob him of his artificial too: But such is his case; to repair his own ruines, (yours, because made by you) he pawns his cloaths, and dearly purchases your sheeps blood with the loss of his own wooll. In this sheep-wrack't vessel of his, like that of *Argos*, he addressees himself to you for the Golden Fleece. For he thinks it requisite to your Honours, as perfect Metaplasts, to transform him without as well as within. If you oblige him in this, he hath more blood still at your service, provided it may be his own, that it may be the nobler sacrifice.

The meanest of your Flock,
AGNUS COGA.

To direct my Reader after to read the following I shall
here add the Letter of George their Father, that they may
see how efficacious the Transfiguration hath been on him, and
what virtues he is now for the same.

To the Royal Society the FIFTH OF SEPTEMBER
I have the Honour to acknowledge the Receipt of your
Letter of the 27th of August last.

Y^{our} Grace (for he was his own man till your
present translation) I find into another (person) a
man of those many alterations he finds in his counte-
nance, which he has himself effected by a constant
study to his father's will, and to rectify his
spirit is forced to forsake his nature, for so many years well
in peace as war. The very wonderful, and the want of
natural heat should rob him of his strength too: But such
is the force to rectify his own nature, (and become more
of God he purges his complexion, and thereby purifies your
imagination with the loss of his own world. In this trans-
formation, which I will of his blood of life, he adds his mind
to give for the Golden Fleece. For he thinks it necessary to
your Honour, as perfect Metaphysics, to transform him
without as well as within. If you desire him to be
in more blood than your Grace, it is to be seen in his
own, that there is the noblest of nature.

Yours most Obedient Son
John Wallis

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CAMPANELLA

REVIVED.

Or an Enquiry into the

HISTORY

OF THE

Royal Society,

Whether the *Virtuosi* there do not pursue the Projects
of *Campanella* for the reducing *England* unto *Popery*.

BEING

The *Extract* of a Letter to a *Person of Honour* from
H. S. with another Letter to *Sir N. N.* relating
the cause of the Quarrel betwixt *H. S.*
and the *R. S.* and an Apology
against some of *their Cavils*.

WITH

A Postscript concerning the Quarrel depending betwixt *H. S.*
and *Dr. Merrett*.

*Aut hoc inclusi ligno occultantur Achivi;
Aut hæc in nostros fabricata est machina muros,
Inspectura domos, venturaque desuper Urbi;
Aut aliquis latet error: equo ne credite Teucris.*

LONDON,

Printed for the Author, 1670.

CAMPANELLA
REVISED
OF AN ENQUIRY INTO THE
HISTORY
OF THE
Royal Society,

Whether the Viruses there do not pursue the Progress
of Campanella for the reducing English into Popery.

BEING
The Extract of a Letter to a Person of Honour from
H. S. with another Letter to Sir W. relating
the cause of the Quarrel between H. S.
and the R. S. and an Apology
for some of their Cavils.

WITH
A Postscript concerning the Quarrel depending between H. S.
and Dr. Astruc.



But how is it possible that a man who has been so long a member of the Royal Society should have been so ignorant of its history and constitution? It is a question which will not easily be answered.

LONDON,
Printed for the Author, 1670.



TO THE READER.

THis ensuing Letter was a part of what I sent long ago to a Person of Honour in this Nation, to represent the occasion of the quarrel betwixt Me and the Virtuosi, and shew'd the necessity of pursuing it: by such arguments I used as gained his approbation; and the generality of serious men have assented thereunto, though their opinion was, that the design might be of great danger and trouble to the bold undertaker. After that, I inserted it into a discourse concerning the Virtuosi, in which I debate many other things: viz. In opposition to Dr. Merrett, I deduce the original of Apothecaries from the times of Hippocrates and Aristotle thorough the Roman and Greek Empires; and shew with what prudence both Physicians and the Civil Magistrates concurred to their institution: and I have largely entreated on that Question, which the Virtuosi, in order to the ruine of the Faculty of Physicians, and of the Trade of Apothecaries, to the great alteration of the Practice of Physick, and aggrandising of themselves, have started, and with much confidence and more ignorance handled. I shew not only sundry particular impostures obtruded upon us by some of them; as also an account of a certain Model of the R. S. published in Germany, and written from London; in which there is so little of truth, that I wonder any of the Virtuosi should abuse Foreigners with such a Relation; or imagine that renown to be durable the foundation whereof is so vain and unstable. It is there that I demand they would make good their

Vide Ph. Fa-
cob, Sacks in
Gammalog.
pag. 65, 66, 67.

To the Reader

Vide Tb. Bar-
tholin. Epist.
Centur. 4. Ep.
92.

Mr. Chamber-
laines present
State of Eng-
land, pag. 341.
Edition 3. &
pag. 61.

promise to the learned Olaus Borrichius, that none of their Colleagues should publish any thing but by the allowance and consent of the R. Society, that thereby it might be cured against the cavils and exceptions of all Men. *Which assurance of theirs, how ill they have managed, I dare appeal unto the world as Judges. I am now indisposed to publish the whole Treatise, and reserve it for some additions which Mr. Evelyns discourse of Forrest-Trees may invite me unto; the Second Edition whereof wants not its defects; and if I should trouble my self to examine his account of the Birch-Tree, it will appear as ridiculous as the History of Salt-Peter: and 'tis to me a Miracle, that neither He, nor all his Correspondents should inform us better of so obvious a thing: Neither is it less strange that I should be necessitated to dispute against another Virtuoso, Mr. Chamberlaine, whether it be our King's Prerogative to define what Books of Scripture are Canonical, and what Apocryphal? And, whether it be the Interest of our Monarchy that all the Commonalty be kept poor and in a complaining condition? But I pass from these considerations, to some exceptions made against what I have already published. It is said, that I have maliciously represented the places censured in their History: which if I have done, it is because they maliciously writ them: for I am not conscious of mis-allegding them, or of imposing any other sense thereon, than the words do bear: and if any man can interpret them otherwise than I do, I confess I have wronged them: but if it be not possible to do so, they must blame themselves: However, supposing the passages might bear a more favourable construction, yet since the sense I follow is the most natural, since that they might be construed to the prejudice of the Church of England, it is judged by me, and others, to be an important service to the Publick, to extort a positive Declaration of their meaning, lest another Brerely make a benefit from those words to overthrow the Protestant Religion. I am further pressed with this intergatory, why I should imagine that the R. S. would subvert the Faculty of Physicians, there being so many eminent men of that Profession admitted therein, and so esteemed by them, as that they cannot be judged to vilifie that Faculty. I answer, Quid verba audio,*

To the Reader.

audio, cum facta videam? I see they do do it, and therefore am not to be harangued into another sentiment. At first they would have incorporated the Colledge of Physicians into their Society: but that the prudent and grave did decline: then they promoted the Anti-Colledge of Pseudo-Chymists, encouraging Odowde and his ignorant Adherents in opposition to the Physicians: and this is not more notorious to the world, than it is also that those objections with which M. N. and other Quackfalvers amuse the Age were suggested unto them by the Virtuosi, and derived their repute from them. As for Mr. Glanvill's book, it was perused by several of their Members, and corrected by them, and how much we are reduceable to a Society that could allow of that, and would not at my reiterated importunities call it in, or disclaim it, Let all Physicians judge. Nor would I have any man to believe that there are so many eminent Physicians of the R. S. for neither is the number of those admitted considerable; few of note but have deserted it again; the rest approve not of it: so that all they talk of will not amount to three understanding persons; and were they more, I do not find our Faculty better secured than that of Divinity, or the two Universities are by such Members thereof as are imbodyed into this Trojan-Horse. It is said also, that my Animadversions on Mr. Glanvill contain little of matter; to which I answer, that they contain enough to have made twenty Virtuosi famous, and would have acquired them a Memorial of ingenious and noble Experimentators: they contain enough to shew the ignorance of that person who had so insulted over all University-learning, and particularly over the Physicians: They contain enough, since they contain more than they all knew: and I think I have done great service to the learned, in shewing that these Virtuosi are very great Impostours, or men of little reading: either of which Imputations, if just, will secure us from their arrogance, and abate their esteem. I am blamed for diminishing the glory of our Nation, by ascribing all discoveries to the Antients, or else to Foreigners: to which I answer, that they take off from the glory of our Nation more, who usurp the inventions of others: I rather preserve the credit of the English (though not of the Virtuosi) then diminish

