A discourse concerning a new world and anoth[er] planet. In 2 bookes [The first book. The discovery of a new world. Or, a discourse tending to prove, that 'tis probable there may be another habitable world in the moone. With a discourse concerning the possiblity of a passage thither. The third impression. A discourse concerning a new planet. Tending to prove, that 'tis probable our earth is one of the planets. The second booke, now first published / Anon].

Contributors

Wilkins, John, 1614-1672.

Publication/Creation

London : Printed J. Norton (Bk. ii, R. H[odgkinson) for Iohn Maynard], [1640]

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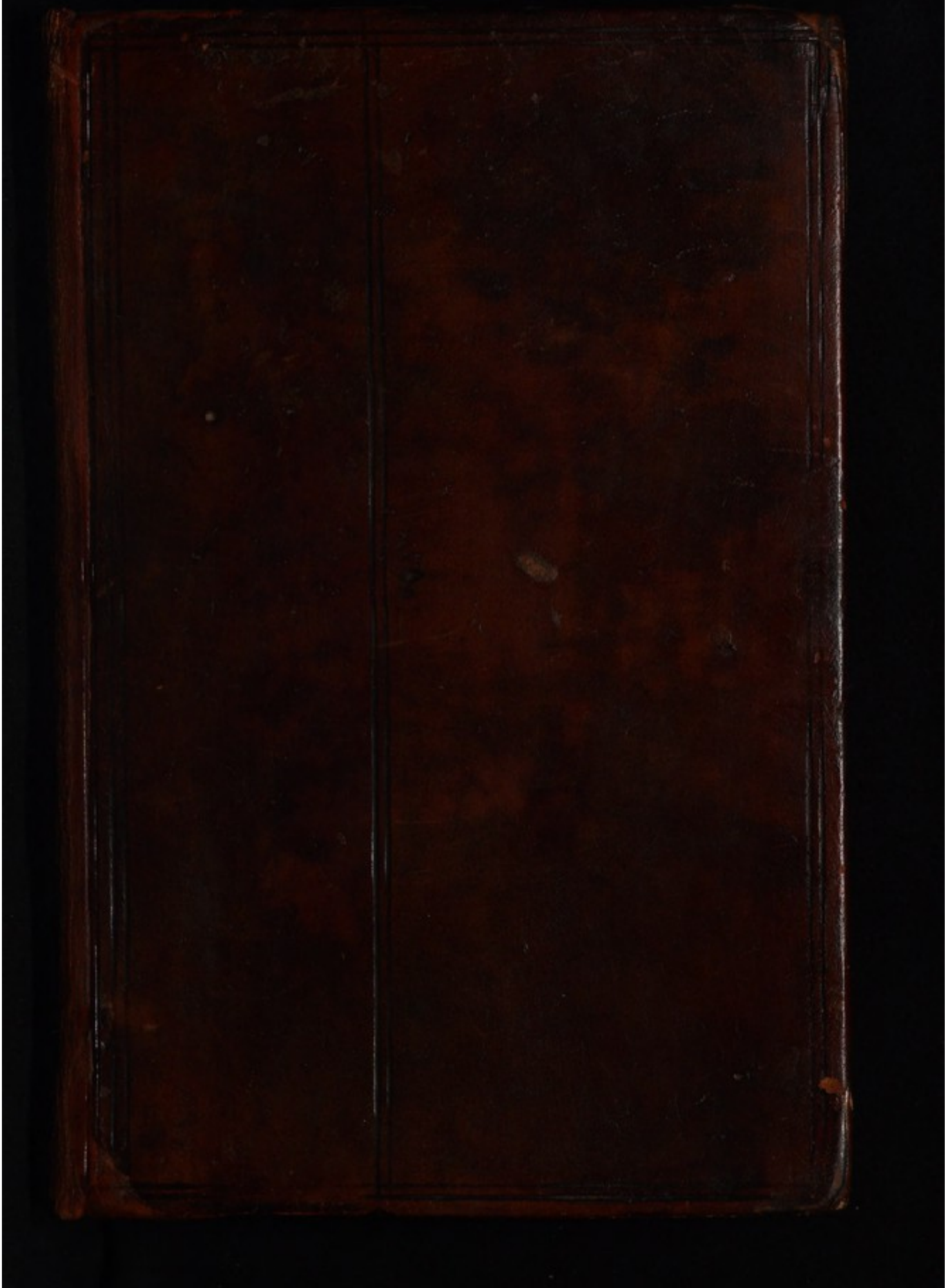

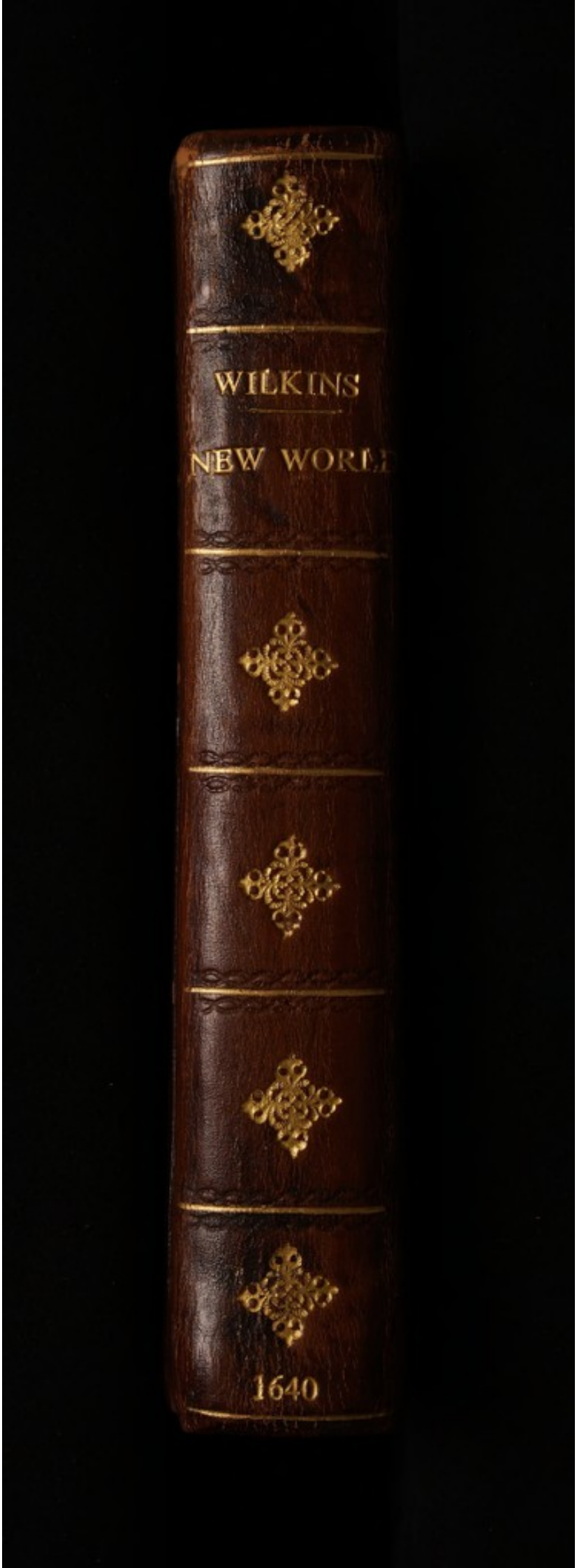
WILKINS
NEW WORL
1640


Saturnus.
Iupiter.
Mars.
Ceres et Proserpina.
Venus.
Mercurius.
Omnibus do calorem motum.
Lucem.
Sua fovent
Mutuo se illuminant
Universa ornant.
Quid si sic ?
Vtinam et alæ.
Hic ejus oculi.
A Discourse concerning A NEW world & Anoth. Planet In 2 Bookes.
Printed for Iohn Maynard, & are to be sold at the George, in Fleet Street neare St. Dunstans Church. 1640.
N. Copernicus.
W. Marshall, sculpsit.
Galilæus.
Kepler.

THE FIRST BOOK.

THE DISCOVERY OF A NEW WORLD.

OR,

A Discourse tending to prove, that 'tis probable there may be another habitable World in the Moone.

With a Discourse concerning the possibility of a Passage thither.

The third impression. Corrected and enlarged.

Quid tibi inquis ista prodcrunt? Si nihil aliud, hoc certè, sciam omnia hic angusta esse. Seneca praf. ad I lib. Nat. Quest.

LONDON:
Printed by IOHN NORTON for IOHN MAYNARD, and are to be sold at the *George* in *Fleetstreet*, neere *St. Dunstons* Church. 1640.

To the Reader.

IF amongſt thy leiſure houres, thou canſt ſpare any for the peruſal of this diſcourſe, and doſt looke to find ſomewhat in it which may ſerve for thy information and benefit: let me then adviſe thee to come unto it with an equall minde, not ſwayed by prejudice, but indifferently reſolved to aſſent unto that truth which upon deliberation ſhall ſeeme moſt probable unto thy reaſon, and then I doubt not, but either thou wilt agree with mee in this aſſertion, or at leaſt not think it to be as farre from truth, as it is from common opinion.

Two

Two cautions there are which I would willingly admonish thee of in the beginning.

1. That thou shouldst not here looke to find any exact, accurate Treatise, since this discourse was but the fruit of some lighter studies, and those too hudled up in a short time, being first thought of and finished in the space of some few weekes, and therefore you cannot in reason expect, that it should be so polished, as perhaps, the subject would require, or the leisure of the Author might have done it.

2. To remember that I promise only probable arguments for the proofe of this opinion, and therefore you must not looke that every consequence should be of an undeniable dependance, or that the truth of each argument should bee measured by

by its neceſsity. I grant that ſome Aſtronomical appearances may poſsibly be ſolved otherwiſe than here they are. But the thing I aime at is this, that probably they may ſo be ſolved, as I have here ſet them downe: Which, if it be granted (as I think it muſt) then I doubt not, but the indifferent Reader will find ſome ſatisfaction in the maine thing that is to be proved.

Many ancient Philoſophers of the better note, have formerly defended this aſſertion, which I have here laid downe; and it were to be wiſhed, that ſome of us would more apply our endeavours unto the examination of theſe old opinions, which though they have for a long time lien neglected by others, yet in them may you find many truths well worthy your paines and obſervation. Tis a falſe conceit for us to thinke, that amongſt the ancient varietie and

search of opinions, the best hath still prevailed. Time (saith the learned Verulam) *seemes to be of the nature of a river or streame, which carrieth down to us that which is light or blown up, but sinketh that which is weighty and solid.*

It is my desire that by the occasion of this discourse, I may raise up some more active spirit to a search after other hidden and unknowne truths. Since it must needes be a great impediment unto the growth of sciences, for men still so to plod on upon beaten principles, as to be afraid of entertaining any thing that may seeme to contradict them. An unwillingnesse to take such things into examination, is one of those errours of learning in these times observed by the judicious Verulam. *Questionlesse, there are many secret truths, which*

the

the ancients have passed over, that are yet left to make some of our age famous for their discovery.

If by this occasion I may provoke any Reader to an attempt of this nature, I shall think my selfe happy, and this worke successefull.

Farewell.

To the Reader.

The ancients have passed over, that are yet left to make some of our ages famous for their discovery.

If by this occasion I may provoke any Reader to an attempt of this nature, I shall think my life happy, and this work successfull.

Farewell.

The first Book.

That the Moone may be a World.

The first Proposition, by way of Preface.

That the strangenesse of this opinion is no sufficient reason why it should be rejected, because other certaine truths have beene formerly esteemed ridiculous, and great absurdities entertained by common consent.

THere is an earnestnesse and hungering after noveltie, which doth still adhere unto all our natures, and it is part of that primitive image, that wide extent and infinite

capacity at first created in the heart of man. For this, since its depravation in *Adam*, perceiving it selfe altogether emptied of any good, doth now catch after every new thing, conceiving that possibly it may finde satisfaction among some of its fellow creatures. But our enemie the devill (who strives still to pervert our gifts, and beat us with our owne weapons) hath so contriv'd it, that any truth doth now seeme distastefull for that very reason, for which errour is entertain'd.. Novelty. For let but some upstart heresie be set abroach, and presently there are some out of a curious humour; others, as if they watched an occasion of singularity, will take it up for canonicall, and make it part of their creede and profession; whereas solitary truth cannot any-where find so ready entertainment; but the same Novelty which is esteemed the commendation of errour, and makes that acceptable, is counted the fault of truth, and causes that to be rejected..

How did the incredulous World gaze

gaze at *Columbus*, when hee promiſed to diſcover another part of the earth, and he could not for a long time, by his confidence, or arguments, induce any of the Chriſtian Princes, either to aſſent unto his opinion, or goe to the charges of an experiment? Now if he, who had ſuch good grounds for his aſſertion, could finde no better entertainement among the wiſer ſort, and upper end of the World; 'tis not likely then that this opinion which I now deliver, ſhall receive any thing from the men of theſe dayes, eſpecially our vulgar wits, but misbeliefe or deriſion.

It hath alwayes beene the unhappineſſe of new truths in Philoſophy, to be derided by thoſe that are ignorant of the cauſes of things, and rejected by others, whoſe perverſeneſſe ties them to the contrary opinion, men whoſe envious pride will not allow any new thing for truth, which they themſelves were not the firſt inventors of. So that I may juſtly expect to be accuſed of a pragmaticall ignorance, & bold oſtentation; eſpecially ſince for this opinion *Xenophanes*, a man whoſe authority was

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able to adde some credit to his assertion, could not escape the like censure from others. For *Natales Comes* speaking of that Philosopher, and this his opinion, saith thus, *Nonnulli ne nihil scisse videantur, aliqua nova monstra in Philosophiam introducunt, ut alicujus rei inventores fuisse appareant.* Some there "are who lest they might seeme to "know nothing, will bring up mon- "strous absurdities in Philosophy, "that so afterward they may be fa- "med for the invention of somewhat.

Mytholog. lib. 3 c. 17.

The same Author doth also in another place accuse *Anaxagoras* of folly for the same opinion. *Est enim non ignobilis gradus stultitiæ, vel si nescias quid dicas, tamen velle de rebus propositis hanc vel illam "partem stabilire.* 'Tis none of the "worst kindes of folly, boldly to af- "firme one side or other, when a man "knowes not what to say.

Lib. 7. c. 1.

If these men were thus censur'd, I may justly then expect to be derided by most, and to be beleeved by few or none; especially since this opinion seemes to carry in it so much strangeness, and contradiction to the generall

all consent of others. But how ever, I am resolved that this shall not be any discouragement, since I know that it is not common opinion that can either adde or detract from the truth. For,

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1. Other truths have beene formerly esteemed altogether as ridiculous as this can be.
2. Grosse absurdities have beene entertained by generall opinion.

I shall give an instance of each, that so I may the better prepare the Reader to consider things without a prejudice, when hee shall see that the common opposition against this which I affirme, cannot any way derogate from its truth.

1. Other truths have beene formerly accounted as ridiculous as this. I shall specifie that of the Antipodes, which have beene denied, and laught at by many wise men and great Schollers, such as were *Herodotus*, *Chrysostome*, *Austine*, *Lactantius*, the venerable *Bede*, *Lucretius* the Poet, *Procopius*, and the voluminous *Abulensis*, together with all those Fathers or other Authors

Vid. Ioseph. Acosta. de nat. novi orbis lib. 1. cap. 1.

Lib. I. Cap. I.

thors who denied the roundneſſe of the heavens. *Herodotus* counted it ſo horrible an abſurdity, that hee could not forbeare laughing to think of it.

Γελῶ δὲ ὁρῶν γῆς περιόδους γεγράφαντας, πολλοὺς ἤδη καὶ οὐδὲν νόον ἔχοντας ἐξηγησάμενον οἱ Ὠκεανόν τε ῥέοντα γράφουσι, πέριξ τὴν γῆν ἐοῦσαν κυκλοτερέα ὡς ἀπὸ τόρνου.

"I cannot chooſe but laugh, (ſaith he) "to ſee ſo many men venture to de- "ſcribe the earths compaſſe, relating "thoſe things that are without all "ſenſe, as that the Sea flowes about "the World, and that the earth it ſelfe "is round as an Orbe. But this great ignorance is not ſo much to be admired in him, as in thoſe learneder men of later times, when all Sciences began to flouriſh in the World. Such were S^t. *Chryſoſtome*, who in his 14. *Homily* upon the Epiſtle to the *Hebrewes*, dos make a chalenge to any man that ſhall dare to defend that the heavens are round, and not rather as a tent. Thus likewiſe S^t. *Auſtine*, who cenſures that relation of the Antipodes to be an incredible fable; and with him agrees the eloquent *Lactantius*, *Quid illi qui eſſe contrarios veſtigiis noſtris Antipodes*

De civit. Dei. lib. 16. cap. 9.

Inſtitut. l. 3. c. 24.

tipodes putant? num aliquid loquuntur? aut est quispiam tam ineptus, qui credat esse homines, quorum vestigia sunt superiora quàm capita? aut ibi quæ apud nos jacent inversa pendere? fruges & arbores deorsum versus crescere, pluvias & nives, & grandinem sursum versus cadere in terram? & miratur aliquis hortos pensiles inter septem mira narrari, quum Philosophi, & agros & maria, & urbes & montes pensiles faciunt, &c. What (saith he) "are they that think there are Antipodes, such as walk with their feet "against ours? doe they speake any "likelihood? or is there any one so "fooliſh as to beleeve that there are "men whose heeles are higher than "their heads? that things which with "us doe lie on the ground, doe hang "there? that the Plants and Trees "grow downwards, that the haile, and "raine, and snow fall upwards to the "earth? and doe we admire the hanging Orchards amongst the seven "wonders, whereas here the Philo"sophers have made the Field and "Seas, the Cities & mountains hanging? What shall we think (saith hee

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in *Plutarch*) that men doe cling to that place like wormes, or hang by their clawes as Cats? or if we ſuppoſe a man a little beyond the Center, to be digging with a ſpade, is it likely (as it muſt be according to this opinion) that the earth which hee looſened, ſhould of it ſelfe aſcend upwards? or elſe ſuppoſe two men with their middles about the Center, the feet of the one being placed where the head of the other is, and ſo two other men croſſe them, yet all theſe men thus ſituated according to this opinion ſhould ſtand upright, and many other ſuch groſſe conſequences would follow (ſaith he) which a falſe imagination is not able to fancie as poſsible. Vpon which conſiderations, *Bede* alſo denies the being of any Antipodes, *Neque enim Antipodarum ullatenus eſt Fabulis ac-*
"*commodandus aſſenſus*, Nor ſhould we
"any longer aſſent to the Fable of An-
"tipodes. So alſo *Lucretius* the Poet ſpeaking of the ſame ſubject, ſayes,

De ratione temporum, Cap. 32.

Sed vanus ſtolidis hæc omnia finxerit error.

De nat. rerum, Lib. 1.

That ſome idle fancie faigned theſe for

for fooles to beleeve. Of this opinion was *Procopius Gazæus*, but hee was perſwaded to it by another kinde of reaſon; for hee thought that all the earth under us was ſunk in the water, according to the ſaying of the *Pſalmiſt*, He hath founded the earth upon the Seas; and therefore hee accounted it not inhabited by any. Nay, *Toſtatus* a man of later yeares and generall learning, doth alſo confidently deny that there are any ſuch Antipodes, though the reaſon which hee urges for it, be not ſo abſurd as the former; For the Apoſtles, ſaith hee, travelled through the whole habitable world, but they never paſſed the Equinoctiall; and if you anſwer that they are ſaid to goe through all the earth, becauſe they went through all the knowne world; he replies, that this is not ſufficient, ſince Chriſt would have all men to be ſaved, and come to the knowledge of his truth, and therefore 'tis requiſite that they ſhould have travelled thither alſo, if there had beene any Inhabitants; eſpecially ſince hee did expreſly command them to goe and

LIB. I. *Cap.* I. *Coment in* I. *Cap. Gen.*

Pſal. 24. 2.