To the Reader.

it: undue praises add not to any mans esteem: nor do I think I derogate from Dr. Willis, if I should say that his notion about the use of the Cerebrum and Cerebellum was fairly intimated by Carlo Ruini, that ingenious Bolognese, in his Italian Anatomy of an Horse: neither do I lessen the performances of the Honourable and curious Mr. R. Boyle, when I averr that Aristotle did hold the Ayre to be ponderous, and weighed it before him; or that the Elasticity of the Ayre was (as to name and thing) fully proposed by Pecquetus; and which is more than I have yet said, yet 'tis true, even the comparison betwixt the Atmosphere and Flocks of Wool is urged by him. "Fingito tibi Aerem hunc velut spongiosi vel LANEI porius stimuli terraqueum orbem ambientis molem: — And, "Insitus aerea substantia ad rarescendum Elater spongiae LANEVE naturam imitatur. As little is Dr. Croone or Dr. Throston injured, if I say that the Experiment about reviving a strangled Fowl by blowing ayre into the Lungs, was practised by Vesalius, and Bogdan, and was vulgarly known before, though perhaps not to the Virtuosi: and that the same Phenomenon succeeds, if when Children are Still-born any one blow into their Breech: which experiment is well known to many Midwives; nor do they doubt the recovery of the Child, if the Guts do rumble thereupon. These, and such like averments of mine, being true, do not lessen the just esteem of any man, and argue candour in me, not malice. Besides, since that the Virtuosi did with this borrowed glory attempt to over-bear the Universities and all others as Ideots and Ignoramus's, 'twas necessary to inform them that neither the Antients, nor modern Academicks were so foolish as they painted them out to be, nor the R. S. so inquisitive as they would seem: and that if others would practise those Artifices, even the Peripateticks might signalize themselves as easily as the Royal Society. But I reserve the further prosecution hereof till another time: that which follows being of more importance to the Monarchy and Religion of our Kingdomes, than that I should detain my Reader any longer from it.

Warwick May 16.
1670.

Henry Stubbe.

Pecquet. differt. Anatom. cap. 8. per totum.

Vesal. de fabr. hum. corp. l. 7. c. 19.
Mr. Bogdan. apoleg. pro vas. Lymph. 988.



CAMPANELLA REVIVED, &c.

NEver was there any sort of people that by so many *Artifices* endeavoured to insinuate themselves and their *Religion* into all places and countries, as that of the *Papists*: there is no *Treaty* or *promise* can secure an enemy from their secret underminings: there is nothing so un-moral, which their *Casuists* do not allow of, and practise; nothing so impious, or bloody, but is an ingredient in their councils, when subservient to their ends: there is no shape or disguise which they will not assume, no humour which they will not comply with; not an *Action* of theirs but ought to be suspected, since their *Confessors* have that influence over their *Lazety*, that whatsoever may, but at a distance, prejudice or tend to the detriment of their *Church*, they instantly put a period and stop thereunto. I speak not this to reflect upon the *Society*, who have found so great encouragement from that party, by the concurrence of their persons and purses: and so freely keep a correspondence with them from beyond seas: I only say, that as such an intercourse is not unknown to the *Congregatio de propaganda fide*, so (whatever Mr. *Sprat* suggests) they do not apprehend the constitution to be any way to the prejudice and dis-service of their *Faith* and *Church*. I believe it is not displeasing to them, to see how friendly the *Protestants* and *Papists* converse together in this *Assembly*: and it must needs raise their hopes of bringing things to a closer union, when they perceive the strangeness, that ought to be, and hath been betwixt them, taken off, and to read addresses commencing with, *Holy Father*. How much an *Oratour* gains upon his *Auditors* when

when he hath made them *attentive*, and what a step that is to gaining upon their *esteem*, and how conducing that is to-wards the *persuading them to what he intends*, I well under-stand: but what benefit and advantage *Popery* may derive from *this*, that our *Nobility* and *Gentry*, our *Divines* and *Layety*, laying aside all memory of the *French* and *Irish* Mas-sacre, and *Marian* persecutions, the *Gun-powder* Treason, the *firing of London*, and forgetting all *animosities* and *apprehensi-ions* of future dangers, converse freely with, and write oblige-ingly to them; testify a great esteem of them, and from the *dis-use* of all *harsh* but too true censures, come at length to lay aside all *rancour* and *bitterness of thoughts*; I say, how great benefit *Popery* may draw hence, I cannot well comprehend: yet I guess in part from what the *Historian* sets down "From
 "enduring each others *company*, they may rise to a learning
 "of each others *opinions*; from thence to an exchange of good
 "offices; from thence to real *friendship*: till at last by such a
 "Gentle, and easie *Method*, our several *interests* and *sects*
 "may come to suffer one another, with the same peaceable-
 "ness as men of different *trades* live one by another, in the
 "same *street*. Is not this a very fair account of what the *R. S.* will bring things unto? and can we wonder that the *Papists* should be very *civil* in their returns to an *Assembly* that so highly obligeth them? But they add, "It is *dishonourable*,
 "to pass an hard censure on the Religions of all other Coun-
 "tries: It concerns them, to look to the *reasonableness* of
 "their *faith*; and it is sufficient for us to be established in
 "the *Truth* of our own.— Well! Adieu to all the Sermons of Bishop *Andrews* upon the fifth of *November*: all that King *James* writ against the *Papacy*, and to prove the *Pope* to be *Antichrist*: farewell to a great part of our *Homilies*, to part of the *thirty nine Articles*; the examples in *Scripture* whereby the *prophets* and *holy men* declare against *Edom*, *Tyre*, *Sidon*, &c. or against the *Scribes* and *Pharisees*, or *Diana* at *Ephesus*, or the *Idols* at *Athens*, these are *dishonourable* and *per-nicious*. Give me leave to speak to these *Virtuosi* in the lan-guage of the *Romish* Saint *Francis*, viz. *Salvete fratres Asini*; *salvete fratres Lupi*. Oh! how the followers of *Conthen* the

Jesuit

Pag. 426.

Pag. 63.

Jesuit hugg themselves to hear these insinuations! *Multam* Conthen, Po-
profecit error, cum id obtinuit ne delegatur. See but the wayes line. 1. 2. c.
 which he proposeth in order to the reducing of Hereticks to 18. Sect. 6.
 the Roman Church again there, and if this procedure be not
 agreeable to the examples which he suggests, may I never
 find credit. You see what applauds Mr. Sprat would have
 gained from that Jesuit for this History; but how would
 Campanella have clapped his hands for joy to see this happy esta-
 blishment which he so long ago projected, in order to the con-
 verting of England, Holland, and other heretical countreys?
 It was his darling design, and which that Fryer (one of the
 most politick that ever was), so often inculcates in his book of
 the Spanish Monarchy.

Campanella touching the Spanish Monarchy.

Ch. 10. pag. 47.

His Prince "Should banish all Theological Questions out of
 the Transalpine Schools: seeing that all the Divines of those
 parts turn Hereticks, by not continuing firm to the Holy
 constitutions of the Pope, but are still raising up fresh contro-
 versies: and the wits of these men are to be exercised only
 in the disputes of Natural Philosophy.

He shall do well to shut up all the Greek and Hebrew
 Schools; because that these two languages have been de-
 structive to Monarchy; and are besides the main pillars by
 which those Heresies that chiefly reign at this day are built
 upon. And therefore, on the contrary, let him endeavour
 to bring in the knowledge of the Arabick tongue; by means
 whereof the Mahumetans may be the better convinced; and
 the troublesome Transalpine wits may employ themselves
 rather in confuting the Turks, than in vexing the Catholics
 with their disputes.

Let him also erect Mathematical Schools ----- because by
 this means the Peoples Minds will be diverted from creating
 Us [Papists] any trouble, and will be incited to bend
 their Studies that way, which may be useful to the King.

B

Ch.

Ch. 25. pag. 157. Concerning England.