Comment. in I. *Geneſ.*

1 Tim. 2. 4

Lib. I. Cap. 1. Mat 28.19

and teach *all nations*, and preach the Gospell through the *whole world*, and therefore hee thinks that as there are no men, so neither are there seas, or rivers, or any other conveniencie for habitation. 'Tis commonly related of one *Virgilius*, that hee was excommunicated and condemned for a Heretique by *Zachary* Bishop of *Rome*, because hee was not of the same opinion. But *Baronius* sayes, it was because hee thought there was another habitable world within ours. How ever, you may well enough discerne in these examples how confident many of these great Schollars were in so grosse an errour, how unlikely, what an incredible thing it seemed to them, that there should be any Antipodes; and yet now this truth is as certaine and plain, as sense or demonstration can make it. This then which I now deliver, is not to be rejected, though it may seeme to contradict the common opinion.

Aventinus Annal. Boiorum. lib. 3.

Annal. Eccles. A.D. 748.

2. Grosse absurdities have beene entertained by generall consent. I might instance in many remarkable examples,

examples, but I will onely ſpeake of the ſuppoſed labour of the Moone in her eclipſes, becauſe this is neereſt to the chiefe matter in hand, and was received as a common opinion amongſt many of the Ancients, In ſo much that from hence they ſtiled eclipſes by the name of πάθη *paſſions*, or in the phraſe of the Poets,

Solis lunæq; labores.

And therefore *Plutarch* ſpeaking of a Lunary eclipſe, relates, that at ſuch times 'twas a cuſtome amongſt the *Romans* (the moſt civill and learned people in the world) to ſound braſſe Inſtruments, and hold great torches toward the heaven. Τῶν δὲ Ρωμαίων (ὥσπερ ὄξιν ἐνομισθήσον) χαλκᾶ τε πατάγοις ἀναπαλαμένων τὸ φῶς αὐτῆς ἐν πυρσοῖς πολλοῖς καὶ δαλοῖς ἀνεχόντων εἰς τὸν ἀέρα. For by this meanes they ſuppoſed the Moone was much eaſed in her labours; and therefore *Ovid* calls ſuch loud Inſtruments the auxiliaries or helps of the Moone,

In vita Paul. Æmil.

Cum fruſtra reſonant æra auxiliaria Lunæ.

Metam. Lib. 4.

And therefore the Satyriſt too, deſcribing a loud Scold, ſayes, She was able to

Lib. I. Cap. I. Juven. Sat. 6.

to make noiſe enough to deliver the labouring Moone.

Vna laboranti poterit ſuccurrere Lunæ.

Now the reaſon of all this their ceremonie, was, becauſe they feared the world would fall aſleepe, when one of its eyes began to wink, and therefore they would doe what they could by loud ſounds to rouſe it from its drowſineſſe, and keepe it awake: by bright torches, to beſtow that light upon it which it began to loſe.

Some of them thought hereby to keepe the Moone in her orbe, whereas otherwiſe ſhee would have fallen downe upon the earth, and the world would have loſt one of its lights; for the credulous people beleeved, that Inchanters and Witches could bring the Moone downe, which made *Virgil* ſay,

Cantus & è cœlo poſſunt deducere Lunam.

And thoſe Wizards knowing the times of her eclipſes, would then threaten to ſhew their skill, by pulling her out of her orbe. So that when the ſilly multitude ſaw that ſhee began to looke

looke red, they presently feared they should lose the benefit of her light, and therefore made a great noise that shee might not heare the sound of those Charmes, which would otherwise bring her downe; and this is rendred for a reason of this custome by *Pliny* and *Propertius*:

Nat. Hist. Lib. 2. c. 12.

Canus & è curru lunam deducere tentant,
Et facerent, si non æra repulsa sonent.

Plutarch gives another reason of it, and he sayes, 'tis becaus they would hasten the Moone out of the dark shade wherein she was involv'd, that so shee might bring away the soules of those Saints that inhabit within her, which cry out by reason they are then deprived of their wonted happinesse, and cannot heare the Musick of the Spheares, but are forced to behold the torments, and wailing of those damned soules which are represented to them as they are tortured in the region of the ayre. But whether this or what ever else was the meaning of this superstition, yet certainly 'twas a very ridiculous custome, and bewrayed a great ignorance of those ancient times,

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times; especially since it was not only received by the vulgar, such as were men of lesse note and learning, but beleeved also by the more famous and wiser sort, such as were those great Poets, *Stesichorus* and *Pindar*. And not onely amongst the more sottish Heathens, who might account that Planet to be one of their gods; but the Primitive Christians also were in this kind guilty, which made Saint *Ambrose* so tartly to rebuke those of his time, when he said, *Tum turbatur carminibus Globus Lunæ, quando calicibus "tur bantur & oculi.* When your heads "are troubled with cups, then you "think the Moone to be troubled with "charmes.

Turinens. Episc.

And for this reason also did *Maximus* a Bishop, write a Homily against it, wherein hee shewed the absurdity of that foolish superstition. I remember that *Ludovicus Vives* relates a more ridiculous story of a people that imprisoned an Asse for drinking up the Moone, whose image appearing in the water, was covered with a cloud as the Asse was drinking, for which the

poore

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poore beaſt was afterward brought to the barre to receive a ſentence according to his deſerts, where the grave Senate being ſet to examine the matter, one of the Counſell (perhaps wiſer than the reſt) riſes up, and out of his deepe judgement thinks it not fit that their Towne ſhould loſe its Moone, but that rather the Aſſe ſhould be cut up and that taken out of him; which ſentence being approved by the reſt of thoſe Politicians, as the ſubtilleſt way for the concluſion of the matter, was accordingly performed. But whether this tale were true or no, I will not queſtion; however, there is abſurdity enough in that former cuſtome of the Ancients, that may confirme the truth to be proved, and plainely declare the inſufficiencie of common opinion to adde true worth or eſtimation unto any thing. So that from that which I have ſaid may be gathered thus much.

1. That a new truth may ſeeme abſurd and impoſsible not onely to the vulgar, but to thoſe alſo who are otherwiſe wiſe men and excellent

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lent Schollars; and hence it will follow that every new thing which seemes to oppose common principles is not presently to be rejected, but rather to be pry'd into with a diligent enquiry, since there are many things which are yet hid from us, and reserv'd for future discoverie.

2. That it is not the commonn-sse of an opinion that can priviledge it for a truth; the wrong way is sometime a well beaten path, whereas the right way (especially to hidden truths) may be lesse trodden and more obscure.

True indeed, the strangenesse of this opinion will detract much from its credit; but yet wee should know that nothing is in it selfe strange, since every naturall effect has an equall dependance upon its cause, and with the like necessity doth follow from it; so that 'tis our ignorance which makes things appeare so; and hence it comes to passe that many more evident truths seeme incredible to such who know not the causes of things: your may as soone per-

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perſwade ſome Country Peaſants that the Moone is made of greene Cheeſe (as wee ſay) as that 'tis bigger than his Cart-wheele, ſince both ſeeme equally to contradict his ſight, and he has not reaſon enough to leade him farther than his ſenſes. Nay ſuppoſe (ſaith *Plutarch*) a Philoſopher ſhould be educated in ſuch a ſecret place, where hee might not ſee either Sea or River, and afterwards ſhould be brought out where one might ſhew him the great Ocean, telling him the quality of that water, that it is brackiſh ſalt and not potable, and yet there were many vaſt creatures of all forms living in it, which make uſe of the water as wee doe of the ayre, queſtionleſſe hee would laugh at all this as being monſtrous lies, and fables, without any colour of truth. Juſt ſo will this truth which I now deliver, appeare unto others; becauſe we never dreamt of any ſuch matter as a World in the Moone; becauſe the ſtate of that place hath as yet beene vailed from our knowledge, therefore we can ſcarcely aſſent to any ſuch matter. Things are

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very hardly received which are altogether ſtrange to our thoughts and our ſenſes. The ſoule may with leſſe difficulty be brought to beleeve any abſurdity, when as it has formerly beene acquainted with ſome colours and probabilities for it; but when a new, and an unheard of truth ſhall come before it, though it have good grounds and reaſons, yet the underſtanding is afraid of it as a ſtranger, and dares not admit it into his beleefe, without a great deale of reluctancie and triall. And beſides, things that are not manifeſted to the ſenſes, are not aſſented unto without ſome labour of minde, ſome travaile and diſcourſe of the underſtanding; and many lazie ſoules had rather quietly repoſe themſelves in an eaſie errour, than take paines to ſearch out the truth. The ſtrangeneſſe then of this opinion which I now deliver, will be a great hinderance to its beliefe, but this is not to be reſpected by reaſon it cannot be helped. I have ſtood the longer in the Preface, becauſe that prejudice which the meere title of the booke may beget, cannot

easily be removed without a great deale of preparation, and I could not tell otherwise how to rectifie the thoughts of the Reader for an impartiall survey of the following discourse.

I must needs confesse, though I had often thought with my selfe that it was possible there might be a world in the Moone, yet it seemed such an uncouth opinion that I never durst discover it, for feare of being counted singular, and ridiculous; but afterward having read *Plutarch*, *Galileus*, *Keplar*, with some others, and finding many of mine owne thoughts confirmed by such strong authority, I then concluded that it was not onely possible there might be, but probable that there was another habitable world in that Planet. In the prosecuting of this assertion, I shall first endeavour to cleare the way from such doubts as may hinder the speed or ease of farther progresse; and because the suppositions imply'd in this opinion, may seeme to contradict the principles of reason or faith, it will be requisite that

I first remove this scruple, shewing the conformity of them to both these, and proving those truths that may make way for the rest, which I shall labour to performe in the second, third, fourth, and fifth Chapters, and then proceede to confirme such Propositions, which doe more directly belong to the maine point in hand.

Proposition 2.

That a plurality of worlds doth not contradict any principle of reason or faith.

THis is reported of *Aristotle*, that when he saw the Books of *Moses*, hee commended them for such a majestick stile as might become a God, but withall hee censured that manner of writing to be very unfitting for a Philosopher; because there was nothing proved in them, but matters were delivered as if they would rather command than perswade beliefe. And 'tis observed that hee sets downe nothing him-

himſelfe, but hee confirmes it by the ſtrongeſt reaſons that may be found, there being ſcarce an argument of force for any ſubject in Philoſophy, which may not be picked out of his Writings; and therefore 'tis likely if there were in reaſon a neceſsity of one onely world, that hee would have found out ſome ſuch neceſſary proofe as might confirme it: Eſpecially ſince hee labours for it ſo much in two whole Chapters. But now all the arguments which hee himſelfe urges in this ſubject, are very weake, and farre enough from having in them any convincing power. Therefore 'tis likely that a plurality of worlds doth not contradict any principle of reaſon. However, I will ſet downe the two chiefe of his arguments from his owne works, and from them you may gueſſe the force of the other.

LIB. I. *Cap.* 2.

De Cœlo l. 1. *c.* 8. 9.

The firſt is this, ſince every heavie body doth naturally tend downwards, and every light body upwards, what a hudling and confuſion muſt there be if there were two places for gravity, and two places for lightneſſe: for it

Ibid.

Lib. 1. Cap. 2.

is probable that the earth of that other world would fall down to this Center, and so mutually the ayre and fire here ascend to those Regions in the other, which must needs much derogate from the providence of nature, and cause a great disorder in his works. But *ratio hæc est minimè firma*, (saith *Zanchy*) And if you well consider the nature of gravity, you will plainely see there is no ground to feare any such confusion; for heavinesse is nothing else but such a quality as causes a propension in its subject to tend downwards towards its owne Center; so that for some of that earth to come hither, would not be said a fall but an ascension, since it moved from its own place, and this would be impossible (saith *Ruvio*) because against nature, and therefore no more to be feared than the falling of the Heavens.

De operibus Dei. part. 2. lib. 2. cap. 2.

De Cœlo l. 1. c. 9. q. 1.

If you reply that then according to this, there must be more Centers of gravity than one; I answer. 'Tis very probable there are, nor can we well conceive, what any piece of the Moon would doe being severed from the rest

rest in the free and open ayre, but only returne unto it againe.

Another argument hee had from his Master *Plato*, that there is but one world, because there is but one first mover, God.

Infirma etiam est hæc ratio (saith *Zanchy*) and we may justly deny the consequence, since a plurality of worlds doth not take away the unity of the first mover. *Vt enim forma substantialis, sic primum efficiens apparentem solummodo multiplicitatem induit per signatam materiam* (saith a Country-man of ours.) As the substantiall forme, so the efficient cause hath only an appearing multiplicity from its particular matter. You may see this point more largely handled, and these Arguments more fully answered by *Plutarch* in his booke (why Oracles are silent) and *Iacob Carpentarius* in his comment on *Alcinous*.

But our opposites the Interpreters themselves, (who too often doe *jurare in verba magistri*) will grant that there is not any strength in these consequences, and certainly then such

LIB. I. Cap. 2.

Metaphys. l. 12 c. 8. Diog. Laert. lib. 3.

Nic. Hill. de Philosop. Epic. partic 379.

Lib. 1. *Cap.* 2.

weake arguments could not covince that wiſe Philoſopher, who in his other opinions was wont to be ſwayed by the ſtrength and power of reaſon: wherefore I ſhould rather think that he had ſome by-reſpect, which made him firſt aſſent to this opinion, and afterwards ſtrive to prove it. Perhaps it was becauſe hee feared to diſpleaſe his ſcholler *Alexander*, of whom 'tis related that he wept to heare a diſputation of another world, ſince he had not then attained the Monarchy of this; his reſtleſſe wide heart would have eſteemed this Globe of Earth not big enough for him, if there had beene another, which made the Satyriſt ſay of him,

Plutarch. de tranq. anim.

Juvenal. *Æſtuat infœlix anguſto limite mundi.*

"That he did vex himſelfe and ſweat "in his deſires, as being pend up in a "narrow roome, when hee was con-"fin'd but to one world. Before, he thought to ſeat himſelfe next the Gods; but now, when hee had done his beſt, hee muſt be content with ſome equall, or perhaps ſuperiour Kings.

It

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It may be, that *Aristotle* was moved to this opinion, that hee might thereby take from *Alexander* the occasion of this feare and discontent; or else, perhaps, *Aristotle* himselfe was as loth to hold the possibility of a world which he could not discover, as *Alexander* was to heare of one which he could not conquer. 'Tis likely that some such by-respect moved him to this opinion, since the arguments hee urges for it, are confest by his zealous followers and commentators, to be very sleight and frivolous, and they themselves grant, what I am now to prove, that there is not any evidence in the light of naturall reason, which can sufficiently manifest that there is but one world.

But however some may object, would it not be inconvenient and dangerous to admit of such opinions that doe destroy those principles of *Aristotle*, which all the world hath so long followed?

This question is much controverted by some of the *Romish* Divines; *Campanella* hath writ a Treatise in defence of

Apologia pro Galilæo.

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of it, in whom you may see many things worth the reading and notice.

To it I answer, that this position in Philosophy, doth not bring any inconvenience to the rest, since 'tis not *Aristotle*, but truth that should be the rule of our opinions, and if they be not both found together, we may say to him, as hee said to his Master *Plato*,

Ethic. l. 1. c. 6. ἀμφοῖν γὰρ ὄντων φίλων, ὅσιον προτιμᾶν τὴν ἀλήθειαν.

"Though *Plato* were his friend, yet "hee would rather adhere to truth "than him.

I must needs grant, that wee are all much beholden to the industry of the ancient Philosophers, and more especially to *Aristotle*, for the greater part of our learning; but yet 'tis not ingratitude to speak against him, when hee opposeth truth; for then many of the Fathers would be very guilty, especially *Iustin*, who hath writ a Treatise purposely against him.

But suppose this opinion were false, yet 'tis not against the faith, and so it may serve for the better confirmation of that which is true; the sparks of errour, being forc'd out by opposition,

as

as the ſparks of fire by the ſtriking of the flint and ſteele. But ſuppoſe too that it were hereticall, and againſt the faith, yet may it be admitted with the ſame priviledge as *Ariſtotle*, from whom many more dangerous opinions have proceeded : as that the world is eternall, that God cannot have while to looke after theſe inferiour things, that after death there is no reward or puniſhment, and ſuch like blaſphemies, which ſtrike directly at the fundamentals of our Religion. LIB. 1. *Cap.* 2.

So that it is juſtly to be wondred why ſome ſhould be ſo ſuperſtitious in theſe dayes, as to ſtick cloſer unto him, than unto Scripture, as if his Philoſophy were the onely foundation of all divine truths.

Vpon theſe grounds both St. *Vincentius* and *Seraſinus de firmo* (as I have ſeene them quoted) think that *Ariſtotle* was the violl of Gods wrath, which was powred out upon the waters of wiſedom by the third Angel ; But for my part, I think the world is much beholden to him for all its ſciences. But yet 'twere a ſhame for theſe later ages Rev. 16. 4.

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ages to reſt our ſelves meerely upon the labours of our Fore-fathers, as if they had informed us of all things to be knowne; and when we are ſet upon their ſhoulders, not to ſee further than they themſelves did. 'Twere a ſuperſtitious, a lazie opinion to think *Ariſtotles* works the bounds and limits of all humane invention, beyond which there could be no poſsibility of reaching. Certainly there are yet many things left to diſcovery, and it cannot be any inconvenience for us, to maintaine a new truth, or rectifie an ancient errour.

But the poſition (ſay ſome) is directly againſt Scripture, for

1. *Moſes* tels us but of one world, and his Hiſtory of the Creation had been very imperfect, if God had made another.

2. Saint *Iohn* ſpeaking of Gods works, ſays hee made the world, in the ſingular number, and therefore there is but one: 'tis the argument of *Aquinas*, and he thinks that none will oppoſe it, but ſuch who with *Democritus* eſteeme ſome blinde chance, and

Part 1. Q. 47. Art. 3.

not

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not any wise providence to be the framer of all things.

3. The opinion of more worlds has in ancient times beene accounted a heresie, and *Baronius* affirmes that for this very reason *Virgilius* was cast out of his Bishoprick, and excommunicated from the Church. *Annal. Eccl. A.D. 748.*

4. A fourth argument there is urged by *Aquinas*; if there be more worlds than one, then they must either be of the same, or of a diverse nature; but they are not of the same kinde; for this were needlesse, and would argue an improvidence, since one would have no more perfection than the other; not of divers kindes, for then one of them could not be called the world or universe, since it did not containe universall perfection. I have cited this argument, because it is so much stood upon by *Julius Cæsar la Galla*, one that has purposely writ a Treatise against this opinion which I now deliver; but the Dilemma is so blunt that it cannot cut on either side, and the consequences so weake that I dare trust them without an answer; And *Ibid.* *De Phænom in orbe Lunæ.*

And (by the way) you may ſee this later Author in that place, where hee endeavours to prove a neceſsity of one world, doth leave the chiefe matter in hand, and take much needleſſe paines to diſpute againſt *Democritus*, who thought that the world was made by the caſuall concourſe of *atoms* in a great *vacuum*. It ſhould ſeeme that either his cauſe or his skill was weake, or elſe he would have ventured upon a ſtronger adverſary. Theſe arguments which I have ſet downe, are the chiefeſt which I have met with againſt this ſubject, and yet the beſt of theſe hath not force enough to endanger the truth that I have delivered.

Vnto the two firſt it may be anſwered, that the negative authority of Scripture is not prevalent in thoſe things which are not the fundamentals of Religion.

But you'le reply, though it doe not neceſſarily conclude, yet 'tis probable if there had beene another world, wee ſhould have had ſome notice of it in Scripture.

I anſwer, 'tis as probable that the Scrip-

Scripture ſhould have informed us of the planets, they being very remarkable parts of the Creation; and yet neither *Moſes*, nor *Job*, nor the *Pſalmes* (the places moſt frequent in Aſtronomicall obſervations) nor any other Scripture mention any of them but the Sunne and Moone. Becauſe the difference betwixt them and the other ſtarres, was knowne onely to thoſe who were learned men, and had skill in *Aſtronomie*. As for that expreſsion in *Job* כוכבי בקר *the ſtarres of the morning*, it is in the plurall number, and therefore cannot properly be applied to *Venus*. And for that in *Iſaiah* הילל, 'tis confeſſed to be a word of obſcure interpretation, and therefore is but by gueſſe tranſlated in that ſence. It being a true and common rule, that *Hebræi rei ſideralis minime curioſi cœleſtium nominum penuriâ laborant*. The Jewes being but little skilled in Aſtronomie, their language dos want proper expreſsions for the heavenly bodies, and therefore they are faine ſometimes to attribute the ſame name unto divers conſtellations.

Now

LIB. I. *Cap.* 2.

Iob 38 7.

Iſai. 14. 12.

Fromond. Veſta. t. 3. *cap.* 2. So 2 Reg. 23. 5. מזלות. Which is interpreted both for the planets & for the 12 ſignes.

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Now if the Holy Ghoſt had intended to reveale unto us any naturall ſecrets, certainly hee would never have omitted the mention of the planets, *Quorum motu nihil eſt quod de Conditoris ſapientiâ teſtatur evidentius apud eos qui capiunt.* Which doe ſo evidently ſet forth the wiſedome of the Creator. And therefore you muſt know that 'tis beſides the ſcope of the old Teſtament or the new, to diſcover any thing unto us concerning the ſecrets of Philoſophy; 'tis not his intent in the new Teſtament, ſince wee cannot conceive how it might any way belong either to the Hiſtorical, exegeticall, or propheticall parts of it: nor is it his intent in the old Teſtament, as is well obſerved by our Countrey-man Maſter Wright. *Non Moſis aut Prophetarum inſtitutum fuiſſe videtur Mathematicas aliquas aut Phyſicas ſubtilitates promulgare, ſed ad vulgi captum & loquendi morem, quemadmodum nutrices infantulis ſolent, ſeſe accommodare.* "'Tis "not the endeavour of *Moſes* or the "Prophets to diſcover any Mathema- "ticall or Philoſophicall ſubtilties, "but

Keplar. introduct. in Mart.

In Epiſt. ad Gilbert.

"but rather to accommodate themselves to vulgar capacities, and ordinary speech, as nurses are wont to use their Infants. True indeed, *Moses* is there to handle the History of the Creation. But 'tis certaine (saith *Calvin*) that his purpose is to treat only of the visible forme of the world, and those parts of it which might be most easily understood by the ignorant and ruder sort of people, and therefore we are not thence to expect the discovery of any naturall secret. *Artes reconditas aliunde discat qui volet; hic spiritus Dei omnes simul sine exceptione docere voluit.* As for more hidden Arts, they must be looked for elsewhere; the Holy Ghost did here intend to instruct all without exception. And therefore 'tis observed, that *Moses* does not any where meddle with such matters as were very hard to be conceived; for being to informe the common people as well as others, he does it after a vulgar way, as it is commonly noted, declaring the originall chiefely of those things which are obvious to the sense, and being silent of other things which

Calvin in 1 *Gen.*

Lib. 1. Cap. 2. Com. in 1 Gen. 11.

then could not well be apprehended. And therefore *Pererius* proposing the question, why the Creation of plants & herbs is mentioned, but not of mettalls and mineralls?

Answers. *Quia istarum rerum generatio est vulgo occulta & ignota.* Because these things are not so commonly knowne as the other; and hee adds, *Moses non omnia, sed manifesta omnibus enarranda suscepit.* *Moses* did not intend to relate unto us the beginnings of all things, but those onely which were most evident unto all men. And therefore too, *Aquinas* observes that hee writes nothing of the ayre, because that being invisible, the people knew not whether there were any such body or no. And for this very reason, S. *Jerom* also thinks that there is nothing expresst concerning the Creation of Angels, because the rude and ignorant vulgar were not so capable of apprehending their natures. And yet notwithstanding, these are as remarkable parts of the Creation, and as fit to be knowne as another world. And therefore the Holy Ghost too

Part 1. Q. 68. Art. 3.

Epist. 139. ad Cypri. So Pererius in 2 Gen.

too uſes ſuch vulgar expreſsions, which ſet things forth rather as they appeare, than as they are, as when he calls the Moone *one of the greater lights*, whereas 'tis the leaſt that wee can ſee in the whole heavens. So afterwards ſpeaking of the great raine which drowned the world; hee ſayes, The windowes of heaven were opened, becauſe it ſeemed to come with that violence, as if it were poured out from windowes in the Firmament.

Gen. 1. 16

Gen. 11. Mala. 3. 10.

Sir *Walter Rawly c.* 7. *ſect.* 6.

And in reference to this, a drowth is deſcribed in ſundry other * places by *the heavens being ſhut up*. So that the phraſes which the Holy Ghoſt uſes concerning theſe things, are not to be underſtood in a literall ſenſe; but rather as vulgar expreſsions; and this rule is ſet down by Saint *Auſtin*, where ſpeaking concerning that in the Pſalm, *who ſtretched the earth upon the waters*, he notes that when the words of Scripture ſhall ſeeme to contradict common ſenſe or experience, there are they to be underſtood in a qualified ſence, and not according to the letter. And 'tis obſerved, that for want of

* Deut. 11. 17. 1 Reg. 3. 35 Luk. 4. 25.

l. 2. *in Gen. Pſal.* 136. 6

Lib. 1. Cap. 2. Hexamer. lib. 2. Item. Basil. Hom. 3. in Genes. Wisd. 2. 4. 17. 5. Ecclus. 43. 3. 4.

this rule, some of the Ancients have fastned strange absurdities upon the words of the Scripture. So Saint *Ambrose* esteemed it a heresie to think that the Sunne and Starres were not very hot, as being against the words of Scripture, *Psalm.* 19. 6. where the Psalmist sayes, that there is nothing that is hid from the heat of the Sunne. So others there are that would prove the heavens not to be round, out of that place, *Psal.* 104. 2. *Hee stretched out the heavens like a curtaine.* So *Procopius* also was of opinion, that the earth was founded upon the waters; nay, hee made it part of his faith, proving it out of *Psal.* 24. 2. *He hath founded the earth upon the seas, and established it upon the floods.* Com. in c. 1. Gen. These and such like absurdities have followed, when men looke for the grounds of Philosophy in the words of Scripture. So that, from what hath beene said, I may conclude that the silence of Scripture concerning any other world, is not sufficient argument to prove that there is none. Thus for the two first arguments.

Vnto the third, I may answer, that this

this very example is quoted by others, to shew the ignorance of those primitive times, who did sometimes condemne what they did not understand, and have often censur'd the lawfull and undoubted parts of Mathematicks for hereticall, because they themselves could not perceive a reason of it. And therefore their practise in this particular, is no sufficient testimonie against us.

But lastly, I answer to all the above named objections, that the terme (*World*) may be taken in a double sense, more generally for the whole Vniuerse, as it implies in it the elementarie and æthereall bodies, the starres and the earth. Secondly, more particularly for an inferiour World consisting of elements.

Now the maine drift of all these arguments, is to confute a plurality of Worlds in the first sense, and if there were any such, it might, perhaps, seem strange, that *Moses*, or S*t*. *John* should either not know, or not mention its creation. And *Virgilius* was condemned for this opinion, because hee held

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quòd sit alius mundus sub terrâ, aliusque Sol & Luna, (as *Baronius*) that within our globe of earth, there was another world, another Sunne and Moone, and so he might seeme to exclude this from the number of the other creatures.

But now there is no such danger in this opinion, which is here delivered, since this World is said to be in the Moone, whose creation is particularly expreſt.

So that in the first sense I yeeld, that there is but one world, which is all that the arguments doe prove; but understand it in the second sense, and so I affirme there may be more, nor doe any of the above named objections prove the contrary.

Neither can this opinion derogate from the divine Wisedom (as *Aquinas* thinks) but rather advance it, shewing a *compendium* of providence, that could make the same body a world, and a Moone; a world for habitation, and a Moone for the use of others, and the ornament of the whole frame of Nature. For as the members of the body

serve

ſerve not onely for the preſervation of themſelves, but for the uſe and conveniencie of the whole, as the hand protects the head as well as ſaves it ſelfe; ſo is it in the parts of the Vniverſe, where each one may ſerve as well for the conſervation of that which is within it, as the help of others without it.

LIB. I. Cap. 2. *Cuſanus de doct. ignor. l. 2 c. 12.*

Merſennus a late Jeſuite, propoſing the queſtion whether or no the opinion of more worlds than one, be hereticall and againſt the faith? He anſwers it negatively, becauſe it does not contradict any expreſſe place of Scripture, or determination of the Church. And though (ſaith he) it ſeemes to be a raſh opinion, as being againſt the conſent of the Fathers; yet if this controverſie be chiefly Philoſophicall, then their authorities are not of ſuch weight. Vnto this it may be added, that the conſent of the Fathers is prevalent onely in ſuch points as were firſt controverted amongſt them, and then generally decided one way, and not in ſuch other particulars as never fell under their examination and diſpute.

Comment. in Gen. Qu. 19. Art. 2.

I have now in ſome meaſure, ſhewed

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that a plurality of worlds does not contradict any principle of reason or place of Scripture, and so cleared the first part of that supposition which is implied in the opinion.

It may next be enquired, whether 'tis possible there may be a globe of elements in that which wee call the æthereall parts of the Vniverse; for if this (as it is according to the common opinion) be priviledged from any change or corruption, it will be in vain then to imagine any element there; and if we will have another world, we must then seeke out some other place for its situation. The third Proposition therefore shall be this.

Proposition 3.

That the heavens doe not consist of any such pure matter, which can priviledge them from the like change and corruption, as these inferiour bodies are liable unto.

IT hath beene often questioned amongst the ancient Fathers & Philosophers, what kinde of matter that should

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ſhould be of which the heavens are framed. Some think that they conſiſt of a fifth ſubſtance diſtinct from the foure elements, as *Ariſtotle* holds, and with him ſome of the late Schoolemen, whoſe ſubtill braines could not be content to attribute to thoſe vaſt glorious bodies but common materialls, and therefore they themſelves had rather take pains to preferre them to ſome extraordinary nature; whereas notwithſtanding, all the arguments they could invent, were not able to convince a neceſsity of any ſuch matter, as is confeſt by their owne * ſide. It were much to be deſired, that theſe men had not in other caſes, as well as this, multiplied things without neceſſity, and as if there had not beene enough to be knowne in the ſecrets of nature, have ſpunne out new ſubjects from their own braines, to finde more work for future ages; I ſhall not mention their arguments, ſince 'tis already confeſt, that they are none of them of any neceſſary conſequence; and beſides, you may ſee them ſet downe in any of the books *de Cœlo*.

De Cœlo li. 1. cap. 2.

* *Colleg. Conimb. de cœlo. l. 1. c. 2. q. 6. art. 3.*

But

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But it is the generall consent of the Fathers, and the opinion of *Lombard*, that the heavens consist of the same matter with these sublunary bodies. S^t. *Ambrose* is so confident of it, that he esteemes the contrary a heresie. True indeed, they differ much among themselves, some thinking them to be made of fire, others of water, and others of both; but herein they generally agree, that they are all framed of some element or other. Which *Dionysius Carthusianus* collects from that place in *Genesis*, where the heavens are mentioned in their creation, as divided onely in distance from the elementary bodies, & not as being made of any new matter. To this purpose others cite the derivation of the *Hebrew* word שמים, *quasi* שם *ibi &* מים *aquæ* or *quasi* אש *ignis &* מים *aquæ*. Because they are framed out of these elements. But concerning this, you may see sundry discourses more at large in *Ludovicus Molina*, *Eusebius Nirembergius*, with divers others. The venerable *Bede* thought the Planets to consist of all the foure elements; and 'tis likely that the

In Hexam. lib. 4.

Enarrat. in Genes. art. 10.

In opere 6. dierum. disput. 5.

the other parts are of an aereous substance, as will be shewed afterward; however, I cannot now stand to recite the arguments for either; I have onely urged these Authorities to countervaile *Aristotle*, and the Schoolemen, and the better to make way for a proofe of their corruptibility.

Lib. 1. *Cap.* 3. *In lib. de Mundi constit.*

The next thing then to be enquired after, is, whether they be of a corruptible nature, not whether they can be destroyed by God; for this, Scripture puts out of doubt.

2 Pet. 3. 12

Nor whether or no in a long time they would weare away and grow worse; for from any such feare they have beene lately priviledged. But whether they are capable of such changes and vicissitudes, as this inferiour world is lyable unto?

By Doctor *Hakewill. Ap. l. lib. 2.*

The two chief opinions concerning this, have both erred in some extremity, the one side going so farre from the other, that they have both gone beyond the right, whilst *Aristotle* hath opposed the truth, as well as the Stoicks.

Some of the Ancients have thought, that

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that the heavenly bodies have ſtood in need of nouriſhment from the elements, by wch they were continually fed, & ſo had divers alterationsby reaſon of their food; this is fathered on *Heraclitus*, followed by that great Naturaliſt *Pliny*, & in generall attributed to all the Stoicks. You may ſee *Seneca* expreſly to this purpoſe iu theſe words. *Ex illâ alimenta omnibus animalibus, omnibus ſatis, omnibus ſtellis dividuntur; hinc profertur quo ſuſtineantur tot Sidera tam exercitata, tam avida, per diem, noctémque, ut in opere, ita in paſtu.* Speaking of the earth, he ſayes, from thence it is that nouriſhment is divided to all the living creatures, the Plants and the Starres; hence were ſuſtained ſo many conſtellations, ſo laborious, ſo greedy, both day and night, as well in their feeding as working. Thus alſo *Lucan* ſings,

Plutarch. de plac. philoſ. l. 2. c. 17.

Nat Hiſt. l 2. c. 9.

Nat. quæſt. lib. 2. cap. 5

Necnon Oceano paſci Phœbúmque polumq; Credimus.

1. *Apoſtel.*

Vnto theſe *Ptolomie* alſo that learned Egyptian ſeemed to agree, when hee affirmes that the body of the Moone is moiſter, and cooler than any of the other Planets, by reaſon of the earthly vapours

vapours that are exhaled unto it. You see these Ancients thought the Heavens to be so farre from this imagined incorruptibility, that rather like the weakest bodies they stood in need of some continuall nourishment, without which they could not subsist.

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But *Aristotle* and his followers were so farre from this, that they thought those glorious bodies could not containe within them any such principles as might make them lyable to the least change or corruption; and their chiefe reason was, because we could not in so long a space discerne any alteration amongst them; But unto this I answer.

De cælo. l. 1. *c.* 3.

1. Supposing wee could not, yet would it not hence follow that there were none, as hee himselfe in effect doth confesse in another place; for speaking concerning our knowledge of the Heavens, he sayes, 'tis very imperfect and difficult, by reason of the vast distance of those bodies from us, and because the changes which may happen unto them, are not either bigge enough, or frequent enough to fall within the apprehension and observation

De cælo. l. 2 *cap.* 3.

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tion of our ſenſes; no wonder then if he himſelfe be deceived in his aſſertions concerning theſe particulars. But yet, in this hee implies, that if a man were nearer to theſe heavenly bodies, hee would be a fitter Judge to decide this controverſie than himſelfe. Now its our advantage, that by the help of *Galileus* his glaſſe, wee are advanced nearer unto them, and the heavens are made more preſent to us than they were before. However, as it is with us where there be many viciſsitudes and ſucceſsions of things, though *the earth abideth for ever*: So likewiſe may it be amongſt the planets, in which though there ſhould be divers alterations, yet they themſelves may ſtill continue of the ſame quantity and light.

2. Though wee could not by our ſenſes ſee ſuch alterations, yet our reaſon might perhaps ſufficiently convince us of them. Nor can wee well conceive how the Sunne ſhould reflect againſt the Moone, and yet not produce ſome alteration of heat. *Diogenes* the Philoſopher was hence perſwaded, that thoſe ſcorching heats had burnt

burnt the Moone into the forme of a Pumice-ſtone.

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3. I anſwer, that there have beene ſome alterations obſerved there; witneſſe thoſe comets which have beene ſeene above the Moone. As alſo thoſe ſpots or clouds that encompaſſe the body of the Sun, amongſt which, there is a frequent ſucceſsion by a corruption of the old, and a generation of new. So that though *Ariſtotles* conſequence were ſufficient, whē he proved that the heavens were not corruptible, becauſe there have not any changes beene diſcovered in them; yet this by the ſame reaſon muſt be as prevalent, that the Heavens are corruptible, becauſe there have beene ſo many alterations obſerved there; But of theſe, together with a farther confirmation of this propoſition, I ſhall have occaſion to ſpeak afterwards; In the meane ſpace, I will refeire the Reader to that work of *Sheiner*, a late Jeſuite which he titles his *Roſa Vrſina*, where hee may ſee this point concerning the corruptibility of the Heavens largely handled, and ſufficiently confirmed.

Lib. 4. par. 2 cap 24. 35.

There

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There are some other things, on which I might here take an occasion to enlarge my selfe; but because they are directly handled by many others, and doe not immediatly belong to the chiefe matter in hand, I shall therefore referre the Reader to their Authors, and omit any large proofe of them my selfe, as desiring all possible brevity.

1. The first is this: That there are no solid Orbes. If there be a habitable world in the Moone (which I now affirme) it must follow, that her Orbe is not solid as *Aristotle* supposed; and if not hers, why any of the other. I rather think that they are all of a fluid (perhaps aereous) substance. Saint *Ambrose*, and Saint *Basil* did endeavour to prove this out of that place in *Isay*, where they are compared to smoak, as they are both quoted by *Rhodiginus*. *Eusebius Nicembergius* doth likewise from that place confute the solidity and incorruptibility of the Heavens, and cites for the same interpretation the authority of *Eustachius* of *Antioch*; and Saint *Austin*, I am sure, in one place seemes to assent unto this opinion, though

Isa. 51. 6.

Ant. lect. l. 1. c. 4.

Hist. nat. l. 2. c. 11. 13.

In lib sup. Gen. ad lit.

though hee does often in his other works contradict it.

If you esteeme the *testimony* of the ancient Fathers, to be of any great force or consequence in a Philosophicall dispute, you may see them to this purpose in *Sixtus Senensis lib.* 5. *Biblioth. annot.* 14. The chiefe *reasons*, that are commonly urged for the confirmation of it, are briefly these three.

1 From the altitude of divers comets, which have beene observed to be above the planets, thorough whose Orbs (if they had beene solid) there would not have beene any passage. To these may be added those lesser planets lately discovered about *Jupiter* and *Saturne*, for which Astronomers have not yet framed any Orbs. 1

2 From that uncertainty of all Astronomicall observations, which will follow upon the supposition of such solid spheres. For then we should never discerne any Starre but by a multitude of refractions, and so consequently wee could not posibly finde their true situations either in respect of us, or in regard of one another: Since 2

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what ever the eye discernes by a refracted beame, it apprehends to be in some other place than wherein it is. But now this would be such an inconvenience, as would quite subvert the grounds & whole Art of Astronomy, and therefore is by no meanes to be admitted.

Vnto this it is commonly answered, that all those Orbs are equally diaphanous, though nor of a continued quantity. Wee reply, that supposing they were, yet this cannot hinder them from being the causes of refraction, which is produced as well by the diversity of superficies, as the different perspicuity of bodies. Two glasses put together, will cause a divers refraction from another single one that is but of equall thicknesse and perspicuity.

3 From the different height of the same planet at severall times. For if according to the usuall *Hypothesis*, there should be such distinct, solid Orbs, then it would be impossible that the planets should intrench upon one anothers Orbs, or that two of them at severall times should be above one another

ther, which notwithstanding hath bin proved to be so by later experience. *Tycho* hath observed, that *Venus* is somtimes nearer to us than the Sunne or *Mercury*, and somtimes farther off than both; which appearances *Regiomontanus* himselfe does acknowledge, and withall, does confesse that they cannot be reconciled to the common *Hypothesis*. LIB. 1. *Cap.* 3.

But for your better satisfaction herein, I shall referre you to the above named *Scheiner*, in his *Rosa Vrsina*, in whom you may see both authorities and reason, very largely and distinctly set downe for this opinion. For the better confirmation of which hee adjoynes also some authenticall Epistles of *Fredericus Cæsius Lynceus*, a Noble Prince, written to *Bellarmine*, containing divers reasons to the same purpose. You may also see the same truth set downe by *Johannes Pena*, in his Preface to *Euclids Opticks*, and *Christoph. Rothmannus*, both who thought the Firmament to be onely ayre: and though the noble *Tycho* doe dispute against them, yet he himselfe holds *Quod pro-*

Lib. 4 *p.* 11. 2. *cap* 7. 26 30.