“Now as concerning the weakning of the *Englisb*, there
 ‘can no better way be possibly found out, then by causing *divisions*,
 ‘and dissentions amongst *themselves*, and by continually keep-
 ‘ing up the same; which will quickly furnish the *Spaniard*
 ‘[or *French*] with better and more advantageous *Opportuni-*
 ‘*ties*. And as for the *Religion* of that people, it is ~~excellent~~
 ‘*Calvin*; though very much moderated, and not so rigid,
 ‘and austere as it is at *Geneva*: which yet cannot be so easily
 ‘extinguished and rooted out *there*, unless there were some
 ‘certain *Schools* set up in *Flanders* (with which the people
 ‘of *England* have very great commerce) by means of which
 ‘there should be scattered abroad the Seeds of Schisme and
 ‘*Divisions* in the *Natural Sciences*; as namely betwixt the
 ‘*Stoicks*, *Peripateticks*, and *Telefians*, by which the errours of
 ‘the *Calvinists* may be made manifest. ---- Being of a Nature
 ‘that is still desirous of *Novelties*, and *change*, they are easi-
 ‘ly wrought over to *any thing*.

’Tis much bet-
 ter done by the
 Virtuosi now
 at Arundel-
 house, under
 the encourage-
 ment of

Ch. 27, pag. 177. Concerning Flanders and lower Germany.

“To conquer them there are but two wayes left now to be
 ‘taken: the first of which is to sow the Seeds of *Division*
 ‘amongst them: and the second to draw them forth of their
 ‘own Countrey. *Cadmus* having a design of erecting a Mo-
 ‘narchy at *Thebes*, whither he came a *stranger*, is said first
 ‘to kill a *Serpent*; by which was signified, the Defence and
 ‘Safe-guard of *Thebes*: and then afterwards to sow the *Teeth*
 ‘of it; that is to say, to scatter abroad the *Poyson* of *Desire* of
 ‘*Innovation*, and an earnestness to be instructed in the know-
 ‘ledge of *Learning*, namely in such *new Sciences* and *Arts*,
 ‘as he had brought over with him from his own Countrey.
 ‘And hence *Souldiers* are said to spring up, who through
 ‘*mutual discord*, slew each other; and the remainders of
 ‘them that were left, joyned themselves with *Cadmus*, their
 ‘Head and Captain; so laying the foundation of the King-
 ‘dome

dome of *Thebes* in *Bæotia*. I affirm therefore that *these very courses* ought to have been taken by the King of *Spain*; and not a war to have been only maintained against them all this while.

And certainly, if the *Southern* people would ever conquer, or lay the foundations of a Monarchy over the *Northern*, seeing that they are *not strong* enough to bring the same about, they ought to have recourse to the *Arts* either of *Cadmus*, or of *Jason*: although of the two, *Jason* went the more wisely to work; seeing he first won the Heart of *Medea*, that is, the good will and affections of the *Northern women* to him.----
Afterwards *Jason* by the enchantments of *Medea*, slew the *Dragon*, that is, the *Guard* of the Kingdome; such as are the valiant and warlike men of a Nation, with the *Preachers*. And then did he by the means of *Enchanted Oyntments*, tame fierce *Beasts*, the Brazen-footed and Fire-spitting *Bulls*; that is, by his *friendship* and *gifts*, he won over to him the *Nobles* and principal men of the Kingdome. And at length, *by them* he sowed about the *Teeth of the Dragon*; that is, by the assistance of the *Nobles*, he spread abroad the seeds of *Discord* and *Dissention* about *Religion*, *Arts*, and *Honours*. Whence, in the last place, sprung up *Souldiers*, that is, *Factions*; (such as are those of the *Guelphs* and *Gibellines*, the *Pontificians* and *Imperialists*, the *Lutherans* and *Catholicks*) wherein they killed each other: But those that remained, chose *Jason* for their *Head*, and *Commander*; and though few in number, yet afforded Him their assistance in the getting of the *Golden Fleece*, that is to say, such an *Empire* as we hear speak of.

After this he proceeds to direct several things, whereof one is, that by all means it be solidly taught, that the *Pope* is not *Antichrist*; for upon the gaining of this point (sayes He, and I desire it may be marked) *do all the rest depend*: And, (in order to the casting away of all *practical Divinity*, and the introducing of *some such Religion*, as Mr. *Sprat* would have) "It must be unanimously and stoutly maintained against them, that All *Commentaries* whatsoever that have been written upon the *Bible*, whether by *Catholicks* or *Hereticks*, ever since *S. Augustins* time,

time, are to be suspected, and not to be trusted unto. Mr. Sprat saith that the foundations on which the Church of England stands, are no other, but (in the first place!) the Rights of the Civil power: the imitation of the first uncorrupt Churches (in the second place! and thirdly) the Scripture expounded by Reason.—“Religion ought not to be the subject of Disputations: It should not stand in need of any devices of Reason: It should in this be like the Temporal laws of all Countreys, towards the obeying of which there is no need of Syllogisms or distinctions; nothing else is necessary but a bare promulgation (the Papists phrase is *sufficient proposition*!) a common apprehension, and sense enough to understand the Grammatical meaning of Ordinary words. — Thus he casts off all Scholastick and Polemical Divinity, and writes as if he did not own the Three Creeds, and four general Councils, or thirty nine Articles: we must use no Syllogisms, though to prove the Trinity, or meritoriousness of Christs death, or our interest therein by a practical Syllogism, and *fides specialis misericordiae*: no Analogy of faith to regulate us by: no Church-History: in fine, we must look no farther than the Grammatical meaning of ordinary words, though the Sacrament, and *Hoc est corpus meum*, be the subject of the debate. ---- I find indeed that Campanella adds, that “the multiplying of Books, and the spinning out of Controversies, do but add Authority to a bad cause, and besides also shews like a kind of Victory.

These Hereticks, after they had put forth new Bibles into the world, and wresting all the Fathers and Historians as they pleased, put such interpretations upon the same as they thought good: they then began, in order thereunto, to apply themselves to the study of the Hebrew and Greek tongues, and started a thousand Grammatical Niceties, wherewith they have filled up many great Volumes: insomuch that the whole North in a manner makes a Grammatical war upon us, rather than a Spiritual: Whereas We have long since laid aside the study of Languages, ever since we overcame the Hebrews, Greeks, and Latines, and have made them submit themselves to Christianity, or else have devided them of the power of discharging all Political and Sacerdotal Administrations; as it is with

'with the *Jews* at this day. And therefore we intend not now
 'to trouble our selves any further with *petite Sophistical Niceties*, and *Grammatical Quirks*: but relying only upon our own
 'strength of Wit, we let alone all prolix courses of *Disci-*
 'plines, and the tediousness of writing huge Volumes: mean
 'while that *these men* spend their time herein, and weary us out
 'almost with their *Carvillings*; although they do not get the
 'better of us. I conceive therefore, that *these men* should be
 'taken off from *these Grammatical Heresies*, namely, by some
 'New Arts and Sciences, and such wherein we are excellent our
 'selves. And to this end the King should erect certain Schools
 'in all the principal Cities, wherein the *Arabick* tongue should
 'be taught: that so by this means there may be such among
 'his Subjects, as shall be able to Dispute with the *Turks, Moors,*
 'and *Persians*, who by the use of that Tongue do spread their
 '*Mahometanisme*, as we do *Christianitie* by the *Latine* Tongue;
 'and so by *these means* our intestine wars may be laid aside, and
 'our Arms turned against foreign enemies.

'There should be Schools also erected for the *Mathematicks,*
 'and *Astronomy*, unto which *these Northern* people should be
 'invited to come, by proposing Salaries for such of them, as
 'shall apply themselves to the Discovering, and giving an Ac-
 'count of such *Starrs* and *Constellations*, as are found in the
 'other *Hemispheres*, in the new world. For by these means there
 'would redound to the *Spanish* Empire both Honour and Pro-
 'fit. I would also have the Schools of the *Old Philosophers* to
 'be opened again; as of the *Platonists* and *Stoicks*, and of the
 '*Telestians*, that so the people may be diverted from *Theological*
 '*Questions*, and may apply themselves to study *Questions* of *Phi-*
 '*losophy*: for those come nearer to the *Christian faith*, than the
 'Doctrine of *Aristotle* doth. Now the King in doing these
 'things, shall follow the example of *Hercules*, who to the end
 'he might the more easily overcome *Anteus*, drew him
 'forth of his own Territories; and also of *Cadmus*,
 'who brought over *New Arts* and *Sciences* with him into *Bao-*
 '*tia*; and by means of the same, got to be Prince of the Coun-
 'tre. And by taking of this course, the *Principal* among the
 '*Hereticks*, when they shall see there is more to be gotten

Nor ever shall
 have occasion
 to be troubled
 with them, if
 our *Historians*
 prevail.