De stell. 15. 72. *l.* 1. *c.* 9.

pius ad veritatis penetralia accedit hæc opinio, quàm Aristotelica vulgariter approbata, quæ cœlum pluribus realibus atque impervijs orbibus citra rem replevit. "That "this opinion comes neerer to the "truth, than that common one of *Aristotle* which hath to no purpose filled "the Heavens with such reall and im-"pervious Orbs.

2. There is no element of fire, which must be held with this opinion here delivered; for if wee suppose a world in the Moone, then it will follow, that the sphere of fire, either is not there where 'tis usually placed in the concavity of his Orbe, or else that there is no such thing at all, which is most probable, since there are not any such solid Orbs, that by their swift motion might heat and enkindle the adjoyning ayre, which is imagined to be the reason of that element. The arguments that are commonly urged to this purpose, are these.

1 That which was before alledged concerning the refractions which will be caused by a different medium. For if the matter of the heavens be of one thick-

thickneſſe, and the element of fire another, and the upper Region of ayre diſtinct from both theſe, and the lower Region ſeverall from all the reſt, there will then be ſuch a multiplicity of refractions, as muſt neceſſarily deſtroy the certainty of all Aſtronomicall obſervations. All which inconveniences might be avoyded by ſuppoſing (as wee doe) that there is onely one Orbe of vaporous ayre which encompaſſes our earth, all the reſt being *Æthereall* and of the ſame perſpicuity.

2 The ſituation of this element does no way agree with *Ariſtotles* own principles, or that common providence of nature, which wee may diſcerne in ordinary matters. For if the heavens be without all elementary qualities, as is uſually ſuppoſed, then it would be a very incongruous thing for the element of fire to be placed immediatly next unto it: Since the heat of this is the moſt powerfull and vigorous quality that is amongſt all the reſt; And Nature in her other works, does not joyne extreames, but by ſomething of

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a middle disposition. So in the very frame of our bodies, the bones which are of a hard substance, and the flesh of a soft, are not joyned together but by the intercession of membranes and griffels, such as being of a middle nature may fitly come betwixt.

3 3 'Tis not conceiveable for what use or benefit there should be any such element in that place, and certaine it is that Nature does not doe any thing in vaine.

4 4 Betwixt two extreams there can be but one Medium, and therefore betweene those two opposite elements of earth and water, it may seeme more convenient to place onely the ayre, which shall partake of middle qualities different from both.

5 5 Fire does not seeme so properly and directly to be opposed to any thing as Ice, and if the one be not an element, why should the other?

If you object that the fire which we commonly use, does alwayes tend upwards. I answer, This cannot prove that there is a naturall place for such an element, since our adversaries themselves

ſelves doe grant that *culinary* and *elementary* fire are of different kinds. The one does burne, ſhine, and corrupt its ſubject; the other diſagrees from it in all theſe reſpects. And therefore from the aſcent of the one, wee cannot properly inferre the being or ſituation of the other.

But for your farther ſatisfaction herein, you may peruſe *Cardan*, *Johannes Pena* that learned Frenchman, the noble *Tycho*, with divers others who have purpoſely handled this propoſition.

3. I might adde a third, *viz.* that there is no Muſick of the ſpheares; for if they be not ſolid, how can their motion cauſe any ſuch ſound as is conceived? I doe the rather meddle with this, becauſe *Plutarch* ſpeakes as if a man might very conveniently heare that harmony, if he were an inhabitant in the Moone. But I gueſſe that hee ſaid this out of incogitancy, and did not well conſider thoſe neceſſary conſequences which depended upon his opinion. However, the world would have no great loſſe in being deprived

3

Lib. 1. Cap. 3. De somniis.

of this Musick, unlesse at somtimes we had the priviledge to heare it: Then indeed *Philo* the Jew thinks it would save us the charges of dyet, and wee might live at an easie rate by feeding at the eare only, and receiving no other nourishment; and for this very reason (sayes he) was *Moses* enabled to tarry forty dayes and forty nights in the Mount without eating any thing, because hee there heard the melody of the Heavens. --*Risum teneatis.* I know this Musick hath had great Patrons, both sacred & prophane Authors, such as *Ambrose*, *Bede*, *Boetius*, *Anselme*, *Plato*, *Cicero*, and others; but becaus it is not now, I think, affirmed by any, I shall not therefore bestow either paines or time in arguing against it.

It may suffice that I have onely named these three last, and for the two more necessary, have referred the Reader to others for satisfaction. I shall in the next place proceed to the nature of the Moones body, to know whether that be capable of any such conditions, as may make it possible to be inhabited, and what those qualities are

are wherein it more neerely agrees with our earth.

Proposition 4.

That the Moone is a solid, compacted, opacous body.

I Shall not need to stand long in the proofe of this Proposition, since it is a truth already agreed on by the generall consent of the most and the best Philosophers.

1 It is solid, in opposition to fluid, as is the ayre; for how otherwise could it beat back the light which it receives from the Sunne? 1

But here it may be questioned, whether or no the Moone bestow her light upon us by the reflection of the Sunbeames from the superficies of her body, or else by her owne illumination? Some there are who affirme this latter part. So [a] *Averroes*, [b] *Cælius Rhodiginus*, [c] *Julius Cæsar*, *&c.* And their reason is, because this light is discerned in many places, whereas those bodies which give

a *De cœlo l. 2. com. 49*
b *Ant. lection. li. 20. c. 4.*
c *De phænom. Lunæ. c. 11.*

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give light by reflexion, can there only be perceived where the angle of reflexion is equall to the angle of incidence, and this is only in one place; as in a looking-glasse, those beams which are reflected from it, cannot be perceived in every place where you may see the glasse, but onely there where your eye is placed on the same line whereon the beames are reflected.

But to this I answer, That the argument will not hold of such bodies whose superficies is full of unequall parts and gibbosities as the Moone is. Wherfore it is as wel the more probable as the more common opinion, that her light proceeds frō both these causes, from reflexion & illumination; nor doth it herein differ from our earth, since that also hath some light by illumination: for how otherwise would the parts about us in a Sunne-shine day appeare so bright, when as the rayes of reflexion cannot enter into our eye?

For the better illustration of this, we may consider the several wayes whereby divers bodies are enlightned. Either as water by admitting the beams into

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into its ſubſtance; or as ayre and thin clouds, by tranſmitting the rayes quite thorow their bodies; or as thoſe things that are of an opacous nature and ſmooth ſuperficies, which reflect the light only in one place; or elſe as thoſe things which are of an opacous nature and rugged ſuperficies, which by a kind of circumfluous reflexion, are at the ſame time diſcernable in many places, as our Earth and the Moone.

2. It is compact, and not a ſpungie and porous ſubſtance. But this is denied by [a] *Diogenes*, [b] *Vitellio*, and [c] *Reinoldus*, and ſome others, who held the Moone to be of the ſame kind of nature as a Pumice ſtone; & this, ſay they, is the reaſon why in the Suns eclipſes there appeares within her a duskiſh ruddy colour, becauſe the Sun beames being refracted in paſsing through the pores of her body, muſt neceſſarily be repreſented under ſuch a colour.

2

a *Plut. de pla. phil. l. 2. c. 13.*
b *Opt. lib. 4.*
c *Com. Purbac. Theo. p. 164.*

But I reply, if this be the cauſe of her redneſſe, then why doth ſhee not appeare under the ſame forme when ſhee is about a Sextile Aſpect, and the darkned part of her body is diſcernable?

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able? for then also doe the same rayes passe through her; and therefore in all likelyhood should produce the same effect; and notwithstanding those beames are then diverted from us, that they cannot enter into our eyes by a straight line, yet must the colour still remaine visible in her body. And besides, according to this opinion, the spots would not alwayes be the same, but divers as the various distance of the Sunne requires. Againe, if the Sun beames did passe through her, why then hath she not a taile (saith *Scaliger*) as the Comets? why doth she appeare in such an exact round? and not rather attended with a long flame, since it is meerely this penetration of the Sunne beames, that is usually attributed to be the cause of beards in blazing starres.

Scaliger Exercit. 80 sect. 13.

3. It is opacous, not transparent or diaphanous like Crystall or glasse, as *Empedocles* thought, who held the Moon to be a globe of pure congealed ayre, like haile inclosed in a spheare of fire; for then,

3

Plut. de facie Lunæ.

1. Why does shee not alwayes appeare in the full? since the light is

dispersed

Lib. 1. *Cap.* 4.

dispersed through all her body?

2. How can the interposition of her body so darken the Sunne, or cause such great eclipses as have turned day into night, that have discovered the starres, and frighted the birds with such a suddaine darkenesse, that they fell downe upon the earth, as it is related in divers Histories. And therefore *Herodotus* telling of an eclipse which fell in *Xerxes* time, describes it thus: ὁ ἥλιος ἐκλιπὼν τὴν ἐν τῷ οὐρανῷ ἕδρην ἠφάνισε ἑωυτόν. The Sun leaving his wonted seat in the heavens, vanished away: all which argues such a great darkenesse, as could not have beene, if her body had beene perspicuous. Yet some there are who interpret all these relations to be hyberbolicall expressions; and the noble *Tycho* thinks it naturally impossible that any eclipse should cause such darkenesse, because the body of the Moone can never totally cover the Sunne. However, in this he is singular, all other Astronomers (if I may beleeve *Keplar*) being on the contrarie opinion, by reason the Diameter of the Moone does for the most part appeare

Thucid. Livij. plut. de facie Lunæ.

Herodot. l. 7 c 37.

Lib. 1. Cap. 4. *De phænom. Lunæ. c. 11.*

peare bigger to us than the Diameter of the Sunne.

But here *Julius Cæsar* once more, puts in to hinder our passage. The Moone (saith he) is not altogether opacous, because 'tis still of the same nature with the heavens which are incapable of totall opacity: and his reason is, because perspicuity is an inseparable accident of those purer bodies; and this hee thinks must necessarily be granted; for he stops there, and proves no further; but to this I shall deferre an answer, till hee hath made up his argument.

Wee may frequently see, that her body does so eclipse the Sunne, as our Earth doth the Moone. And besides, the mountains that are observed there, doe cast a dark shadow behind them, as shall be shewed afterwards. Since then the like interposition of them both, doth produce the like effect, they must necessarily be of the like natures, that is, alike opacous, which is the thing to be shewed; and this was the reason (as the Interpreters guesse) why *Aristotle* affirmed the Moone to be of the

Prop. 9.

In lib. de animalib.

the Earths nature, becauſe of their agreement in opacity, whereas all the other elements ſave that, are in ſome meaſure perſpicuous.

But, the greateſt difference which may ſeeme to make our Earth altogether unlike the Moone, is, becauſe the one is a bright body, and hath light of its owne, and the other a groſſe dark body which cannot ſhine at all. 'Tis requiſite therefore that in the next place I cleare this doubt, and ſhew that the Moone hath no more light of her owne than our Earth.

Propoſition 5.

That the Moone hath not any light of her owne.

'TWas the fancie of ſome of the Jewes, and more eſpecially of *Rabbi Simeon*, that the Moone was nothing elſe but a contracted Sunne, and that both thoſe planets at their firſt creation, were equall both in light and quantity. For, becauſe God did then call

Toſtatus in 1 Gen. Myeron. de Sancta fide. Hebræomaſt. l. 2. c. 4

Lib. 1. Cap. 5.

call them both great lights, therefore they inferred that they must be both equall in bigneſſe. But a while after (as the tradition goes) the ambitious Moone put up her complaint to God againſt the Sunne, ſhewing that it was not fit there ſhould be two ſuch great lights in the heavens; a Monarchie would beſt become the place of order and harmony. Vpon this, God commanded her to contract her ſelfe into a narrower compaſſe; but ſhee being much diſcontented hereat, replies, What! becauſe I have ſpoken that which is reaſon and equity, muſt I therefore be diminiſhed? This ſentence could not chuſe but much trouble her; and for this reaſon was ſhee in great diſtreſſe and griefe for a long ſpace; but that her ſorrow might be ſome way pacified, God bid her be of good cheere, becauſe her priviledges and Charter ſhould be greater than the Sunnes; he ſhould appeare in the day time onely, ſhee both in the day and night; but her melancholy being not ſatisfied with this, ſhee replied againe, That, that alas was no benefit; for in the

the day time shee should be either not seene, or not noted. Wherefore, God to comfort her up, promised, that his people the Israelites should celebrate all their feasts and holy dayes by a computation of her moneths; but this being not able to content her, shee has looked very melancholy ever since; however, she hath still reserved much light of her owne.

Others there were, that did think the Moone to be a round globe; the one halfe of whose body was of a bright substance, the other halfe being dark; and the divers conversions of those sides towards our eyes, caused the variety of her appearances: of this opinion was *Berosus*, as hee is cited by [a] *Vitruvius*; and [b] St. *Austin* thought it was probable enough. But this fancie is almost equally absurd with the former, and both of them sound rather like fables, than Philosophicall truths. You may commonly see how this latter does contradict frequent and easie experience; for 'tis observed, that that spot which is perceived about her middle when shee is in the encrease,

a *Lib. 9. Architecturæ.*
b *Narratio Psalmorum. item. ep. 119.*

Lib. 1. Cap. 5.

may be discern'd in the same place when she is in the full: whence it must follow, that the same part which was before darkned, is after inlightened, and that the one part is not alwayes dark, and the other light of it selfe. But enough of this, I would be loth to make an enemy, that I may afterwards overcome him, or bestow time in proving that which is already granted; I suppose now, that neither of them hath any patrons, and therefore need no confutation.

'Tis agreed upon by all sides, that this Planet receives most of her light from the Sunne; but the cheife controversie is, whether or no shee hath any of her owne? The greater multitude affirme this. *Cardan* amongst the rest, is very confident of it, and hee thinks that if any of us were in the Moone at the time of her greatest eclipse, *Lunam aspiceremus non secus ac innumeris cereis splendidissimis accensis, atque in eas oculis defixis cæcutiremus*; "Wee should perceive so great a "brightnesse of her owne, that would "blinde us with the meere sight, and "when

De Subtil. lib. 3.

" when she is enlightened by the Sun, " then no Eagles eye (if there were " any there) is able to look upon her. This *Cardan* sayes, and hee doth but say it, without bringing any proofe for its confirmation. However, I will set downe the arguments that are usually urged for this opinion, and they are taken either from Scripture, or reason; from Scripture is urged that place, 1 *Cor.* 15. where it is said, *There is one glory of the Sunne, and another glory of the Moone.* *Vlysses Albergettus* urges that in *Math.* 24. 29. ἡ σελήνη οὐ δώσει τὸ φέγγος αὐτῆς, *The Moon shall not give her light:* therefore (sayes he) shee hath some of her owne.

But to these we may easily answer, that the glory and light there spoken of, may be said to be hers, though it be derived, as you may see in many other instances.

The arguments from reason are taken either.

1. From that light which is discerned in her, when there is a totall eclipse of her owne body, or of the Sunne.

2. From the light which is discerned in the darker part of her body, when shee is but a little distant from the Sunne.

1. For when there are any totall eclipses, there appeares in her body a great redneſſe, and many times light enough to cause a remarkable shade, as common experience doth sufficiently manifest: but this cannot come from the Sun, since at such times either the earth or her own body shades her from the Sun-beames; therfore it must proceed from her owne light.

2. Two or three dayes after the new Moone, we may perceive light in her whole body, whereas the rayes of the Sun reflect but upon a small part of that which is visible; therefore 'tis likely that there is some light of her owne.

In answering to these objections, I shall first shew, that this light cannot be her owne, and then declare that which is the true reason of it.

That it is not her owne, appeares.

1 Becaus then she would alwayes retaine it, but shee has beene sometimes

LIB. I. *Cap.* 5.

times altogether inviſible, when as notwithwanding ſome of the fixed Starres of the fourth or fifth magnitude might eaſily have been diſcerned cloſe by her, As it was in the yeare 1620.

Keplar. epit. Aſtron. cop. l. 6. p. 5. ſect. 2.

2 This may appeare likewiſe from the variety of it at divers times; for 'tis commonly obſerved that ſometimes 'tis of a brighter, ſometimes of a darker appearance, now redder, and at another time of a more duskiſh colour. The obſervation of this variety in divers eclipſes, you may ſee ſet downe by *Keplar* and many others. But now this could not be, if that light were her owne, that being conſtantly the ſame, and without any reaſon of ſuch an alteration: So that thus I may argue.

Opt. Aſtron. c. 7. num. 3.

If there were any light proper to the Moone, then would that Planet appeare brighteſt when ſhe is eclipſed in her Perige being neereſt to the earth, and ſo conſequently more obſcure and duskiſh when ſhee is in her Apoge or fartheſt from it; the reaſon is, becauſe the neerer any enlightned

Lib. I. Cap. 5.

body comes to the ſight, by ſo much the more ſtrong are the ſpecies and the better perceived. This ſequell is granted by ſome of our adverſaries, and they are the very words of noble *Tycho*, *Si Luna genuino gauderet lumine, utiq; cum in umbra terræ eſſet, illud non amitteret, ſed eò evidentiùs exereret; omne enim lumen in tenebris, plus ſplendet cum alio majore fulgore nõn præpediur.* If the Moone had any light of her own, then would ſhe not loſe it in the earths ſhadow, but rather ſhine more clearely; ſince every light appeares greater in the dark, when it is not hindered by a more perſpicuous brightneſſe.

De nova ſtella. lib. 1. c. 10.

But now the event falls out cleane contrary, (as obſervation doth manifeſt, and our oppoſites themſelves doe grant) the Moone appearing with a more reddiſh and cleare light when ſhe is eclipſed, being in her Apoge or fartheſt diſtance, and a more blackiſh iron colour when ſhee is in her Perige or neareſt to us, therefore ſhe hath not any light of her owne. Nor may wee think that the earths ſhadow can cloud the proper light of the Moone from appearing

Reinhold *Comment. in Purb. Theor pag.* 164.

appearing; or take away any thing from her inherent brightneſſe; for this were to think a ſhadow to be a body, an opinion altogether misbecomming a Philoſopher, as *Tycho* grants in the fore-cited place, *Nec umbra terræ corporeum quid eſt, aut denſa aliqua ſubſtantia, ut Lunæ lumen obtenebrare poſſit, atque id viſui noſtro præripere, ſed eſt quædam privatio luminis ſolaris, ob interpoſitum opacum corpus terræ.* Nor is the earths ſhadow any corporall thing, or thick ſubſtance, that it can cloud the Moones brightneſſe, or take it away from our ſight; but it is a meere privation of the Sunnes light by reaſon of the interpoſition of the earths opacous body.

3 If ſhe had any light of her owne, then that would in it ſelfe be either ſuch a ruddy brightneſſe as appeares in the eclipſes, or elſe ſuch a leaden duskiſh light as wee ſee in the darker parts of her body, when ſhee is a little paſt the conjunction. (That it muſt be one of theſe may follow from the oppoſite arguments) but it is neither of theſe, therefore ſhee hath none of her owne.

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1 'Tis not such a ruddy light as appeares in eclipses; for then why can we not see the like rednesse, when wee may discerne the obscurer parts of the Moone?

You will say, perhaps, that then the neerenesse of that greater light takes away that appearance.

I reply, this cannot be; for then why does *Mars* shine with his wonted rednesse, when hee is neere the Moone? or why cannot her greater brightnesse make him appeare white as the other Planets? nor can there be any reason given why that greater light should represent her body under a false colour.