And of *Demo-*
critus and *Epi-*
curus too!



‘there then *here*, forsaking their *Heresies*, will become Ring-
 ‘leaders in the Sects of *Philosophy* and *Astronomy*.

‘—There should also be erected publick *work-houses* for
 ‘the exercises of *Mechanical Arts*, to which this people is
 ‘exceeding apt: and so by this means will the Business of
 ‘*Navigation* be much promoted, together with the skill of
 ‘besieging Towns, and of taking them in by the use of Ar-
 ‘tificial *Fire-works*. By these means the *People* (probably)
 ‘will be taken off from their *False Religion*, and divided one
 ‘from another; to the great advantage of the Kingdome of
 ‘*Spain*, to whom many will now come and tender their service:
 ‘and his Empire, which of late hath been contemptible and
 ‘hateful to the world, shall recover its antient Splendour and
 ‘Honour.

These are the *passages* which I think I first accommodated
 to the *Royal Society*, and which served me as a *Key* to expound
 their *History* by: and although the *indignation* I conceived
 against Mr. *Glanvill* of the affronts he and his *Assistants* had
 put upon the *Physicians* was the *first motive* which put me up-
 on writing, yet it was a regard I had to the *Religion* and the
Education of our Youth (which I found undermined by these
Campanella's) which *imboldened* me never to lay aside my
 Pen. I was afraid lest our *Virtuosi* with their *trinkets* and
experiments would serve this Nation such a trick as the *Pyed-*
Piper at Hammel in the Dutchy of *Brunswic* did those Inhabi-
 tants: He first played in the Town and all the *Rats* and *Mice*
 follow'd him, which He so destroyed: then He played again,
 and their *Children* followed him, and thence He lead them
 out of the Town unto an *Hill*, into which He went, and they
 followed him, and perished all. Some of these passages I
 have censured in my first book printed at *Oxford*; it being
 manifest, that without a Regard to those *Popish* Machinati-
 ons, no man would have inserted any thing of such import
 which was no way necessary to the vindication of the *Vir-*
tuosi or matter intreated on.

Wierus de
 fig. De-
 c.

To his ever honoured Friend, Sir N. N.

SIR,

ALthough the *multiplicity* of business arising from my *practice* in the *Countrey*, and the great inclinations I have to improve each *vacant minute*, in the prosecution of my *studies*, although these occasions render me not so *civil* to my friends by any intercourse of *Letters*, as I *seemingly* ought to be, yet do not they at all diminish my *respects* for them, so that they may as absolutely as ever dispose of my *services*, though the confirmation thereof be not daily renew'd unto them with all that noise of *ceremony* and *Flattery* with which this *impertinent age* doth abound. Your Letter brought with it all those circumstances that could justly endear it unto me; and I was infinitely satisfied to understand that I had so important a place in that *memory* which retains nothing *vulgar* and *trivial*: These sentiments alone were enough to transport me into some vanity, and place a greater value on my self than I know I merit, because you write, that is think, *I have some*; and I am almost ready to yield that to the *opinion of your judgement* that which I have many demonstrations against. I am pleas'd to understand that so many *serious* and *real Patriots* of this Kingdome do approve not only of my undertaking the *Royal Society*, but of my *performances* therein: what others, especially *judicious* and *sober persons*, say of us, is a thing no *virtuous person* ought to look upon with indifference: though the greatest comforts in all actions arise from that content which our own *breasts* afford us. My life hath been a continual scene of *dangers*, which the Rebellion in *Ireland*, *Poverty*, *Sickness*, and *other accidents* involved

involved me in, but though in a thousand misfortunes I have reflected on my condition as *irreleivable*, yet of all the *intricacies* that ever I encountered, the beginning of this *Quarrel* did represent unto me the *worst* and most *perplexed* I ever encountered: All the others appeared like the contrivances of a *resistless Fate*, this to depend upon my *own election*; All others did at once acquaint me with the whole prospect of the *hazard* I was in, and my thoughts discovered unto me clearly what grounds I might rely upon for *hopes*, and what *occasions* I had to *despair*, and amidst these resentments I was prepared for any issue *Providence* would ordain me: but in *this* I could not any wayes imagine what might be the consequence of the attempt, whence to derive any *assurance*, or where to terminate my *fears*: so that I was forced to abandon all those *melanchollick apprehensions*, and to deduce my encouragements from the *necessity of the Action*, and from that *despair* which made all troubles and even death it self pleasant, since I could make no other estimate of *England*, but that even the poor remains of *Religion* and *Learning* amongst us were so imminently endangered, that I could not expect their *long continuance*, nor with patience think how to survive them. All men represented unto me the perils into which I threw my self, but none more than I foresaw my self: none had the confidence to imbolden me, many dissuaded me: but in the whole affair I consulted the tranquility of my *own mind*, and determined upon that course wherein I found the most *content*, not the most *profit*: and agreeable to the directions of that *Hebrew Proverb*, *Though sixty Counsellours tender you an advice, yet reject not the dictates of your own breast*, I fixed upon those resolutions which were most conformable to my Soul, and in which I found my *internal peace* best established: I left the conduct to God, whose glory was concern'd so highly, and bottomed my self upon this ground alone as to *outward supports*, that my design must be agreeable to all that regarded the interest of the *Monarchy* and *Religion* of this land, the welfare of the *Church* or *State* the happiness of *this Generation* and of *Posterity*: and in steed of making particular friends (or matter of great uncertainty

now t

now) I hoped that the particular concernments of the Church of England, the two Universities, the Colledge of Physicians, and of all Artisans, would supply that defect. The History of the R. S. and Mr. Glanvills *plus ultra*, did furnish me with undenyable arguments of the common danger; and the general and constant discourses as well as deportment of the Comical Wits or Vertuosi were such, that no gloss or comment could create another representation of things. Sir, it is not unknown to you what influence Education hath upon any Government; that without a regard hereunto the best Laws become useless and ineffectual, thorough the contempt and malepertness of the Subjects: and the most noble designs of Princes frustrated for want of *besitting instruments* to carry them on: By the sole force of good Education sundry Governments have subsisted, whose constitution hath been defective, and whose disturbances and calamities have been such as would have shatter'd into pieces and confusion any weaker foundation: of this *Lycurgus* took an especial care, and the paucity of his Laws was admirably supplied by his diligence herein: and the neglect hereof is justly censured by Aristotle Aristot. Ethic. l. 10. c. 9. in other Republicks. Upon this account our prudent Ancestors, (knowing how much more untractable Northern people were than others, sacrificing upon any occasion their lives unto their passions) have been eminent in their cares for the educating of our Youth, Gentry and others, to such knowledge and customs as was necessary to the due honouring of God, and the welfare of the Nation and Government. From this care had our Universities their original, and that publick breeding in Free Schools: and the advantages are these, that by the Uniformity of the instruction mens minds may be better united and cemented together, (no material difference arising, nor each seeming to the other foolish and ridiculous, where all are inured to the same sentiments) and not only that confusion is prevented which private Tutors would occasion by infusing different and repugnant principles into the Youth, but even the deportment and inclinations of all becomes evident to the Magistrates and others, which best and most naturally discover themselves in their tender and

unhappy years, from whence the *prudent* can judge what to hope, or expect from them in their maturity, how to *discourage*, *distrust*, *confide* in or *employ* them: the *Tutors* they have, the *Books* they converse with, the *Studies* and *usages* which they like and dislike, are thereby known: and of those evil fruits which some men have afterwards produced, 'tis notorious that the first *buds* and *bl. ssoms* were, or might have been observed during their continuance at the Universities. Pardon a despised Peripatetick if I tell you that it is an opinion *Aristotle* betrays me into, that the source of all our evils, and the continuance of them, is derived from the neglect of *publick Education*: nor doth there appear to me any possibility of remedying thereof, or reconciling us by the establishment of *new Laws* (how *penal* soever) but by resetting a *fitting Education*: this *diligently* pursued, would *insensibly* and *infallibly* atchieve that which no *Laws* will ever do where they are to encounter *grown men*, whose *resentments* are *violent*, and their *reasons* *weak* especially as to *remote consequences*. This *general advantage* to the *publick*, was attended with *another* not of less importance: *viz.* that since the condition of our *Nation* and *Monarchy* requires that all be principled in the *Protestant Religion* in opposition

Let these Considerations (if others from Piety seem contemptible) teach us wisdom before an absolute impossibility to redress our evils: Leave us no consolation but despair, for not having timely foreseen and prevented them.

to *Popery* (the *restoration* of which would indanger the Title of our *King* to his *Crown*, or render it *feudatary* and *obnoxious* to *foreign power*, as any man that is acquainted with *History* must know: it would also *embroyl* us in the restitution of *Churchlands*, which as *they* make up the greatest

part of *most mens estates*, so the rendition of them, if I can judge of the posture of *England* now, will be more *facile* than that of the *Episcopal Revenue* lately was) and in *conformity* to the *Church*, whilst *custome*, *example*, and *uniform instruction* would represent those *ceremonies* and *habits* as *decent*, *orderly* and *rational*, which would otherwise seem *uncouth*, and *phantastical*: Besides these, it was a further security to our Government, that the *Education* there did qualifie men to a *submission* to and love of our Government: It being evident that

that the *Politicks* of *Aristotle* suit admirably with our *Monarchy*, and men are well prepared to own and support a *reiglement*, which that intelligent *Phylosopher* so long ago represented as the *Idea of humane policy*, in opposition to the *Seigniorial* and *absolute Monarchy*. The *Ethicks* there are *generous* and *subservient* to *Religion*, and *civil prudence*, and all manner of *virtue*: the *Logick* and *Metaphysicks* are so entwisted with the *establisshed Religion*, and so requisite to the support of it against *Papists* and *Socinians*, that without a *miracle* the neglect *hereof* must bring a change in the *former*: even *common wisdom* teacheth us that we must vary our *Weapons* and *Militia* according to what our *enemies* practise: thus when the world assumed *Guns*, we have been forced to abandon our *Archery*, and quit those *fortifications* which sufficed against all former approaches, since the *battering Canon* were introduced: the learning of the *Sarracens* prevailing on the minds of men *endued with reason*, the *Monks* and *Ecclesiasticks* were forced to Study *School-divinity* in opposition to them, and not to rely upon the sole support of *Authority*, *Legends*, and *feigned Miracles*: and whilst that *Subtlety of reasoning* and *distinguishing* continues amongst our *Adversaries*, 'tis no less than *apparent madness* to cast our *Arms* away, and desert those courses by which alone so great a part of the Nation is to be reduced, and *Foreign encroachments* prevented. The Study of *Learned Languages* is so necessary to *Ecclesiastical* and *Civil History*, and the understanding thereof (together with the *Original Scripture*) so requisite to our *State* and *Church*, that they must be *enemies* to both that discourage those *Studies*, and looked upon as such as manifestly go about to ruine their *Native Countrey*. With what facility are those *Arguments* solved in an *Academical* way, which perplex the *ignorant*? What *sense* do those *terms* bear to an *understanding person* which seem *insignificant* and *contradictions* or *non-sensical notions* to those of *lower intellectuals*? What *intricate cases* are resolved, when it is made evident that their *Authors* are *spurious*, or intended otherwise? As to that *usual exception* that 'tis an *empty* and *mean employment* for *generous youth* to be wasted in the studying of *Languages*, and *chopping of Logick*;

it argues no judgement in those that use it: for nothing is mean, despicable, and empty, without which so high and important benefits cannot be attained: By the same reason, the exercises of the old Romans in the *Campus Martius*, the *Palæstra* and Olympic games, the modern Training, and Cudgel-playing, or shooting at Butts, must be exploded; yet no wise man will assent hereunto: and it is evident, that those other studies are as subservient to the ends proposed in them, as those others are to what is designed therein. All these so considerable advantages which our Church and State derives from Academical education, are designed to be overthrown by the *Historian*, and the common entertainments of the *Virtuosi* consist in debauching our Nobility, Gentry, and all the youth from those studies, as useless, empty, and impertinent: and how just, how necessary ought that undertaking to seem universally, which hath no other end than the silencing of these *Comedians*? They magnifie, in opposition to all other knowledge, the *Experimental Philosophy*: were the thing well modelled, managed by discreet persons, and the Question rightly stated, there would be no controversy betwixt us: the pursuit thereof would creat us some profit, and much of pleasure: but whosoever accustomes Children or Youth to those divertisements, shall never breed up any eminent personage, nor reduce them afterwards to serious and sedentary studies: as daily observation shews: And whosoever asserts that such & innocent works will certainly have a more sure effect in the composing and purifying mens thoughts, than all the rigid precepts of the Stoical, or the empty distinctions of the Peripatetick Moralists: it is certain he never was acquainted with the Stoicks, or Peripateticks, but is a *Virtuosi*. I profess some shame to think that any man should oppose this Mechanical education to the other, and make use of it to disparage that Moral discipline which instructs us in the nature of virtue and vice, of Distributive and Commutative Justice: humane actions, and the due course, as well as exorbitances of our passions: But to prefer the advancement of such Experiments before the most renowned Actions of the best Princes, is so strange a passage, that I only say, 'tis well the Author thereof is an enemy to, and unacquainted with University-Learning. "Non est conveniens proportio inter

History of the
R. S. pag. 342.

In the Dedic-
ation of the Hi-
story.

Maimonides in
More Nebu-
chim l. 2. c. 37.

res differentes specie. Non enim oportet dicere quod hominis perfectio est tanta, vel major equi perfectione. All that is said about the erecting of *Mechanical* or *Sensible Philosophy of Nature*, is but empty talk: *Humane nature* is not capable of such *atchievements*: 'tis evidently impossible to attain any *exact knowledge* of the surface of our whole *Terrestrial Globe*: and the *depths of the Earth and water*, are no less *unsearchable*: and as to the *component particles*, their *nature, figure, motions*, and *combinations* are known only to the *Deity*: so that no prudent person is to be amused with these *Rosicrucian* promises: As to the collection of the *History of Nature*, were it not *universal*, it might be of *some use*, and afford not only matter for the *raillieurs*, but other pretty *illustrations* and *similitudes* for the *Rhetoricians*; but I must here complain of them for making us *false relations*, which will create us more trouble than if they had *done nothing*; and also for this, that since *these men* take upon them to upbraid all the *Aristotelians* and *Physicians* for not attending unto *Experiments*, yet do they do little more than steal the *Experiments* of others, and publish them as *their own*, without ever referring to *Authors*, except an *ingenious Virtuoso* be concern'd: would these persons be pleased to declare solemnly unto the world that they understand nothing of *antient or modern Writers* (you may see by *Aristotles* gravitation of the *Ayre*, that they never read him: nor *Galen*, or *Pliny*, or *Aristotle*, who speak of *Apothecaries* such as *ours*) it were but *candour* in them, and the best way to secure their credit from being thought *Plagiaries* and *Cheats*: so, if they would but get any one to teach them *Latine* and *Greek*, it would have saved me some trouble, as you will see in my *Animadversions* on their *History*: In fine, I doubt not but to make it plain to all the world, that some having been so *negligent*, most so *ignorant*, we can expect no great things from *them*, nor are to be concern'd for *them* at all in an affair of such importance as the change of *our Education* and *Religion*. They might have appeased me, would they have called in *those two books*; but since they would not do that, I suspect their intentions, and that they drive on *Campanella's project*: *why should they else have scrupled at it?*