2. 'Tis not such a duskish leaden light, as we see in the darker part of her body, when shee is about a sextile Aspect distant from the Sunne; for then why does shee appeare red in the eclipses, since meere shade cannot cause such variety? for 'tis the nature of darknesse by its opposition, rather to make things appeare of a more white and cleare brightnesse than they are in themselves. Or if it be the shade, yet those parts of the Moone are then in

in the ſhade of her body, and therefore in reaſon ſhould have the like redneſſe. Since then neither of theſe lights are hers, it followes that ſhe hath none of her owne. Nor is this a ſingular opinion, but it hath had many learned Patrons; ſuch was *Macrobius*, who being for this quoted of *Rhodiginus*, hee calls him *vir reconditiſſimæ ſcientiæ*, a man who knew more than ordinary Philoſophers, thus commending the opinion in the credit of the Author. To him aſſents the venerable *Bede*, upon whom the gloſſe hath this compariſon. As the Looking-glaſſe repreſents not any image within it ſelfe unleſſe it receive ſome from without; ſo the Moone hath not any light, but what is beſtowed by the Sunne. To theſe agreed [a] *Albertus Magnus*, [b] *Scaliger*, [c] *Mæſlin*, *Keplar*, and more eſpecially [d] *Mulapertius*, whoſe words are more pat to the purpoſe than others, and therefore I ſhall ſet them down as you may finde them in his Preface to his Treatiſe concerning the *Auſtriaca ſydera*; *Luna, Venus, & Mercurius, terreſtris & humidæ ſunt ſubſtantiæ, ideoque de*

Somn Scip. l.1. c.20.

Lect. antiq. l.1.c.15.

In lib. de natur. rerum.

a *De 4. Coævis. Q. 4 Art.21.*
b *Exercit. 62.*
c *Epitom. Aſtron. l.4. p.2.*
d *Epit. Aſtro. Cop. l.6 part.5. ſect. 2.*

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de suo non lucere, sicut nec terra. The Moone, *Venus*, and *Mercury* (saith he) are of an earthly and moyst substance, and therefore have no more light of their owne, then the earth hath. Nay, some there are, who think, (though without ground) that all the other Starres doe receive that light, whereby they appeare visible to us, from the Sunne: so *Ptolomie*, [a] *Isidore Hispalensis*, [b] *Albertus Magnus*, and [c] *Bede*; much more then must the Moone shine with a borrowed light.

a Originum l. 3. c. 60.
b De Cœlo. l. 2.
c De ratione tempor. c. 4.
Item Plinie l. b. 2. ca. 6.
Hugo de Sancto Victore. Annot. in Gen. 6.

But enough of this. I have now sufficiently shewed what at the first I promised, that this light is not proper to the Moone. It remaines in the next place, that I tell you the true reason of it. And here, I think 'tis probable that the light which appeares in the Moone at the eclipses, is nothing else but the second species of the Sunnes rayes which passe through the shadow unto her body: and from a mixture of this second light with the shadow, arises that redness which at such times appeares unto us. I may call it *Lumen crepusculinum*, the *Aurora* of the Moon, or

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or such a kinde of blushing light, that the Sunne causes when he is neere his rising, when he bestowes some small light upon the thicker vapours. Thus we see commonly the Sunne being in the Horizon, and the reflexion growing weak, how his beames make the waters appeare very red.

The Moabites in *Jehorams* time, when they rose early in the morning, and beheld the waters afarre off, mistooke them for blood. *Et causa hujus est quia radius solaris in Aurora contrahit quandam rubedinem, propter vapores combustos manentes circa superficiem terræ, per quos radij transeunt, & ideo cum repercutiantur in aqua ad oculos nostros, trahunt secum eundem ruborem, & faciunt apparere locũ aquarum, in quo est repercussio, esse rubrum,* saith *Tostatus*. The reason is, because of his rayes, which being in the lower vapours, those doe convay an imperfect mixed light upon the waters. Thus the Moone being in the earths shadow, and the Sunne beames which are round about it, not being able to come directly unto her body, yet some second rayes there are, which passing

2 King. 3. 22.

2. *Quæst. in hoc cap.*

Lib. I. Cap. 5.

passing through the shadow, make her appeare in that ruddy colour: So that shee must appeare brightest when shee is eclipsed, being in her Apoge or greatest distance from us, because then the cone of the earths shadow is lesse, and the refraction is made through a narrower medium. So on the contrary, shee must be represented under a more dark and obscure forme when she is eclipsed, being in her Perige or neerest to the earth, because then shee is involved in a greater shadow, or bigger part of the cone, and so the refraction passing through a greater medium, the light must needs be weaker which doth proceed from it. If you ask now, what the reason may be of that light which wee discerne in the darker part of the new Moone? I answer, 'tis reflected from our earth, which returnes as great a brightnesse to that Planet, as it receives from it. This I shall have occasion to prove afterward.

I have now done with these propositions which were set downe to cleare the passage, and confirme the suppositions

tions implied in the opinion, I ſhall in the next place proceed to a more direct treating of the chiefe matter in hand.

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Propoſition 6.

That there is a World in the Moone, hath beene the direct opinion of many ancient with ſome moderne Mathematicians, and may probably be deduced from the tenents of others.

SInce this opinion may be ſuſpected of ſingularity, I ſhall therefore firſt confirme it by ſufficient authority of divers Authors, both ancient and moderne, that ſo I may the better cleare it from the prejudice either of an upſtart fancie, or an abſolute errour. This is by ſome attributed to *Orpheus*, one of the moſt ancient Greek Poets, Who ſpeaking of the Moone, ſayes thus, ἐστὶν ὄρεα ἔχει, πολλὰ ἄστεα, πολλὰ μέλαθρα, That it hath many mountaines, and cities, and houſes in it. To him aſſented *Anaxagoras*, *Democritus*, and *Heraclides*, all

Plut. de plac. phil. l. 2. c. 13.

Ibid. c. 25.

Lib. I. Cap. 6. Diog. Laert. l. 2. & l. 9.

Divin Inst. lib. 3. c. 23.

all who, thought it to have firme solid ground, like to our earth, containing in it many large fields, champion grounds, and divers Inhabitants.

Of this opinion likewise was *Xenophanes*, as he is cited for it by *Lactantius*; though that Father (perhaps) did mistake his meaning whilst hee relates it thus *Dixit Xenophanes, intra concavum Lunæ esse aliam terram, & ibi aliud genus hominum simili modo vivere sicut nos in hac terra, &c.* As if hee had conceived the Moone to be a great hollow body, in the midst of whose concavity, there should be another globe of sea and land, inhabited by men, as our earth is. Whereas it seemes to be more likely by the relation of others, that this Philosophers opinion is to be understood in the same sence, as it is here to be proved. True indeed, the Father condemnes this assertion as an equall absurdity to that of *Anaxagoras*, who affirmed the snow to be black: but no wonder, for in the very next Chapter it is that hee does so much deride the opinion of those who thought there were *Antipodes*. So that his ignorance

in

in that particular may perhaps disable him from being a competent Judge in any other the like point of Philosophy. Vnto these agreed *Pythagoras*, who thought that our earth was but one of the Planets which moved round about the Sun, (as *Aristotle* relates it of him) and the *Pythagoreans* in generall did affirme that the Moone also was terrestriall, & that she was inhabited as this lower world; That those living creatures and plants which are in her, exceed any of the like kind with us in the same proportion, as their dayes are longer than ours: *viz.* by 15 times. This *Pythagoras* was esteemed by all, of a most divine wit, as appeares especially by his valuation amongst the *Romans*, who being commanded by the Oracle to erect a statue to the wisest *Græcian*, the Senate determined *Pythagoras* to be meant, preferring him in their judgements before the divine *Socrates*, whom their Gods pronounc'd the wisest. Some think him a *Jew* by birth; but most agree that hee was much conversant amongst the learneder sort and Priests of that Nation, by

LIB. I. *Cap.* 6.

De Cælo. l. 2. *cap.* 13.

Plut. ibid. cap. 30.

Plin. Nat. Hist. l. 34. *cap.* 6.

Lib. 1. Cap. 6.

by whom hee was informed of many ſecrets, and (perhaps) this opinion which he vented afterwards in *Greece*, where he was much oppoſed by *Ariſtotle* in ſome worded diſputations, but never confuted by any ſolid reaſon.

To this opinion of *Pythagoras* did *Plato* alſo aſſent, when he conſidered that there was the like eclipſe made by the earth; and this, that it had no light of its owne, that it was ſo full of ſpots. And therefore wee may often reade in him and his followers, of an *ætherea terra*, and *lunares populi*, An æthereall earth, & inhabiters in the Moon; but afterwards this was mixed with many ridiculous fancies: For ſome of them conſidering the myſteries implied in the number 3, concluded that there muſt neceſſarily be a Trinity of worlds, whereof the firſt is this of ours; the ſecond in the Moon, whoſe element of water is repreſented by the ſpheare of *Mercury*, the ayre by *Venus*, and the fire by the Sunne. And that the whole Vniverſe might the better end in earth as it began, they have contrived it, that *Mars* ſhall be a ſpheare of

Plat. de conviviis. Macrob. Somn. Scip. lib. 1. c. 11.

of the fire, *Jupiter* of ayre, *Saturne* of water; and above all these, the Elysian fields, spacious and pleasant places appointed for the habitation of those unspotted soules, that either never were imprisoned in, or else now have freed themselves from any commerce with the body. *Scaliger* speaking of this *Platonick* fancy, *quæ in tres trientes mundum quasi assem divisit*, thinks 'tis confutation enough, to say, 'tis *Plato's*. However, for the first part of this assertion, it was assented unto by many others, and by reason of the grosnesse and inequality of this planet, 'twas frequently called *quasi terra cœlestis*, as being esteemed the sediment and more imperfect part of those purer bodies; you may see this proved by *Plutarch*, in that delightfull work which he properly made for the confirmation of this particular. With him agreed *Alcinous* and *Plotinus*, later Writers.

Thus *Lucian* also in his discourse of a journey to the Moon, where though hee does speake many things out of mirth & in a jesting manner: yet in the beginning of it he does intimate that

LIB. I. Cap. 6.

Exercit. 62.

De facie Lunæ.

Instit. ad discip. plat. Cœl. Rhodig. l. 1. c. 4.

Lib. I. Cap. 6.

it did contain some serious truths concerning the real frame of the Vniverse.

The Cardinall *Cusanus* and *Jornandus Brunus*, held a particular world in every Starre, and therefore one of them defining our earth, he sayes, it is *stella quædam nobilis, quæ lunam & calorem & influentiam habet aliam, & diversam ab omnibus aliis stellis*; "A noble "Starre having a distinct light, heat, "& influence frō all the rest. Vnto this *Nichol. Hill*, a Country man of ours, was enclined, whē he said *Astrea terræ natura probabilis est*: "That 'tis pro-"bable the earth hath a starry nature.

But the opinion which I have here delivered, was more directly proved by [a] *Mæslin*, [b] *Keplar*, and [c] *Galilæus*, each of them late Writers, and famous men for their singular skill in Astronomy. *Keplar* calls this World by the name of *Levania* from the Hebrew word לבנה which signifies the Moon, and our earth by the name of *Volva à volvendo*, because it does by reason of its diurnall revolution appeare unto them constantly to turne round, and therefore hee stiles those who live in that

Cusa. de docct. ign. l. 2 cap. 12.

Philos. Epicur. part. 434.

a *In Thesibus.*
b *Dissertatio cum Nunc.*
c *Nuncius Sydereus.*

Somn. Astr.

Lib. I. *Cap.6.*

that Hemisphere which is towards us, by the title of *Subvolvani*, because they enjoy the sight of this earth; and the others *Privolvani*, *quia sunt privati conspectu volvæ*, because they are deprived of this priviledge. But *Julius Cæsar*, whom I have above quoted, speaking of their testimony whom I cite for this opinion, *viz. Keplar* and *Galilæus*, affirmes that to his knowledge they did but jest in those things which they write concerning this; and as for any such world, he assuredly knowes they never so much as dreamt of it. But I had rather beleeve their owne words, than his pretended knowledge.

De phænom. lunæ. c.4.

'Tis true indeed, in some things they doe but trifle, but for the maine scope of those discourses, 'tis as manifest they seriously meant it, as any indifferent Reader may easily discerne; As for *Galilæus*, 'tis evident that hee did set downe his owne judgement and opinion in these things; otherwise sure *Campanella* (a man as well acquainted with his opinion, and perhaps his person as *Cæsar* was) would never have writ an Apologie for him. And be-

Lib. 1. Cap. 6.

sides 'tis very likely if it had beene but a jest, *Galilæus* would never have suffered so much for it as report saith afterwards he did.

And as for *Keplar*, I will onely referre the Reader to his owne words as they are set downe in the Preface to the fourth book of his *Epitome*, where his purpose is to make an Apologie for the strangenesse of those truths that he was there to deliver, amongst which there are divers things to this purpose concerning the nature of the Moone. Hee professes that he did not publish them either out of a humor of contradiction, or a desire of vaine-glory, or in a jesting way, to make himselfe or others merry, but after a considerate and solemne manner for the discovery of the truth.

Now as for the knowledge which *Cæsar* pretends to the contrary, you may guesse what it was by his strange confidence in other assertions, and his boldnesse in them may well derogate from his credit in this. For speaking of *Ptolome's Hypothesis*, hee pronounces this verdict, *Impossibile est excentricorum*

Cap. 7.

&

Lib. I. Cap. 6.

& epicyclorum positio, nec aliquis est ex Mathematicis adeo stultus qui veram illam existimet. "The position of *Excen-* "*trickes* and *Epicycles* is altogether im- "possible, nor is there any Mathema- "tician such a foole as to think it true. I should guesse hee could not have knowledge enough to maintaine any other *Hypothesis*, who was so ignorant in Mathematicks as to deny that any good Author held this. For I would faine know whether there were never any that thought the Heavens to be solid bodies, and that there were such kindes of motion as is by those fained Orbs supplied; if so, *Cæsar la Galla* was much mistaken. I think his assertions are equally true, that *Galilæus* and *Keplar* did not hold this, and that there were none which ever held that other. Thus much for the testimony of those who were directly of this opinion.

But, in my following discourse I shall most insist on the observation of *Galilæus*, the inventor of that famous Perspective, whereby we may discern the Heavens hard by us; whereby those things which others have for-

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merly gueſt at, are manifeſted to the eye, and plainely diſcovered beyond exception or doubt; of which admirable invention, theſe latter Ages of the world may juſtly boaſt, and for this expect to be celebrated by poſterity. 'Tis related of *Eudoxus*, that hee wiſhed himſelfe burnt with *Phaeton*, ſo hee might ſtand over the Sunne to contemplate its nature; had hee lived in theſe dayes, he might have enjoyed his wiſh at an eaſier rate; and ſcaling the heavens by this glaſſe, might plainely have diſcerned what hee ſo much deſired. *Keplar* conſidering thoſe ſtrange diſcoveries which this Perſpective had made, could not chooſe but cry out in a ἐνθουσιασμὸς and rapture of admiration, *O multiſcium & quovis ſceptro pretioſius perſpicillum! an qui te dextrâ tenet, ille non dominus conſtituatur operum Dei?* And *Johannes Fabricius* an elegant Writer, ſpeaking of the ſame glaſſe, and for this invention preferring our age before thoſe former times of greater ignorance, ſayes thus; *Adeo ſumus ſuperiores veteribus, ut quam illi carminis magici pronunciatu demiſſam repre-*

De macula in ſole obſer.

repreſentâſſe putantur, nos non tantum innocenter demittamus, ſed etiam familiari quodam intuitu ejus quaſi conditionem intueamur. "So much are wee above the "Ancients, that whereas they were "faine by their Magicall charmes to "repreſent the Moones approach, we "cannot onely bring her lower with a "greater innocence, but may alſo "with a more familiar view behold "her condition. And becauſe you ſhall have no occaſion to queſtion the truth of thoſe experiments, which I ſhall afterwards urge from it; I will therefore ſet downe the teſtimony of an enemie, and ſuch a witneſſe hath alwayes beene accounted prevalent: you may ſee it in the above-named *Cæſar la Galla*, whoſe words are theſe: *Mercurium caduceum geſtantem, cæleſtia nunciare, & mortuorum animas ab inferis revocare ſapiens finxit antiquitas. Galilæum verò novum Jovis interpretem Teleſcopio caduceo inſtructum Sydera aperire, & veterum Philoſophorum manes ad ſuperos revocare ſolers noſtra ætas videt & admiratur.* "Wiſe antiquity fabled *Mercury* "carrying a rod in his hand to relate "newes

Lib. 1. Cap. 6.

De phænom. cap. 1.

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"newes from Heaven, and call back "the ſoules of the dead; but it hath "beene the happineſſe of our induſtri- "ous Age to ſee and admire *Galilæus* "the new Embaſſadour of the Gods "furniſhed with his Perſpective to un- "fold the nature of the Starres, and "awaken the ghoſts of the ancient "Philoſophers. So worthily & high- ly did theſe men eſteeme of this excel- lent invention.

Now, if you would know what might be done by this glaſſe, in the ſight of ſuch things as were neerer at hand, the ſame Author will tell you, when he ſayes, that by it thoſe things which could ſcarce at all be diſcerned by the eye at the diſtance of a mile and a half, might plainly and diſtinctly be perceived for 16 *Italian* miles, & that as they were really in thẽſelves, with- out any tranſpoſition or falſifying at all. So that what the ancient Poets were faine to put in a Fable, our more happy Age hath found out in a truth, and wee may diſcerne as farre with theſe eyes which *Galilæus* hath be- ſtowed upon us, as *Lynceus* could with

Ibid. c. 6.

thoſe

Lib. 1. Cap. 6.

thoſe which the Poets attributed unto him. But if you yet doubt whether all theſe obſervations were true, the ſame Author may confirme you, when hee ſayes they were ſhewed *Non uni aut alteri, ſed quamplurimis, neq; gregariis hominibus, ſed præcipuis atq; diſciplinis omnibus, necnon Mathematicis & Opticis præceptis optimè inſtructis ſedulâ ac diligenti inſpectione.* "Not to one or two, "but to very many, and thoſe not or- "dinary men, but to thoſe who were well vers'd in Mathematicks and Op- "ticks, and that not with a meere "glance, but with a ſedulous and di- "ligent inſpection. And leaſt any ſcruple might remaine unanſwered, or you might think the men who beheld all this though they might be skilfull, yet they came with credulous minds, and ſo were more eaſie to be deluded: Hee adds that it was ſhewed *Viris qui ad experimenta hæc contradicendi animo acceſſerant.* "To ſuch as were come "with a great deale of prejudice, and "an intent of contradiction. Thus you may ſee the certainty of thoſe experiments which were taken by this glaſſe.

Cap. 2.

Cap. 5.

Lib. II. Cap. 6.

glasse. I have spoken the more concerning it, because I shall borrow many things in my farther discourse, from those discoveries which were made by it.

I have now cited such Authors both ancient and moderne, who have directly maintained the same opinion. I told you likewise in the Proposition that it might probably be deduced from the tenents of others: such were *Aristarchus*, *Philolæus*, and *Copernicus*, with many other later Writers who assented to their hypothesis; so *Joach. Rhelicus*, *David Origanus Lansbergius*, *Guil. Gilbert*, and (if I may beleeve *Campanella*) *Innumeri alij Angli & Galli*, Very many others, both English and French, all who affirmed our Earth to be one of the Planets, and the Sunne to be the Center of all, about which the heavenly bodies did move. And how horrid soever this may seeme at the first, yet is it likely enough to be true, nor is there any maxime or observation in Opticks (saith *Pena*) that can disprove it.

See the second book. 1. Prop.

Apologia pro Galileo.

Now if our earth were one of the Planets

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Planets (as it is according to them) then why may not another of the Planets be an earth?

Thus have I shewed you the truth of this Proposition. Before I proceed farther, 'tis requisite that I enforme the Reader, what method I shall follow in the proving of this chiefe assertion, that there is a World in the Moone.

The order by which I shall be guided, will be that which *Aristotle* uses in his book *De mundo* (if that book were his.)

First, περὶ τῶν ἐν αὐτῷ of those chiefe parts which are in it; not the elementary and æthereall (as hee doth there) since this doth not belong to the present question, but of the Sea and Land, &c. Secondly, περὶ αὐτῷ πάθων, of those things which are extrinsecall to it, as the seasons, meteors, and inhabitants.

Proposition

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Proposition 7.

That those spots and brighter parts which by our sight may be distinguished in the Moone, doe shew the difference betwixt the Sea and Land in that other world.