Is it below *them* to acknowledge their errors, whereas they blame the *Peripateticks* for refusing to confess theirs? I am inform'd by you that they say many of my citations are false & but no man of reading will say so: they were true when they went from me; if the Printer have mistook, I cannot help it: a *Stratagem* of theirs hinder'd me from correcting the *Press*: I know some books are *misnamed*, but such *Scholars* as they pretend to be (and who offer to tell the *Parliament* of what in each invention is new or old) can easily correct that: as where I cite *Scheinir: ros. Vagin:* any ordinary man can tell it should be *rosa Ursin:* and so for other defaults: but if the poor *Devils* cannot tell how to apprehend such *Errata*, if they will send to me, I will rectify any citation, rather than they should give them a needless trouble in denying it. There is not one allegation that I have not consulted my self, except what relates to *Pecquet* and *Mersennus*: and neither of those were they injured in; but my books being burnt at *London*, those two pieces I wanted: but as to *Pecquet*, if you look into him: you will find not only the gravitation of the *Atmosphere*, but the *Elasticity* and comparison with a *Fleece of Wooll*, and Experiment of the *Barometer* (not the non-sensical appellation) related as amply as in any of the *Virtuosi*: and it is in this manner that I have injured them. But they must say something to preserve their credit; yet have I a thousand faults more to charge them with: but I reserve them for another Treatise, which if they do not submit to the two Universities, and the Colledge of Physicians, I will publish. In truth, no Physician can joyn with them, or give them any countenance without betraying his Faculty to most unworthy *Empiricks*. It is intollerable that a company of men that know not what belongs to a Disease, or Remedy, should arrogate as they do. I have already shew'd the long use of *Ivy-berries* for the *Plague*: this they bring (out of *Parkinson!*) for an *Arcanum!* The *Lunar Pills* as to the main ingredient was publick in *Tenthelius* and *Mynsicht*: but the making of the *Luna Cathartica* into Pills with white-bread crumbs is their invention! And if the additional crumbs of bread works not the miracles (as indeed neither do the Pills answer expectation at all) neither

*Pecquet d. C.
fert Atatom.
C. 8.*

*Tenthelii ex-
ges. Chymiatr.
de magisterio
Luna, & Myn-
sicht de Cathar-
tico argenteo.
I do not cite
A. Sula, be-
cause he adds
not Nitre.*

is the addition of *Nitre* new, nor the *discovery* above what we knew before. I dare undertake to make an *Experimentator* of any insipid *Aristotelian* at this rate, let him but pretend to *other mens discoveries*: a little wit and a brazen-face will serve to that purpose, *without studying*. As to what you farther add, that they decry me for an *Atbeist*, and one of *no Religion*: First, I reply that it doth not become any of them to upbraid me therewith; or if that procedure be excusable, it admits only of this *Apology*, that being to Character a man altogether unknown to most, and not intimate with any of them, they make themselves the *Original*, and so copy me out thence: this is a fallacy our senses commonly betray us into; for the things which we are unacquainted with farther than by report, or deceitful *Telescopes*, we presently fancy to resemble more or less those objects we daily converse with: and the *Virtuosi* being sensible *Phylosophers*, act according to their principles herein, though not according to real truth. Secondly, if ever my tongue (I am sure my actions have not) ever given any occasion to conjecture so of me, I beg pardon of God and the world for it: but the occasion of such reports was rather from the malice of men, than that they had any ground for it; unless this were one, that during the late times, because I would joyn with no party in a Church, they imagined that I could be of *no Religion*; whereas I did no more than *Chrysostome* and others before me: A second enducement may have been a custom natural unto me, to defend the absent or depressed, or excuse them against the censures of illiterate *Adversaries*: other ground I know none, and it is not to be deduced by any man from any of my present writings I am sure; but the contrary: And it is strange that men pretending to a respect for our Church, should thus conspire to defame me for so seasonable and powerful a defence thereof: it being obvious to see that hereby I recede from my *Temporal interest*, which they know might be better made up by open debauchery, indifference as to Religion, flattering and lying: not to mention the present and future dangers I run into by this attempt, the final issue whereof is scarce likely to antedate my death: If a profession of the Protestant Religion, Union with the Church

of England, *an unblamable life*, and the *hazards* I now encounter *voluntarily*, cannot justify me against *these imputations*, let them produce *as much in their behalfs*, and acquaint me what *more* is requisite, and they shall find I will not decline any *fitting testimony* whereby to undeceive them: so that they ought not to upbraid a man who appears principally concerned for the *Church and Protestant Religion* with such a *Calumny*, which might with great shew of justice be fixed upon all the Abettours of that *History of theirs*. As for the rest you write about, I value it not: those *untruths* are easily refuted; and as yet I cannot believe that they will avow *them* in Print: Let us leave them Sir, to talk a little as yet; they have been used to spend their discourses in *commendation of one another*; be contented that you have some *new discourse*: would you have them so soon to hold their peace? I know a Gentleman who in the wars of Ireland at one blow cut off a *man's head*, and the *headless trunk* clapp'd spurs to the horse sides and rid about *ten yards after*: Let these *loosers* talk a little; and then retire and work, and so cure *their passions* (according as Mr. Sprat adviseth) and endeavour to regain *their credit*, which I think is irrecoverably lost, if others, *by my example*, will pursue *their failings*. As to his Majesty, he cannot suffer when these *Spirits* dis-appear, who like those *Phantasmes* in the *Mines* have made a great shew of *doing much*, but upon enquiry no such performances are *really found*: All posterity will celebrate the glory of his intentions to improve the *knowledge and trading* of this Nation: and he is possessed of so many *Royal Virtues* that render him the object of all *our esteem*, that the removal of *these* now will not derogate from, but *illustrate* his Renown, and confirm *England* in the Reverence of his *generosity* and their *detestableness*: But I doubt I trespass too much upon your patience, and that you are tyred, as I am with *writing*, but not with any *professions* that becomes

G. Agricola de
animantibus
subterraneis.

Your most humble Servant

Warwick June 2^d
1670.

Hen. Stubbe.



The Postscript.

SIR,

THE *News* you write me about Dr. Merrett did at first a little surprise me, and had I not during this last year been accustomed to the *puny Stratagems* of the *Virtuosi*, I should have wondered much to understand that I was entitled to the *Lex Talionis*, or that *Apologie for Apothecaries to practice Physick*. But the *Comediants* finding their anger insignificant against me, by reason of the advantages which *their ignorance* had given me over them, have ascribed unto me a *book* which admits of an *easy reply*, and which enterferes with the *Colledge of Physicians*, that so they might seem to *baffle* and *inodiate* me at once in the judgement of that *profession* for which I seem concern'd. I cannot make any particular defence, not having seen *his book*: but if Dr. Merrett had consulted the *principal Apothecaries*, I doubt not but *some of them* could have given him an account of my intentions, and how different my sentiments were from those of *that Authour*: and it was easie for him to learn that I was not the *penner* or *approver* of the other piece. I writ to some of the Company of *Apothecaries* desiring them to compose the growing *feud* betwixt them and the *Colledge*, and told them that I neither could nor would encourage them against that *Illustrious Assembly*; that it was the interest of *Physicians* to employ *Apothecaries*, as a *distinct profession*; and that it was the *prudence of States* that it should be so: that I could deduce the difference of the *employments* thorough *Antient* and *Modern Greece*, as well as *Rome*: and that the reasons to be alledged against *Physicians* preparing their *own Medicaments* were such as admitted of *no answer*, nor *evasion* amongst under-

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standing

standing men: but that I could never *invent* or meet with any arguments that could induce me to allow of *practicing Apothecaries*; and that I understood so well the *extent* and *difficulty* of my *profession*, that (however they might in *some cases* prosper) I could never defend that *assertion*. I desired them to consider that if any *heats* or *indignities* had passed from the *Colledge* towards them, it was their *wisdom* to *pass them by*, and not to abandon their *important concerns* to indulge any *passion*: that the effect of this *contest* would be, that the impertinent *Virtuosi* and insolent *Quack-salvers* would carry away all the *advantage*: to conclude, there were many defaults needed regulation *in them*, that although the *Physicians* in general would be prejudiced by *this dispute*, yet so many *eminent persons* would continue *famous*, as might divert the Storm upon the heads of the *Apothecaries*, and if the *Colledge* would joyn effectually therein, the *project* is not *difficult*, though I would not intimate it. I did therefore earnestly recommend unto their considerations an *union*, and that they would not delude themselves that they could prosecute *their Trades* long, if that *famed body of men* did resolve against *them*, with whose *determinations* I did not doubt but all *intelligent practitioners* in the *Countrey* and *Counties* would comply: but I hoped we should not be put upon *those extreams*. I advised them to reflect upon our *common Enemies* the *Royal Society*, and see if *they* were not the *principal Incendiaries*: that all the books that had been yet written on *that Subject* proceeded from *them*; and that I looked on it as a design of *theirs* to aggrandise themselves upon the *ruine* of the *Colledge* (a thing they have alwayes endeavoured) and *Apothecaries*: that there wanted not of *them* who purposed to erect a *Laboratory* and *Shop*, whence all should be furnished *cheaper* and *better* than now, as to *general Medicines*, provided *they* would act *themselves* in the more common and frequent *Medicaments*: that if they proceeded herein, the *Virtuosi* might facilitate their *design*, though their *ignorance* and *unfaithfulness* be such that all men ought to oppose *these Projectors*. Upon this account I did largely handle that *Question*, *Whether Physicians ought to make their own Medicines?* which I resolved in the *Negative*, and urged all those arguments

arguments (with several illustrations) which have hitherto swayed with prudent Governours and Physicians to establish the received usage: but I protested against any encouragement for Apothecaries to practice. I answer'd all that Dr. Merrett had alledged, and shewed his intollerable ignorance in that book; and if we might take an estimate of his parts from that writing, 'twas manifest he might better imploy his time in studying the method of Physick, than composing Medicaments: that after 30. years practice 'twas evident he understood not the Rudiments of that noble Science, nor could state a case therein. As for Dr. Goddard, who had writ more warily and with greater prudence, I only dissented from him in the Antiquity of Apothecaries, and treated him as a Physician whom I pittied for being mixed with so illiterate a company. This was the purport of my Treatise, which was joyned with another miscellaneous Discourse about the errors and cheats of the Virtuosi; and the pernicious influence they would have ere long upon all Trades and Professions, when they had more inspected them: that they began with the rectifying Apothecaries, but where they would end I did not know: that it behooved all men to combine against them, the tendency of whose designs was so fatal and malignant: that I hoped the Physicians would consult their common interest in opposition to the Thomsons and Odowdes, &c. and act with that moderation which became wisemen, & who were tender of continuing the renown of their Faculty, which would suddenly else devolve into the hands of Empiricks; and demean themselves with that moderation which might end in an accord with the Apothecaries: that this quarrel was inconsiderable, and indeed (as Dr. Merrett confesseth) of no longer continuance then that of the R. S. and would receive a period with their overthrow; which not only all Doctors, but all good men ought to endeavour; that the disasters of the late Dutch Warr, the Plague, and Fire of London were less inconveniences than their perpetuity: that these calamities admitted of some remedy hereafter; but the evils they are likely to occasion us, would never be corrected by any humane prudence; and I doubted whether God would support us by his providence, when they had debauched the Nation from all Piety and Morality, as well as civil wisdom,

dem. This was the subject of *that Book*, which I doubt not but will be approved by all *judicious persons*: and the *Colledge* will see that I can write against *Dr. Merrett* without derogating from them; or rather that my intendments were to support them, and not dis-serve the *Apothecaries* in the least. I intend to make it publick in *Michaelmas Term*: the passage of *Campanella* being taken out thence, hath occasioned that breach in it which I have not leisure now to redress: and perhaps I may call those other writings of the *Virtuosi* to an examination, which have been the principal cause of all these controversies, and which if they be not refuted, 'tis in vain to attack the *Medela Medecine*, *Mainwairing*, &c. They must blame themselves, not me, for any undertaking of this nature; ordinary prudence would have inabled them to foresee the issue of those kind of writings; and a proportionate candour now would induce them to retract them, without enforcing me to shew how many unreasonable tryals they put us upon; how many impertinences they suggest unto us; how delusory their Medicaments are; how 'tis their usual practice to vouch those things for new discoveries which we very well knew before, and to which if they were strangers, it is because they were not acquainted with the practice of the most eminent Physicians. Let them therefore hence forward permit the Physicians to be Judges of their own Science, and give them the credit best to understand their own deficiencies, and the occasions of any failours in their practice. The blind may as well judge of colours; the insensible concerning the objects of feeling, as the Virtuosi of Physick. This is no knowledge that ariseth from natural wit alone: Fancy without judgement, reading, and observation will not enable them hereunto: This is a performance too great for the Merretts and the Sydenhams: as I shall shew hereafter; and as little agreeing with *Dr. Sprat*, or *Mr. Glanvill*, whose abilities in matters relating to their profession are so contemptible, that 'twere folly to expect much from them where they profess not. I have not time to enlarge farther, being now employed otherwise, and having appointed to spend the next week or two at *Bath* in attendance of a Neighbouring Patient.

Ragley June 14.
1670.

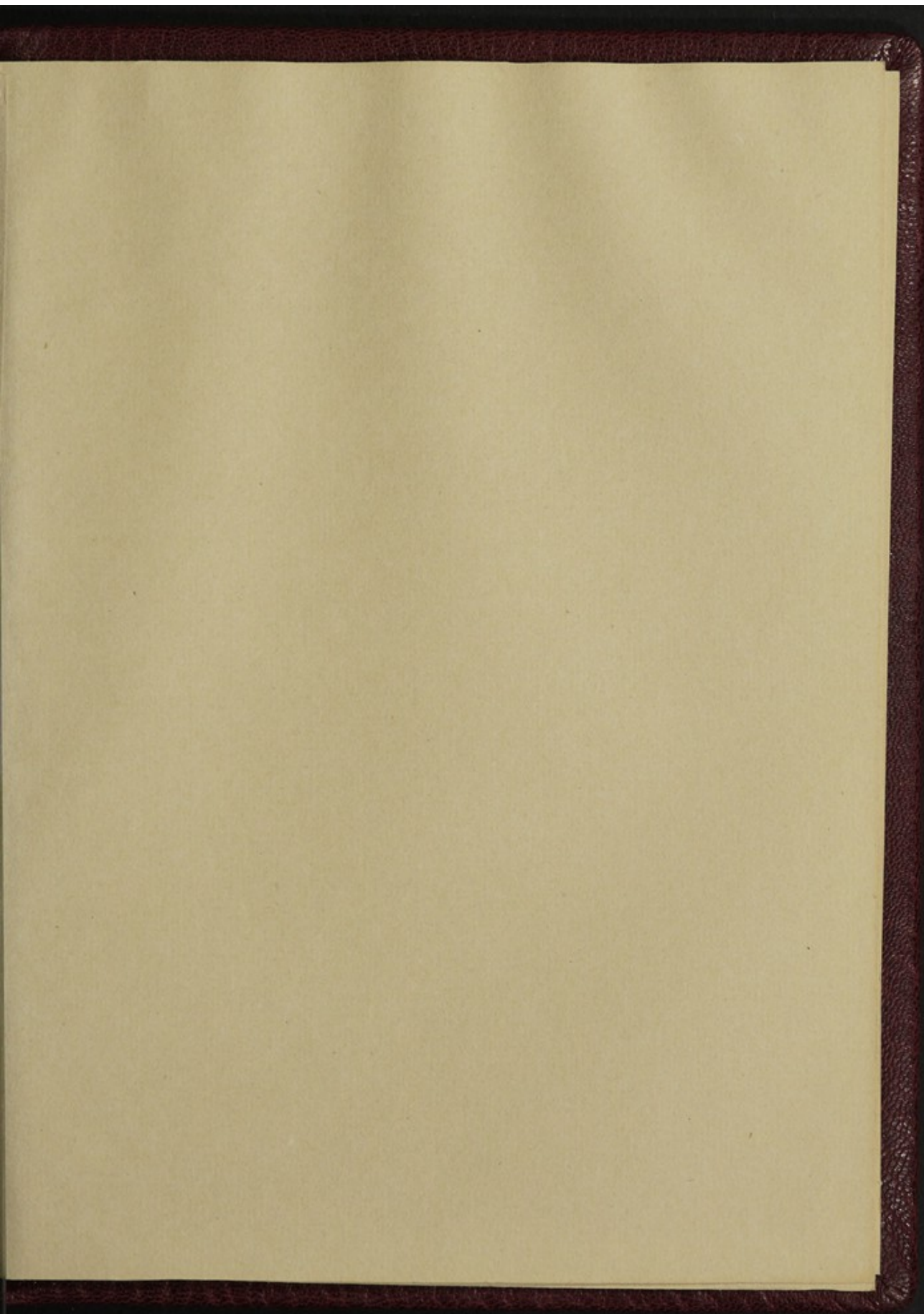
Yours, &c.