FOr the cleare proofe of this Proposition, I shall first reckon up and refute the opinions of others concerning the matter and forme of those spots, and then shew the greater probability of this present assertion, and how agreeable it is to that truth, which is most commonly received; As for the opinions of other concerning these, they have beene very many; I will only reckon up those which are common and remarkable.

Some there are that think those spots doe not arise from any deformity of the parts, but a deceit of the eye, which cannot at such a distance discerne an equall light in that Planet; but these doe but only say it, and shew not any reason for the proofe of their opinion:

opinion: Others think that there are some bodies betwixt the Sunne and Moone, which keeping off the light in some parts, doe by their shadow produce these spots which we there discerne.

LIB. I. *Cap.* 7. So *Bede* in *l. de Mund. constit.*

Others would have them to be the figure of the seas or mountaines here below, represented there as in a looking-glasse. But none of those fancies can be true, because the spots are still the same, and not varied according to the difference of places; and besides, *Cardan* thinks it is impossible that any image should be conveyed so farre as there to be represented unto us at such a distance. But 'tis commonly related of *Pythagoras*, that he by writing what he pleased in a glasse, by the reflexion of the same species, would make those letters to appeare in the circle of the Moone, where they should be legible by any other, who might at that time be some miles distant from him. [a] *Agrippa* affirmes this to be possible, and the way of performing it not unknowne to himselfe, with some others in his time. It may be, that Bishop *Godwine*

De subtil. lib. 8.

a *Occulta. Philos. l.* 1. *cap.* 6.

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Godwine did by the like meanes perform those strange conclusions, which he professes in his *Nuncius inanimatus*, where he pretends, that he can inform his friends of what he pleases, though they be an hundred miles distant, *forte etiam, vel milliare millesimum*, (they are his owne words) and, perhaps, a thousand, and all this in a little space, quicker than the Sunne can move.

Now, what conveyance there should be, for so speedy a passage, I cannot conceive, unlesse it be carried with the light, than which wee know not any thing quicker; But of this only by the way; however, whether those images can be represented so or not, yet certaine it is, those spots are not such representations. Some think that when God had at first created too much earth to make a perfect globe, not knowing well where to bestow the rest, hee placed it in the Moone, which ever since hath so darkned it in some parts; but the impiety of this is sufficient confutation, since it so much detracts from the divine power and wisedome.

The

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The [a] Stoicks held that Planet to be mixed of fire and ayre; and in their opinion, the variety of its compoſition cauſed her ſpots: Being not aſhamed to ſtile the ſame body a Goddeſſe, calling it *Diana*, *Minerva*, &c. and yet affirme it be an impure mixture of flame, and ſmoke, and fuliginous ayre. But this Planet cannot conſiſt of fire (ſaith *Plutarch*) becauſe there is not any fewell to maintaine it. And the Poets have therefore fained *Vulcan* to be lame, becauſe hee can no more ſubſiſt without wood or other fewell than a lame man without a ſtaffe.

[a] *Plut. de placit. phil. l. 2. c. 25.*

Anaxagoras thought all the ſtarres to be of an earthly nature, mixed with ſome fire; and as for the Sunne, he affirmed it to be nothing elſe but a fiery ſtone; for which later opinion, the *Athenians* ſentenc'd him to death; thoſe zealous Idolaters counting it a great blaſphemy to make their God a ſtone, whereas notwithſtanding, they were ſo ſenſleſſe in their adoration of Idols, as to make a ſtone their God. This *Anaxagoras* affirmed the Moone to be more terreſtriall than the other Planets,

Joſephus l. 2. con. App. Auguſt. de Civit. Dei. l 18. c 41.

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Planets, but of a greater purity than any thing here below, and the spots he thought were nothing else, but some cloudy parts, intermingled with the light wch belonged to that Planet; but I have above destroyed the supposition on which this fancy is grounded. *Plinie* thinks they arise from some drossie stuffe, mixed with that moysture which the Moone attracts unto her selfe; but he was of their opinion who thought the starres were nourished by some earthly vapours, which you may commonly see refuted in the *Commentators* on the books *de Cœlo*.

Nat. Hist. l. 2. c. 9.

Vitellio & *Reinoldus* affirme the spots to be the thicker parts of the Moone, into which the Sunne cannot infuse much light; and this (say they) is the reason why in the Sunnes eclipses the spots and brighter parts are still in som measure distinguished, because the Sun beames are not able so well to penetrate through those thicker, as they may through the thinner parts of that Planet. Of this opinion also was *Cæsar la Galla*, whose words are these; "The Moone doth there ap-

Opt. lib. 9. Comment. in Perb. pag. 164.

"peare

" peare cleareſt, where ſhe is tranſpi-
" cuous, not onely through the ſuper-
" ficies, but the ſubſtance alſo, and
" there ſhee ſeemes ſpotted, where
" her body is moſt opacous. The ground of this his aſſertion was, becauſe hee thought the Moone did receive and beſtow her light by illumination onely, and not at all by reflexion, but this, together with the ſuppoſed penetration of the Sun-beames, and the perſpicuity of the Moones body I have above anſwered and refuted.

The more common and generall opinion is, that the ſpots are the thinner parts of the Moone, which are leſſe able to reflect the beames that they receive from the Sunne, and this is moſt aggreeable to reaſon; for if the ſtarres are therefore brighteſt, becauſe they are thicker and more ſolid than their orbes, then it will follow, that thoſe parts of the Moone which have leſſe light, have alſo leſſe thickneſſe. It was the providence of nature (ſay ſome) that ſo contrived that planet to have theſe ſpots within it, for ſince

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Ex qua parte luna eſt tranſpicua non ſolum ſecundum ſuperficiem, ſed etiam ſecundum ſubſtantiam, eatenus clara, ex qua autem parte opaca eſt, eatenus obſcura videtur. De Phænom. cap. 11.

Albert. mag. de Cœvis. Q. 4. *Art.* 21. *Colleg. Con.*

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that is neereſt to thoſe lower bodies which are ſo full of deformity, 'tis requiſite that it ſhould in ſome meaſure agree with them, and as in this inferiour world, the higher bodies are the moſt compleat, ſo alſo in the heavens perfection is aſcended unto by degrees, and the Moone being the loweſt, muſt be the leaſt pure, and therefore *Philo* the Jew interpreting *Jacobs* dreame concerning the ladder, doth in an allegory ſhew, how that in the fabricke of the world, all things grow perfecter as they grow higher, and this is the reaſon (ſaith he) why the Moone doth not conſiſt of any pure ſimple matter, but is mixed with aire, which ſhewes ſo darkely within her body.

De Somniis

But this cannot be a ſufficient reaſon; for though it were true that nature did frame every thing perfecter as it was higher, yet is it as true that nature frames every thing fully perfect for that office to which ſhee intends it. Now, had ſhe intended the Moone meerely to reflect the Sunne-beames and give light, the ſpots then had not ſo much argued her providence, as her unskilful-

unskilfulneſſe and overſight, as if in the haſte of her worke ſhee could not tell how to make that body exactly fit for that office to which ſhee intended it.

LIB. I. *Cap. 7.* *Scalig. exercit. 62.*

Tis likely then that ſhe had ſome other end which moved her to produce this variety, and this in all probability was her intent to make it a fit body for habitation with the ſame conveniences of ſea and land, as this inferiour world doth partake of. For ſince the Moone is ſuch a vaſt, ſuch a ſolid and opacous body, like our earth (as was above proved) why may it not be probable, that thoſe thinner and thicker parts appearing in her, doe ſhew the difference betwixt the ſea and land in that other world? and *Galileus* doubts not, but that if our earth were viſible at the ſame diſtance, there would be the like appearance of it.

If wee conſider the Moone as another habitable earth, then the appearances of it will be altogether exact, and beautifull, and may argue unto us that it is fully accompliſhed for all thoſe ends to which Providence did

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appoint it. But consider it barely as a starre or light, and then there will appeare in it much imperfection and deformitie, as being of an impure darke substance, and so unfit for the office of that nature.

As for the forme of those spots, some of the vulgar thinke they represent a man, and the Poëts guesse tis the boy *Endymion*, whose company shee loves so well, that shee carries him with her, others will have it onely to be the face of a man as the Moone is usually pictured, but *Albertus* thinkes rather, that it represents a Lyon with his taile towards the East, and his head the West, and * some others have thought it to be very much like a Fox, and certainly 'tis, as much like a Lyon as that in the *Zodiake*, or as *Vrsa major* is like a Beare.

* *Eusebius Nicremb. Hist. Nat. l. 8. c. 15.*

I should guesse that it represents one of these as well as another, and any thing else as well as any of these, since 'tis but a strong imagination, which fancies such images as schoole-boyes usually doe in the markes of a wall, whereas there is not any such similitude

tude in the ſpots themſelves, which rather like our Sea, in reſpect of the land, appeares under a rugged and confuſed figure, and doth not repreſent any diſtinct image, ſo that both in reſpect of the matter, and the forme it may be probable enough, that thoſe ſpots and brighter parts may ſhew the the diſtinction betwixt the Sea and Land in that other world.

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Propoſition 8.

The ſpots repreſent the Sea, and the brighter parts the Land.

WHen I firſt compared the nature of our earth and water with thoſe appearances in the Moone; I concluded contrary to the propoſition, that the brighter parts repreſented the water, and the ſpots the land; of this opinion likewiſe was *Keplar* at the firſt. But my ſecond thoughts, and the reading of others, have now convinced me (as after he was) of the truth of that propoſition which I have

Opt. Aſtro. c. 6 num 9. Diſſert. cum nuncio Gal.

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now set downe. Before I come to the confirmation of it, I shall mention those scruples which at first made mee doubt the truth of this opinion.

1. It may be objected, 'tis probable, if there bee any such sea and land as ours, that it beares some proportion and similitude with ours: but now this proposition takes away all likenesse betwixt them. For whereas the superficies of our earth is but the third part of the whole surface in the globe, two parts being overspread with the water (as *Scaliger* obserues) yet here, according to this opinion, the Sea should be lesse than the land, since there is not so much of the bespotted, as there is of the enlightened parts, wherefore 'tis probable, that there is no such thing at all, or else that the brighter parts are the Sea.

Exercit. 38

2. The water, by reason of the smoothnesse of its superficies, seemes better able to reflect the Sun-beames than the earth, which in most places is so full of ruggednesse of grasse and trees, and such like impediments of reflexion; and besides, common experience

rience ſhewes, that the water ſhines with a greater & more glorious brightneſſe than the earth; therfore it ſhould ſeeme that the ſpots are the earth, and the brighter parts the water. But to the firſt it may be anſwered.

1. There is no great probability in this conſequence, that becauſe 'tis ſo with us, therefore it muſt be ſo with the parts of the Moone, for ſince there is ſuch a difference betwixt them in divers other reſpects, they may not perhaps agree in this.

2. That aſſertion of *Scaliger* is not by all granted for a truth. *Fromondus* with others thinke that the ſuperficies of the Sea and Land in ſo much of the world as is already diſcovered, is equall and of the ſame extenſion. *De Meteoris l. 3. c. 2. Art. 2.*

3. The Orbe of thicke and vaporous aire which incõpaſſes the Moone, makes the brighter parts of that Planet appeare bigger than in themſelves they are; as I ſhall ſhew afterwards.

To the ſecond it may be anſwered, that, that though the water be of a ſmooth ſuperficies, and ſo may ſeeme

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moſt fit to reverberate the light, yet becauſe 'tis of a perſpicuous nature, therefore the beames muſt ſinke into it, and cannot ſo ſtrongly and clearely be reflected. *Sicut in ſpeculo ubi plumbum abraſum fuerit*, (ſaith *Cardan*) as in Looking-glaſſes where part of the lead is razed off, and nothing left behind to reverberate the image, the ſpecies muſt there paſſe through and not back againe; ſo it is where the beames penetrate and ſinke into the ſubſtance of the body, there cannot be ſuch an immediate and ſtrong reflexion, as when they are beate back from the ſuperficies, and therefore the Sunne cauſes a greater heate by farre upon the Land than upon the water. Now as for that experiment where it is ſayd, that the waters have a greater brightneſſe than the Land: I anſwer, 'tis true onely there where they repreſent the image of the Sunne or ſome bright cloud, and not in other places, eſpecially if wee looke upon them at any great diſtance, as is very plaine by common obſervation.

And 'tis certaine that from any high moun-

mountaine the land dos appeare a great deale brighter than any lake or river.

This may yet be farther illuſtrated by the ſimilitude of a looking glaſſe hanging upon a wall in the Sun-ſhine, where, if the eye be not placed in the juſt line of reflexion from the glaſſe, tis manifeſt that the wall will bee of a brighter appearance than the glaſſe. True indeed in the line of reflexion, the light of the glaſſe is equall almoſt unto that which comes immediately from the Sunne it ſelfe; but now this is onely in one particular place and ſo is not like that brightneſſe which wee diſcerne in the Moone, becauſe this dos appeare equally in ſeverall ſituations, like that of the wall which doe ſeeme bright as well from every place as from any one. And therefore the ruffneſſe of the wall, or (as it is in the objection) the ruggedneſſe of our earth is ſo farre from being an hinderance of ſuch a reflexion as there is from the Moone, that it is rather required as a neceſſary condition unto it. We may conceive that in every rough body

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body there are, as it were innumerable ſuperficies, diſpoſed unto an innumerable diverſitie of inclinations. *Ita ut nullus ſit locus, ad quem non pertingant plurimi radii reflexi a plurimis ſuperficieculis, per omnem corporis ſcabri radiis luminoſis percuſsi ſuperficiem diſperſis.* "So "that there is not any place unto "which there are not ſome beams re- "flected from theſe diverſe ſuperfi- "cies, in the ſeverall parts of ſuch a "rugged body. But yet (as I ſaid before) the earth dos receive a great part of its light by illumination, as wel as by reflexion.

Galilæus Syſtem. coll. 1.

So that notwithſtanding thoſe doubts, yet this propoſition may remaine true, that the ſpots may be the Sea, and the brighter parts the Land. Of this opinion was *Plutarch*: unto him aſſented *Keplar* and *Galilæus*, whoſe words are theſe, *Si quis veterum Pythagoreorum ſententiam exuſcitare velit, lunam ſcilicet eſſe quaſi tellurem alteram, ejus pars lucidior terrenam ſuperficiem, obſcurior verò aqueam magis congruè repræſentet. Mihi autem dubium fuit nunquam terreſtris globi à longè conſpecti, atque*

De facie lun. Diſſertatio. Nunc. Syd.

que a radiis ſolaribus perfuſi, terream ſuperficiem clariorem, obſcuriorem vero aqueam ſeſe in conſpectum daturam. " If " any man have a mind to renue the " opinion of the *Pythagoreans*, that the " Moone is another earth, then her " brighter parts may fitly repreſent " the earths ſuperficies, and the darker " part the water: and for my part, I " never doubted but that our earthly " globe being ſhined upon by the " Sunne, and beheld at a great di- " ſtance, the Land would appeare " brighteſt, and the Sea more obſcure- ly. The reaſons may be.

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1. That which I urged about the foregoing chapter, becauſe the water is the thinner part, and therefore muſt give leſſe light.

Since the Starres and Planets, by reaſon of their brightneſſe, are uſually concluded to bee the thicker parts of their orbe.

2. Water is in it ſelfe of a blacker colour (ſaith *Ariſtotle*) and therefore more remote from light than the earth. Any parts of the ground being moiſtned with raine, dos looke much more darkely

In lib. de coloribus.

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darkely than when it is dry.

3. 'Tis obſerved that the ſecondary light of the Moone (which afterwards is proved to proceede from our earth) is ſenſibly brighter unto us, for two or three dayes before the conjunction, in the morning when ſhe appeares Eaſtward, than about the ſame time after the conjunction, when ſhee is ſeene in the Weſt. The reaſon of which muſt be this, becauſe that part of the earth which is oppoſite to the Moone in the Eaſt, has more land in it than Sea. Whereas on the contrary, the Moone when ſhe is in the Weſt, is ſhined upon by that part of our earth where there is more Sea than Land, from whence it will follow with good probabilitie that the earth dos caſt a greater light than the water.

4. Becauſe obſervation tels us, that the ſpotted parts are alwayes ſmooth and equall, having every where an equality of light when once they are enlightned by the Sunne, whereas the brighter parts are full of rugged gibboſities and mountaines, having many ſhades in them, as I ſhall ſhew more at large afterwards. That

LIB. I. *Cap.* 8. *Apologia pro Galilæo.*

That in this Planet there must bee Seas, *Campanella* indeavours to prove out of Scripture interpreting *the waters above the Firmament* spoken in *Genesis*, to bee meant of the Sea in this world. For (saith he) 'tis not likely that there are any such waters above the Orbes to moderate that heate which they receive from their swift motion (as some of the Fathers think.) Nor did *Moses* meane the Angels which may be called spirituall waters, as *Origen* and *Austin* would have it, for both these are rejected by the generall consent: Nor could he meane any waters in the second region, as most Commentators interpret it. For first there is nothing but vapours, which though they are afterwards turned into water, yet while they remayne there, they are onely the matter of that element, which may as well bee fire or earth or ayre. 2 Those vapours are not above the expansum but in it. So that hee thinkes there is no other way to salve all, but by making the Planets severall worlds with Sea and Land, with such Rivers & Springs as we have

Vide Ieron. epist. ad Pammachium. Confession. l. 13. c. 32. Retracted. lib. 2. Retr. cap. 6.

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2 Esdr 4.7.

have here below: Especially since *Esdras* speakes of the springs above the Firmament. But I cannot agree with him in this, nor doe I thinke that any such thing can bee proved out of Scripture.

Before I proceede to the next position, I shall first answer some doubts which might be made against the generalitie of this truth, whereby it may seeme impossible that there should be either Sea or Land in the Moone; for since she moves so swiftly as Astronomers observe, why then does there nothing fall from her, or why doth she not shake something out by the celerity of her revolution? I answer, you must know that the inclination of every heavy body to its proper Center, doth sufficiently tie it unto its place; so that suppose any thing were separated, yet must it necessarily returne againe. And there is no more danger of their falling into our world than there is feare of our falling into the Moone.

But yet there are many fabulous relations of such things as have dropped thence.

thence. There is a tale of the Nemean Lyon that *Hercules* slew, which first rushing among the heards out of his unknowne den in the Mountaine of *Cytheron* in *Bœotia*, the credulous people thought hee was sent from their Goddesse the Moone. And if a whirlewinde did chance to snatch any thing up, and afterwards raine it downe againe, the ignorant multitude were apt to believe that it dropt from Heaven. Thus *Avicenna* relates the story of a Calfe which fell downe in a storme, the beholders thinking it a Moone-calfe, and that it fell thence. So *Cardan* travelling upon the Apennine Moũtaines, a sudden blast tooke off his hat, which if it had been carryed farre, he thinks the peasants who had perceived it to fall, would have sworne it had rained hats. After some such manner, many of our prodigies come to passe, and the people are willing to believe any thing, which they may relate to others as a very strange and wonderfull event. I doubt not but the Trojan *Palladium*, the Romane *Minerva*, and our Ladies Church at *Loretto*, with many

LIB. I. *Cap.* 8. *Vide Guli: Nubrigens. de rebus Anglica: lib.* 1.

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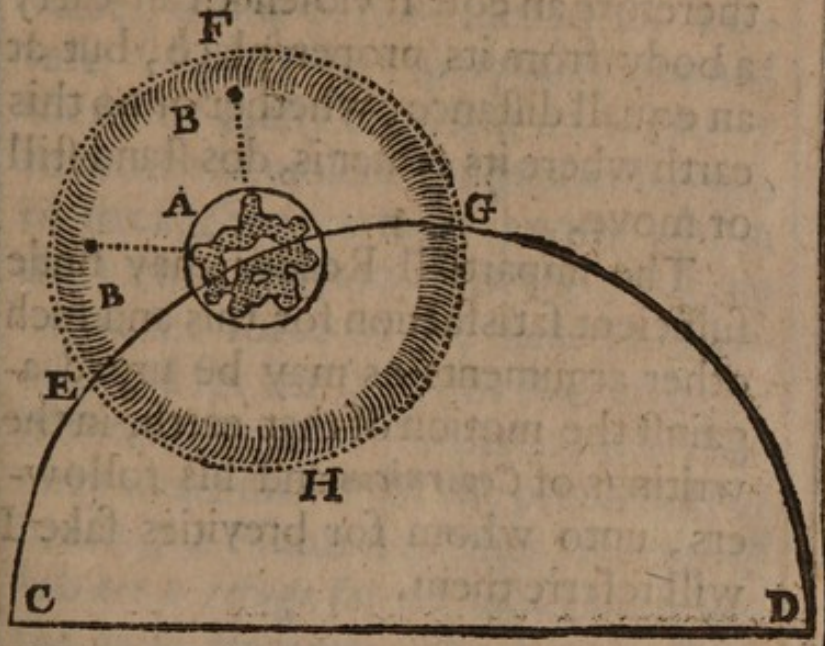
many ſacred reliques preſerved by the Papiſts might drop from the Moone as well as any of theſe.