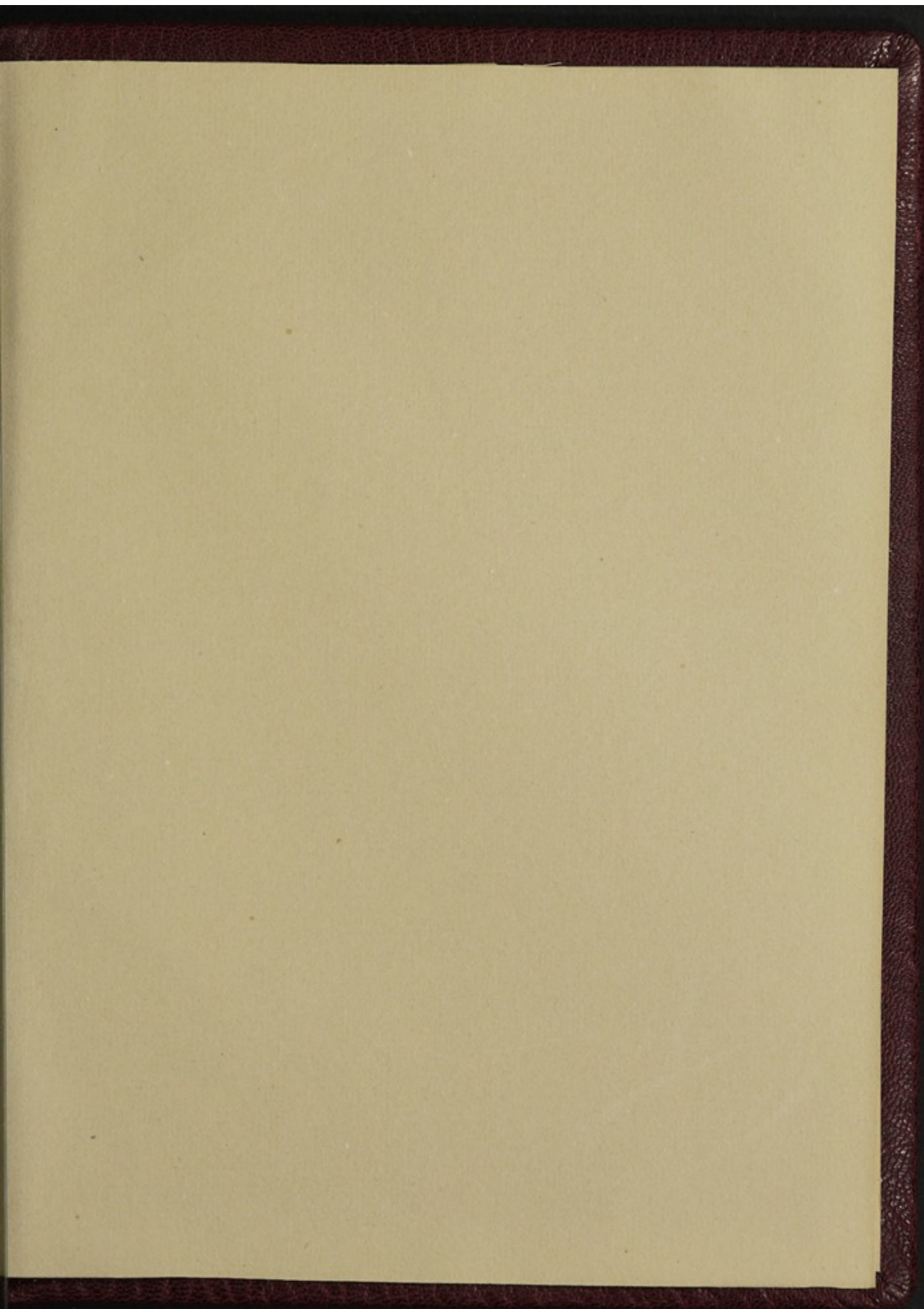
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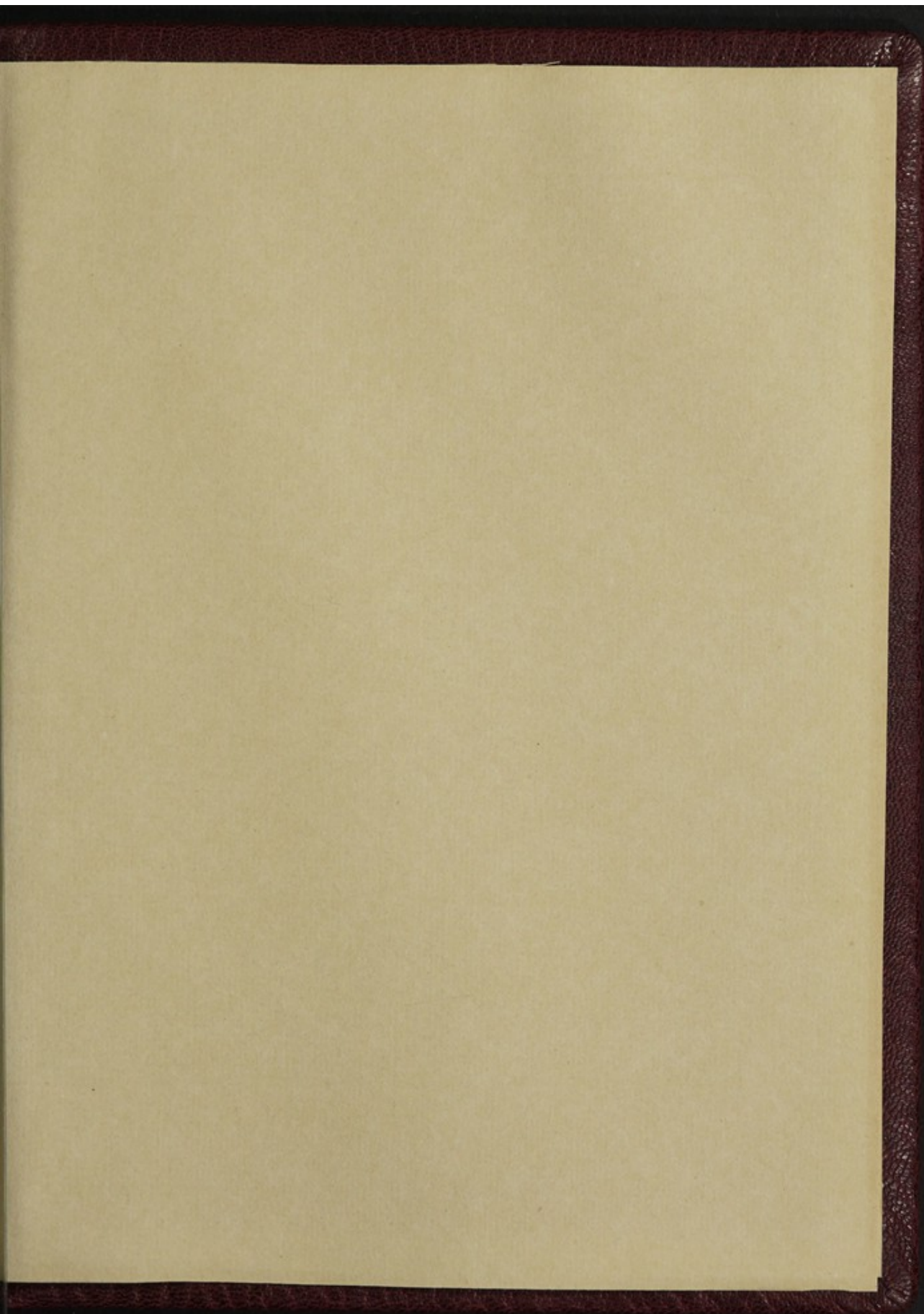
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had done
which, which the Day and the rage of many waters
Dove sent out of Noah's Ark, to bring us the Olive
an testimony to do wonderful things, and like the
angel came to the Mount High, which hath made him
and all the people in his Dominion break to the time
the tower of Babel, may bear testimony from his towers
That he who hath builded up our walls, and raised up
Reuben and Ephraim.
The Lord was as quiet, keep and fix the account of his
that, not in mind to do as they say, but did what
He, and that a great way, now our Temple is

FINIS







Desmond Shaw Cambridge 1991