But it may be againe objected, ſuppoſe there were a bullet ſhot up in that world, would not the Moone runne away from it, before it could fall downe, ſince the motion of her body (being every day round our earth) is farre ſwifter than the other, and ſo the bullet muſt be left behind, and at length fall downe to us? To this I anſwer,

1. If a bullet could bee ſhot ſo far till it came to the circumference of thoſe things which belong to our center, then it would fall downe to us.

2. Though there were ſome heavie body a great height in that ayre, yet would the motion of its center belong by an attractive vertue ſtill hold it within its convenient diſtance, ſo that whether their earth moved or ſtood ſtill, yet would the ſame violence caſt a body from it equally far. That I may the plainer expreſſe my meaning, I will ſet downe this Diagramme.

Suppoſe



Suppoſe this earth were A, which was to move in the circle C D. and let the bullet be ſuppoſed at B. within its proper verge; I ſay, whether this earth did ſtand ſtill or move ſwiftly towards D, yet the bullet would ſtill keepe at the ſame diſtance by reaſon of that Magnetick vertue of the center (if I may ſo ſpeake) whereby all things within its ſpheare are attracted with it. So that the violence to the

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bullet, being nothing elſe but that whereby 'tis removed from its center, therefore an equall violence can carry a body from its proper place, but at an equall diſtance, whether or no this earth where its center is, dos ſtand ſtill or move.

The impartiall Reader may finde ſufficient ſatisfaction for this and ſuch other arguments as may be urged againſt the motion of that earth, in the writings of *Copernicus* and his followers, unto whom for brevities ſake I will referre them.

Propoſition 9.

That there are high Mountaines, deepe Vallies, and ſpacious Plaines in the body of the Moone.

THough there are ſome, who think Mountaines to be a deformitie to the earth, as if they were either beate up by the Flood, or elſe caſt up like ſo many heaps of rubbiſh left at the Creation; yet if well conſidered, they will be

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bee found as much to conduce to the beauty and conveniency of the universe, as any of the other parts. Nature (saith *Pliny*) purposely framed them for many excellent uses: partly to tame the violence of greater Rivers, to strengthen certaine joynts within the veines and bowels of the earth, to break the force of the Seas inundation, and for the safety of the earths inhabitants, whether beasts or men. That they make much for the protection of beasts, the Psalmist testifies, *The highest hils are a refuge for the wild goates, and the rocks for conies.* The Kingly Prophet had likewise learned the safety of these by his owne experience, when he also was faine to make a mountaine his refuge from the fury of his Master *Saul*, who persecuted him in the wilderneſſe.

Nat. hist. l. 36. c. 8.

Psal. 104. *v.* 18.

True indeed, such places as these keepe their neighbours poore, as being most barren, but yet they preserve them safe, as being most strong; witnesse our unconquered *Wales* and *Scotland*, whose greatest protection hath beene the naturall strength of their

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Countrey, so fortified with Mountaines, that these have alwayes beene unto them sure retraites from the violence and oppression of others. Wherfore a good Author doth rightly call them natures bulwarks, cast up at God Almighties owne charges, the scornes and curbes of victorious armies; which made the Barbarians in *Curtius* so confident of their owne safety, when they were once retired to an inaccessible mountaine, that when *Alexanders* Legate had brought them to a parley, and perswading them to yeeld, told them of his masters victories, what Seas and Wildernesses he had passed; they replied, that all that might be, but could *Alexander* fly too? Over the Seas hee might have ships, and over the land horses, but hee must have wings before hee could get up thither. Such safety did those barbarous nations conceive in the mountaines whereunto they were retired. Certainly then such usefull parts were not the effect of mans sin, or produced by the Worlds curse, the Flood, but rather at the first created by the goodnesse and providence

vidence of the Almightie.

This truth is usually concluded from these and the like arguments.

1. Because the Scripture it selfe, in the description of that generall deluge, tells us, it overflowed the highest mountaines.

2. Because *Moses* who writ long after the Flood, dos yet give the same description of places and rivers, as they had before; which could not well have been if this had made so strange an alteration.

3. 'Tis evident that the trees did stand as before. For otherwise *Noah* could not so well have concluded, that the waters were abated, from this reason, because the Dove brought an Olive leafe in her mouth, when she was sent forth the second time: whereas had the trees been rooted up, she might have taken it the first time, from one of them as it was floating on the top of the waters. Now if the motion of the water was not so violent as to subvert the trees, much lesse was it able to cast up such vast heapes as the mountaines.

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4. When the Scripture doth set forth unto us the power and immensitie of God by the varietie or usefulnesse of the creatures which hee hath made, amongst the rest it doth often mention the mountaines. *Psal.* 104. 8. item. 148. 9. *Isai.* 40. 12. And therefore 'tis probable they were created at the first. Unto this I might adde that in other places Divine Wisdome in shewing of its owne antiquitie, saith that he was *From the beginning, before the earth or the mountains were brought forth.*

Prov. 8. 25.

Psal. 90. 2.

5. If we may trust the relations of Antiquitie, there were many monuments left undefaced after the Flood.

Ioseph. Ant. lib. 1. *c.* 3.

So that if I intend to prove that the Moone is such a habitable world as this is; 'tis requisite that I shew it to have the same conveniences of habitation as this hath; and here if some Rabbi or Chymick were to handle the point, they would first prove it out of Scripture, from that place in *Moses* his blessing, where hee speakes of the ancient mountaines and lasting hills, *Deut.* 33. תררי קרם וגבעות עולם for having

having immediately before mentioned those blessings which should happen unto *Joseph* by the influence of the Moone, he does presently exegetically iterate them in blessing him with the chiefe things of the ancient mountaines and lasting hills; you may also see the same expression used in *Jacobs* blessing of *Joseph*. *Gen.* 49. 26.

But however we may deale *pro* or *con* in Philosophy, yet we must not bee too bold with divine truths, or bring Scripture to patronize any fancy of our owne, though, perhaps, it be a truth. I am not of their mind who think it a good course to confirme Philosophicall secrets from the letter of the Scripture, or by abusing some obscure text in it. Mee thinks it savors too much of that Melancholly humor of the Chymicks, who, aiming in all their studies at the making of gold, doe perswade themselves, that the most learned and subtile of the antient Authors, in all their obscure places doe meane some such sence as may make to their purpose. And hence it is that they derive such strange mysteries

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from the fables of the Poëts, and can tell you what great secret it was that antiquitie did hide under the fiction of *Jupiter* being turned into a shower of gold: of *Mercuries* being made the interpreter of the gods: of the *Moones* descending to the earth for the love of *Endymion*: with such ridiculous interpretations of these and the like fables, which any reasonable considering man cannot conceive to proceed from any but such as are distracted. No lesse fantasticall in this kind are the Jewish Rabbies, amongst whom is not any opinion, whether in nature or policy, whether true or false, but some of them, by a Cabalisticall interpretation can father it upon a darke place of Scripture, or (if need bee) upon a text that is cleane contrary. There being not any absurditie so grosse and incredible, for which these abusers of the text, will not find out an argument. Whereas, 'tis the more naturall way, and should be observed in all controversies, to apply unto every thing, the proper proofes of it; and when wee deale with Philosophicall truths,

truths, to keepe our ſelves within the bounds of humane reaſon and authority. Lib. 1. Cap. 9.

But this by the way. For the better proofe of this propoſition, I might here cite the teſtimony of *Diodorus*, who thought the Moone to bee full of rugged places, *velut terreſtribus tumulis ſuperciliоſam*; but hee erred much in ſome circumſtances of this opinion, eſpecially where he ſayes, there is an Iland amongſt the *Hyperboreans*, wherein thoſe hills may to the eye bee plainly diſcovered; and for this reaſon* *Cælius* calls him a fabulous Writer. But you may ſee more expreſſe authority for the proofe of this in the opinions of *Anaxagoras* and *Democritus*, who held that this Planet was full of champion grounds, mountains and vallies. And this ſeemed likewiſe probable unto *Auguſtinus Nifus*, whoſe words are theſe: *Forſitan non eſt remotum dicere lunæ partes eſſe diverſas, veluti ſunt partes terræ, quarum aliæ ſunt valloſæ, aliæ montoſæ, ex quarum differentia effici poteſt facies illa lunæ; nec eſt rationi diſſonum, nam luna eſt corpus imperfectè Sphæricum,*

* *Lect. aut. l. 1. c. 15.*

Plut. de plac. l. 2. c. 25.

De Cælo. l. 2. part. 49.

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ricum, cum sit corpus ab ultimo cœlo elongatum, ut supra dixit Aristoteles. Perhaps, it would not be amisse to say that the parts of the Moone were divers, as the parts of this earth, whereof some are vallies, and some mountaines, from the difference of which, some spots in the Moone may proceed; nor is this against reason; for that Planet cannot be perfecty spherical, since 'tis so remote a body from the first orbe, as *Aristotle* had said before. You may see this truth assented unto by *Blancanus* the Jesuit, and by him confirmed with divers reasons. *Keplar* hath observed in the Moones eclipses, that the division of her inlightned part from the shaded, was made by a crooked unequall line, of which there cannot bee any probable cause conceived, unlesse it did arise from the ruggednes of that Planet; for it cannot at all be produc'd from the shade of any mountaines here upon earth, because these would bee so lessened before they could reach so high in a conicall shadow, that they would not be at all sensible unto us (as might

De Mundi fab. pars 3. c. 4.

Astron. Opt. c. 6. num. 9.

might easily bee demonstrated) nor can it be conceived what reason of this difference there should be in the Sun. Wherefore there being no other body that hath any thing to doe in eclipses, we must necessarily conclude, that it is caused by a variety of parts in the Moone it selfe, and what can these be but its gibbositities? Now if you should aske a reason why there should bee such a multitude of these in that Planet, the same *Keplar* shall jest you out an answer. Supposing (saith hee) that those inhabitants are bigger than any of us in the same proportion, as their dayes are longer than ours, viz. by fifteen times it may be, for want of stones to erect such vast houses as were requisite for their bodies, they are faine to digge great and round hollowes in the earth, where they may both procure water for their thirst, and turning about with the shade, may avoid those great heats which otherwise they would be liable unto; or if you will give *Cæsar la Galla* leave to guesse in the same manner, he would rather thinke that those thirsty nations cast

Lib. 1. *Cap.* 9.

Kep. append. Selenogra.

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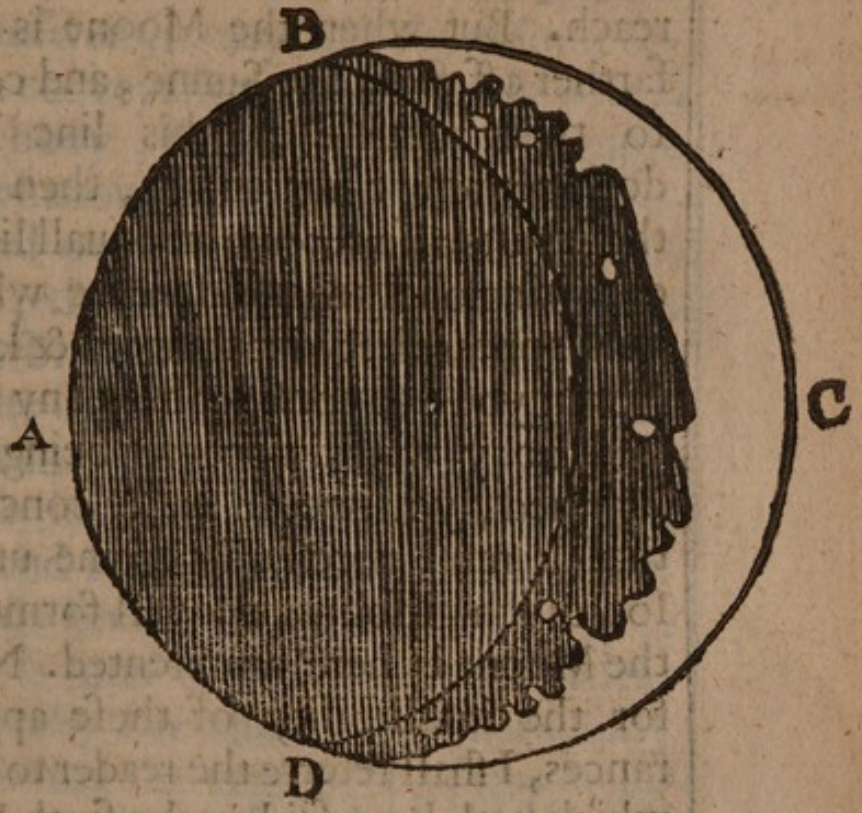
cast up so many and so great heaps of earth in digging of their wine cellars; but this onely by the way.

Nuncius Sydereus.

I shall next produce the eye-witnesse of *Galilæus*, on which I most of all depend for the proofe of this Propositi-on, when he beheld the new Moone through his perspective, it appeared to him under a rugged and spotted figure, seeming to have the darker and en-lightned parts divided by a tortuous line, having some parcels of light at a good distance from the other; and this difference is so remarkable, that you may easily perceive it through one of those ordinary perspectives, which are commonly sold amongst us; but for your better apprehending of what I deliver, I will set downe the Figure as I find it in *Galilæus*.

Suppose



Suppoſe A B C D to repreſent the appearance of the Moones body being in a ſextile, you may ſee ſome brighter parts ſeparated at a pretty diſtance from the other, which can be nothing elſe but a reflexion of the Sun beames upon ſome parts that are higher than the reſt, and thoſe obſcure gibboſities which

which ſtand out towards the enlightened parts, muſt be ſuch hollow and deepe places whereto the rayes cannot reach. But when the Moone is got farther off from the Sunne, and come to that fulneſſe as this line B D doth repreſent her under, then doe theſe parts alſo receive an equall light, excepting onely that difference which doth appeare betwixt their ſea & land. And if you doe conſider how any rugged body would appeare being enlightned, you would eaſily conceive that it muſt neceſſarily ſeeme under ſome ſuch gibbous unequall forme, as the Moone is here repreſented. Now for the infallibility of theſe appearances, I ſhall referre the reader to that which hath been ſaid in the ſixth Propoſition.

But *Cæſar la Galla* affirmes, that all theſe appearances may conſiſt with a plaine ſuperficies, if wee ſuppoſe the parts of the body to be ſome of them *Diaphanous*, and ſome *Opacous*; and if you object that the light which is convayd to any diaphanous part in a plaine ſuperficies, muſt bee by a continued line,

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line, whereas here there appeare many brighter parts among the obscure at some distance from the rest. To this he answers, it may arise from some secret conveyances and channels within her body, that doe consist of a more diaphanous matter, which being covered over with an opacous superficies, the light passing through them may break out a great way off; whereas the other parts betwixt, may still remaine darke. Just as the River *Arethusa* in *Sicily* which runnes under ground for a great way, and afterwards breaks out againe. But because this is one of the chiefest fancies, whereby hee thinks hee hath fully answered the argument of this opinion; I will therefore set downe his answer in his owne words, least the Reader might suspect more in them than I have expressed *Non est impossibile cæcos ductus diaphani & perspicui corporis, sed opacâ superficie protendi, usque in diaphanam aliquam ex profundo in superficiem emergentem partem, per quos ductus lumen longo postmodum interstitio erumpat, &c.* But I reply, if the superficies betwixt

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betwixt theſe two enlightened parts remaine darke becauſe of its opacity, then would it alwayes be darke, and the Sunne could not make it partake of light more than it could of perſpicuity: But this contradicts all experience, as you may ſee in *Galilæus*, who affirmes that when the Sunne comes neerer to his oppoſition, then, that which is betwixt them both, is enlightned as well as either. Nay, this oppoſes his owne eye-witneſſe, for he confeſſes himſelfe that he ſaw this by the glaſſe. Hee had ſaid before, that he came to ſee thoſe ſtrange ſights diſcovered by *Galilæus* his glaſſe, with an intent of contradiction, and you may reade that confirmed in the weakneſſe of this anſwer, which rather bewrayes an obſtinate, than a perſwaded will; for otherwiſe ſure he would never have undertooke to have deſtroyed ſuch certaine proofes with ſo groundleſſe a fancy.

Syſt. mundi coll. 1.

That inſtance of *Galilæus*, would have beene a better evaſion had this Author been acquainted with it; who might then have compared the Moone to

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to that which wee call mother of pearle, which though it bee most exactly polished in the superficies of it; yet will seeme unto the eye as if there were divers swellings and risings in its severall parts. But yet, this neither would not well have shifted the experiment of the perspective. For these rugged parts doe not only appeare upon one side of the Moone, but as the Sunne dos turne about in divers places, so doe they also cast their shadow. When the Moone is in her increase, then doe they cast their shadowes to the East. When she is in the decrease, and the Sunne on the other side of her, then likewise may we discover these brighter parts casting their shadowes Westward. Whereas in the full Moone there are none of all these to be seene.

But it may be objected, that 'tis almost impossible, and altogether unlikely, that in the Moone there should bee any mountaines so high, as those observations make them. For doe but suppose according to the common principles, that the Moones diameter

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unto the Earths, is very neere to the proportion of 2 to 7. Suppose withall that the Earths diameter containes about 7000. Italian miles, and the Moones 2000 (as is commonly granted.) Now *Galilæus* hath observed, that some parts have beene enlightned, when they were the twentieth part of the diameter distant from the common terme of illumination. From whence, it must necessarily follow that there may bee some Mountaines in the Moone, so high, that they are able to cast a shadow a 100 miles off. An opinion that sounds like a prodigie or a fiction; wherefore 'tis likely that either those appearances are caused by somewhat else besides mountaines, or else those are fallible observations, from whence may follow such improbable, inconceiveable consequences.

But to this I answer:

1. You must consider the height of the Mountaines is but very little, if you compare them to the length of their shadowes. Sir *Walter Rawleigh* observes that the Mount *Athos* now called

Hist. l. 1. *c.* 7. *sect.* 11.

called *Lacas*, casts its shadow 300 furlongs, which is above 37 miles; and yet that Mount is none of the highest. Nay *Solinus* (whom I should rather believe in this kinde) affirmes that this Mountaine gives his shadow quite over the Sea, from *Macedon* to the Ile of *Lemnos*, which is 700 furlongs or 84 miles, and yet according to the common reckoning it doth scarce reach 4 miles upwards, in its perpendicular height.

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Polyhistor. c. 21.

2. I affirme that there are very high Mountaines in the Moone. *Keplar* and *Galilæus* thinke that they are higher than any which are upon our earth. But I am not of their opinion in this, because I suppose they goe upon a falfe ground, whilst they conceive that the highest mountaine upon the earth is not above a mile perpendicular.

Whereas 'tis the common opinion and found true enough by observation, that *Olympus*, *Atlas*, *Taurus* and *Emus*, with many others, are much above this height. *Tenariffa* in the Canary Ilands, is commonly related to bee above 8 miles perpendicular, and

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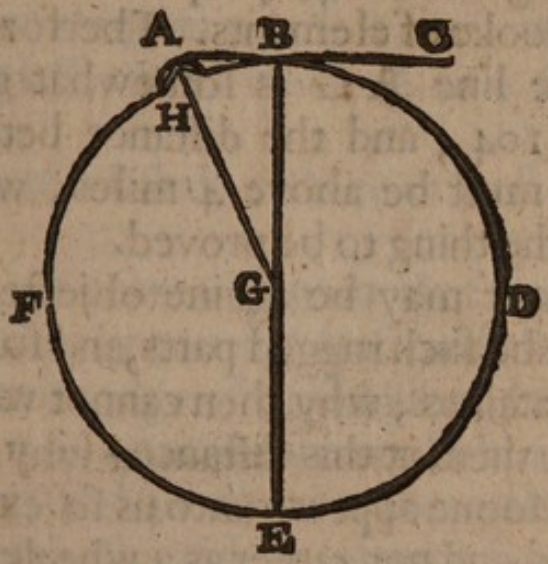
bout this height (say some) is the mount *Perjacaca* in *America*. * *Sir Walter Rawleigh* seemes to thinke, that the highest of these is neere 30 miles upright: nay, *Aristotle* speaking of *Caucasus* in *Asia*, affirmes it to bee visible for 560 miles, as some interpreters finde by computation; from which it will follow, that it was 78 miles perpendicularly high, as you may see confirmed by *Jacobus Mazonius*, and out of him in *Blancanus* the Jesuite. But this deviates from the truth more in excesse, than the other doth in defect. However, though these in the Moone are not so high as some amongst us; yet certaine it is they are of a great height, and some of them at the least foure miles perpendicular. This I shall prove from the observation of *Galilæus*, whose glasse can shew to the senses a proofe beyond exception; and certainly that man must needs be of a most timerous faith who dares not believe his own eye.

By that perspective you may plainly discerne some enlightned parts (which are the mountaines) to bee distant

*Hist. l. 1. c. 7. sect. 11. Meteor. l. 1. c. 11.

Comparatio Arist. cum. Platone. Sect. 3. c. 5. Exposit. in loc. Math. Arlis loc. 148.

distant from the other about the twentieth part of the diameter. From whence it will follow, that those mountaines must necessarily be at the least foure Italian miles in height.



For let B D E F be the body of the Moone, A B C will be a ray or beame of the Sunne, which enlightens a mountaine at A, and B is the point of contingency; the distance betwixt A and B, must bee supposed to bee the twentieth part of the diameter, which is an 100 miles, for so far are some en-

lightened parts ſevered from the common terme of illumination. Now the aggregate of the quadrate from A B a hundred, and B G a 1000 will be 1010000; unto which the quadrate ariſing from A G muſt be equall; according to the 47 propoſition in the firſt booke of elements. Therfore the whole line A G is ſomewhat more than 104, and the diſtance betwixt H A muſt be above 4 miles, which was the thing to be proved.

But it may be againe objected, if there be ſuch rugged parts, and ſo high mountaines, why then cannot we diſcerne them at this diſtance? why doth the Moone appeare unto us ſo exactly round, and not rather as a wheele with teeth?

I anſwer, by reaſon of too great a diſtance; for if the whole body appeare to our eye ſo little, then thoſe parts which beare ſo ſmall a proportion to the whole, will not at all bee ſenſible.

But it may be replied, if there were any ſuch remarkeable hils, why does not the limbe of the Moone appeare like

like a wheele with teeth, to thoſe who looke upon it through the great perſpective, on whoſe witneſſe you ſo much depend? or what reaſon is there that ſhee appeares as exactly round through it, as ſhee doth to the bare eye? certainely then, either there is no ſuch thing as you imagine, or elſe the glaſſe failes much in this diſcovery.

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To this I ſhall anſwer out of *Galilæus.*

1. You muſt know that there is not meerely one ranke of mountaines, about the edge of the Moone, but divers orders, one mountaine behind another, and ſo there is ſomewhat to hinder thoſe void ſpaces which otherwiſe, perhaps, might appeare.

Now, where there be many hils, the ground ſeemes even to a man that can ſee the tops of all. Thus when the ſea rages, and many vaſt waves are lifted up, yet all may appeare plaine enough to one that ſtands at the ſhore. So where there are ſo many hils, the inequality will bee leſſe remarkable, if it be diſcerned at a diſtance.

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2. Though there be mountains in that part which apeares unto us to be the limbe of the Moone, as well as in any other place, yet the bright vapors hide their appearance: for there is an orbe of thicke vaporous aire that doth immediatly compasse the body of the Moone; which though it have not so great opacity, as to terminate the sight, yet being once enlightened by the Sunne, it doth represent the body of the Moone under a greater forme, and hinders our sight, from a distinct view of her true circumference. But of this in the next Chapter.

Somn. Astr. not. 207.

3. *Keplar* hath observed, that in the solary Eclipses, when the rays may passe thorough this vaporous ayre, there are some gibbosities to be discerned in the limbe of the Moone.

I have now sufficiently proved, that there are hills in the Moone, and hence it may seeme likely that there is also a world; for since providence hath some speciall end in all its works, certainly then these mountaines were not produced in vaine; and what more probable meaning can wee conceive there

ſhould be, than to make that place convenient for habitation?

Propoſition 10.

That there is an Atmo-ſphæra, or an orbe of groſſe, vaporous aire, immediately encompaſſing the body of the Moone.

AS that part of our aire which is neereſt to the earth, is of a thicker ſubſtance than the other, by reaſon 'tis alwayes mixed with ſome vapours, which are continually exhaled into it. So is it equally requiſite, that if there be a world in the Moone, that the aire about that, ſhould be alike qualified with ours. Now, that there is ſuch an orbe of groſſe aire, was firſt of all (for ought I can reade) obſerved by *Meſlin*, afterwards aſſented unto by *Keplar* and *Galilæus*, and ſince by *Baptiſta Ciſacus*, *Sheiner* with others, all of them confirming it by the ſame arguments which I ſhall onely cite, and then leave this Propoſition.

Vide Euſeb. Nicrem. de Nat. Hiſt. l. 2. c. 11.

1. 'Tis

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1. 'Tis not improbable that there ſhould be a ſphere of groſſer aire about the Moone; becauſe 'tis obſerved, that there are ſuch kind of evaporations which proceed from the Sun it ſelfe. For there are diſcovered divers moveable ſpots, like clouds, that doe encompaſſe his body: which thoſe Authors, who have been moſt frequently verſed in theſe kind of experiments and ſtudies, doe conclude to be nothing elſe but evaporations from it. The probabilitie and truth of which obſervations may alſo bee inferred from ſome other appearances. As,

So. A. D. 1547. Aprill 24. to the 28.

1. It hath been obſerved that the Sunne hath ſometimes for the ſpace of foure days together, appeared as dull and ruddy almoſt as the Moone in her Eccliplſes; In ſo much that the Starrs have been ſeene at midday. Nay, he hath been conſtantly darkned for almoſt a whole yeare, and never ſhined, but with a kind of heavy and duskiſh light, ſo that there was ſcarſe heate enough to ripen the fruits. As it was about the time when *Cæſar* was killed. Which was recorded by ſome of the Poëts.

Poëts. Thus *Virgil*, ſpeaking of the Sunne.

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Virgil. Georg. lib. 1.

Ille etiam extincto miſeratus Cæſare Romam,
Cum caput obſcurâ nitidum ferrugine texit,
Impiaq́, æternam timuerunt ſæcula noctem.
He pittying Rome when as great Cæſar dyde,
His head within a mourning vaile did hide.
And thus the wicked guilty world did fright,
With doubtfull feares of an eternall night.

Ovid likewiſe ſpeaking of his death

Metam. lib. 15.

----------Solis quoque triſtis imago
Lurida ſollicitis præbebat lumina terris.
----------The Suns ſad image then
Did yeeld a lowring light to feareſull men.

Now theſe appearances could not ariſe from any lower vapor. For then 1. They would not have been ſo univerſall as they were, being ſeene through all Europe; or elſe 2. that vapor muſt have covered the ſtarres as well as the Sunne, which yet notwithſtanding

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ſtanding were then plainly diſcerned in the day time. You may ſee this argument illuſtrated in another the like caſe. Chap. 12. Hence then it will follow, that this fuliginous matter, which did thus obſcure the Sunne, muſt needs bee very neere his body; and if ſo, then, what can we more probably gueſſe it to be, than evaporations from it?

2. 'Tis obſerved, that in the Suns totall Ecclipſes, when there is no part of his body diſcernable, yet there dos not always follow ſo great a darkneſſe, as might bee expected from his totall abſence. Now 'tis probable, that the reaſon is, becauſe theſe thicker vapors, being enlightned by his beames, doe convey ſome light unto us, notwithſtanding the interpoſition of the Moone betwixt his body and our earth.

3. This likewiſe is by ſome gueſt to be the reaſon of the *crepuſculum* or that light which wee have before the Suns riſing.

Now, if there be ſuch evaporations from the Sunne, much more then from

from the moone, which does consist of a more grosse and impure substance. The other arguments are taken from severall observations in the Moon herselfe, and doe more directly tend to the proofe of this proposition.

2. 'Tis observed, that so much of the Moone as is enlightned, is alwayes part of a bigger circle, than that which is darker. The frequent experience of others hath proved this, and an easie observation may quickly confirme it. But now this cannot proceede from any other cause so probable, as from this orbe of aire; especially when we consider how that Planet shining with a borrowed light, doth not send forth any such rayes as may make her appearance bigger than her body.

3. When the Moone being halfe enlightned, begins to cover any Starre, if the Starre bee towards the obscurer part, then may it by the perspective be discerned, to bee neerer unto the center of the moone, than the outward circumference of the enlightned part. But the moone being in the full;

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full; then dos it seeme to receive these starres, within its limbe.

4. Though the Moone doe sometime appeare the first day of her change when so much as appeares enlightned, cannot be above the 80 part of her diameter, yet then will the hornes seeme at least to be of a fingers breadth in extension. Which could not bee, unlesse the ayre about it were illuminated.

5. 'Tis observed in the Solary eclipses, that there is sometimes a great trepidation about the body of the Moone, from which wee may likewise argue an Atmo-sphæra, since we cannot well conceive what so probable a cause there should be of such an appearance as this, *Quod radii Solares à vaporibus Lunam ambientibus fuerint intercisi*, that the Sunne-beames were broken and refracted by the vapours that encompassed the Moone.

Scheiner. Ros. Vrs. l. 4. pars 2. c. 27.

6. I may adde the like argument taken from another observation which will be easily tried and granted. When the Sunne is eclipsed, we discerne the Moone as shee is in her owne naturall bignesse;

bigneſſe; but then ſhe appeares ſomewhat leſſe than when ſhe is in the full, though ſhe be in the ſame place of her ſuppoſed excentrick and epicycle; and therfore *Tycho* hath calculated a Table for the Diameter of the divers new Moones. But now there is no reaſon ſo probable, to ſalve this appearance, as to place an orbe of thicker aire, neere the body of that Planet, which may bee enlightned by the reflected beames, and through which the direct rayes may eaſily penetrate.

But ſome may object, that this will not conſiſt with that which was before delivered, where I ſaid, that the thinneſt parts had leaſt light.

If this were true, how comes it to paſſe then, that this aire ſhould bee as right as any of the others parts, when as tis the thinneſt of all?

I anſwer, if the light be received by reflection only, then the thickeſt body hath moſt, becauſe it is beſt able to beate backe the rayes; but if the light be received by illumination (eſpecially if there be an opacous body behinde, which may double the beames

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beames by reflexion) as it is here, then I deny not but a thinne body may retaine much light; and perhaps, some of those appearances, which wee take for fiery comets, are nothing else but a bright cloud enlightned; So that probable it is, there may be such aire without the Moone; & hence it comes to passe, that the greater spots are only visible towards her middle parts, and none neere the circumference; not but that there are some as well in those parts as elsewhere, but they are not there perceiveable, by reason of those brighter vapours which hide them.

Proposition 11.

That as their world is our Moone, so our world is their Moone.

I Have already handled the first thing that I promised, according to the Method which *Aristotle* uses in his Book *de Mundo*, and shew'd you the necessary parts that belong to this world

world in the Moone. In the next place 'tis requisite that I proceed to those things which are extrinsecall unto it, as the Seasons, the Meteors, and the Inhabitants.

1. Of the Seasons;

And if there be such a world in the Moone, 'tis requisite then that their seasons should bee some way correspondent unto ours, that they should have Winter and Summer, night and day, as we have.

Now that in this Planet there is some similitude of Winter and Summer, is affirmed by *Aristotle* himselfe, since there is one hemispheare that hath alwayes heate and light, and the other that hath darkenesse and cold. True indeed, their dayes and yeares are always of one and the same length (unlesse we make one of their yeares to be 19 of ours, in which space all the Starres doe arise after the same order.) But tis so with us also under the Poles, and therefore that great difference is not sufficient to make it altogether unlike ours; nor can we expect that every thing there should be in the same

De gen animal. l. 4. 12.

Golden Number.

Lib. I. Cap. II.

manner as it is here below, as if nature had no way but one to bring about her purposes. We have no reason then to thinke it necessary that both these worlds should be altogether alike, but it may suffice if they be correspondent in something only. However, it may bee questioned whether it doth not seeme to bee against the wisedome of Providence, to make the night of so great a length, when they have such a long time unfit for worke? I answer, no; since tis so, and more with us also under the poles; and besides, the generall length of their night is somewhat abated in the bignesse of their Moone which is our earth. For this returnes as great a light unto that Planet, as it receives from it. But for the better proofe of this, I shall first free the way from such opinions as might otherwise hinder the speed of a clearer progresse.

Plut. de fac. lunæ.

Plutarch one of the chiefe patrons of this world in the Moone, doth directly contradict this proposition; affirming, that those who live there, may discerne our world, as the dreggs and

sediment

ſediment of all other creatures, appearing to them through clouds and foggy miſts, and that altogether devoid of light, being baſe and unmoveable, ſo that they might well imagine the darke place of damnation to bee here ſituate, and that they onely were the inhabiters of the world, as being in the midſt betwixt Heaven and Hell.

To this I may anſwer, 'tis probable that *Plutarch* ſpake this inconſiderately, and without a reaſon; which makes him likewiſe fall into another abſurditie, when hee ſays our earth would appeare immoveable; whereas queſtionleſſe, though it did not, yet would it ſeeme to move, and theirs to ſtand ſtill, as the Land doth to a man in a Shippe; according to that of the Poët:

Provehimur portu, terræq́; urbeſq; recedunt.

And I doubt not but that ingenuous Author would eaſily have recanted, if hee had beene but acquainted with thoſe experiences which men of latter times have found out, for the confirmation of this truth.

Lib. I. Cap. II.

Somn. Scip. l. 1. c. 19.

2. Unto him assents *Macrobius*, whose words are these; *Terra accepto solis lumine clarescit tantummodò, non relucet.* "The earth is by the Sunne-"beames made bright, but not able "to enlighten any thing so farre. And his reason is, because this being of a thick and grosse matter, the light is terminated in its superficies, and cannot penetrate into the substance; whereas the Moone doth therefore seeme so bright to us, because it receives the beames within it selfe. But the weaknesse of this assertion, may bee easily manifest by a common experience; for polished steele (whose opacity will not give any admittance to the rayes) reflects a stronger heate than glasse, and so consequently a greater light.

3. 'Tis the generall consent of Philosophers, that the reflection of the Sunne-beames from the earth doth not reach much above halfe a mile high, where they terminate the first region, so that to affirme they might ascend to the Moone, were to say, there were but one region of aire, which contradicts the proved and received opinion.

Unto

Unto this it may be answered:

That it is indeed the common consent, that the reflexion of the Sunne-beames reach onely to the second region; but yet some there are, and those too, Philosophers of good note, who thought otherwise. Thus *Plotinus* is cited by *Cælius*, *Si concipias te in sublimi quopiam mundi loco, unde oculis subjiciatur terræ moles aquis circumfusa, & solis syderumq; radiis illustrata, non aliam profecto visam iri probabile est, quam qualis modo visatur lunaris globi species.* "If "you conceive your selfe to bee in "some such high place, where you "might discerne the whole Globe of "the earth and water, when it was "enlightned by the Sunnes rayes, 'tis "probable it would then appeare to "you in the same shape as the Moone "doth now unto us. So *Paulus Foscarinus. Terra nihil aliud est quàm altera Luna, vel Stella, taliſq; nobis appareret, si ex convenienti elongatione eminus conspiceretur, in ipsaq; observari possent eædem aspectuum varietates, quæ in Lunâ apparent.* The earth is nothing else but another Moone or Starre, and would appeare so

LIB. I. *Cap.* II.

Ant. lect. l. 1. c. 4.

In epist. ad Sebast. Fantonum.

Lib. I. Cap. II.

so unto us if it were beheld at a convenient distance with the same changes and varieties as there are in the Moon. Thus also *Carolus Malapertius*, whose words are these, *Terra hæc nostra, si in luna constituti essemus, splendida prorsus quasi non ignobilis planeta, nobis appareret.* "If wee were placed in the Moone, "and from thence beheld this our "earth, it would appeare unto us ve- "ry bright, like one of the nobler "Planets. Unto these doth *Fromondus* assent, when he sayes, *Credo equidem quod si oculus quispiam in orbe lunari foret, globum terræ & aquæ instar ingentis sydéris à sole illustrem conspiceret.* "I believe "that this globe of earth and water "would appeare like some great Star "to any one, who should looke upon "it from the Moone. Now this could not bee, nor could it shine so remarkably, unlesse the beames of light were reflected from it. And therefore the same *Fromondus* expresly holds, that the first region of ayre is there terminated, where the heate caused by reflexion begins to languish, whereas the beames themselves doe passe a great

Præfat. ad Austriaca syd.

Meteor. l. 1. c. 2. Art. 2.

great way further. The chiefe argument which doth moſt plainely manifeſt this truth, is taken from a common obſervation which may bee eaſily tryed.

If you behold the Moone a little before or after the conjunction, when ſhe is in a ſextile with the Sunne, you may diſcerne not onely the part which is enlightned, but the reſt alſo to have in it a kind of a duskiſh light; but if you chuſe out ſuch a ſituation, where ſome houſe or chimney (being ſome 70 or 80 paces diſtant from you) may hide from your eye the enlightned hornes, you may then diſcerne a greater and more remarkable ſhining in thoſe parts unto which the Sunne beames cannot reach; nay there is ſo great a light, that by the helpe of a good perſpective you may diſcerne its ſpots. In ſo much that *Blancanus* the Jeſuite ſpeaking of it, ſayes, *Hæc experientia ita me aliquando fefellit, ut in hunc fulgorem caſu ac repente incidens, exiſtimarim novo quodam miraculo tempore adoleſcentis lunæ factum eſſe plenilunium.* " This experiment did once " ſo deceive mee, that happening up- " on

De mundi fab. p. 3. *c.* 3.

" on the ſight of this brightneſſe upon " a ſudden, I thought that by ſome " new miracle the Moone had beene " got into her full a little after her " change.

But now this light is not proper to the Moone; it doth not proceed from the rayes of the Sunne which doth penetrate her body, nor is it cauſed by any other of the Planets and Starres. Therefore it muſt neceſſarily follow, that it comes from the earth. The two firſt of theſe I have already proved, and as for the laſt, it is confidently affirmed by *Cælius*, *Quod ſi in diſquiſitionem evocet quis, an lunari ſyderi lucem fœnerent planetæ item alii, aſſeveranter aſtruendum non fœnerare.* " If any ſhould " aske whether the other Planets lend " any light to the Moone? I anſwer, " they doe not. True indeed, the noble *Tycho* diſcuſsing the reaſon of this light attributes it to the Planet *Venus*; and I grant that this may convey ſome light to the Moone; but that it is not the cauſe of this whereof wee now diſcourſe, is of it ſelfe ſufficiently plaine, becauſe *Venus* is ſometimes over the Moone,

Ant. Lect. l. 20. c. 5.

Progym. 1.

Moone, when as ſhee cannot convey any light to that part which is turned from her. Lib. 1. *Cap.* 11.

It doth not proceed from the fixed ſtarres; for then it would retaine the ſame light in ecclipſes, whereas the light at ſuch times is more ruddy and dull. Then alſo the light of the Moone would not be greater or leſſer, according to its diſtance from the edge of the earths ſhadow, ſince it did at all times equally participate this light of the ſtarres.

In briefe, this is neither proper to the Moone, nor does it proceed from any penetration of the Suns rays, or the ſhining of *Venus*, or the other Planets, or the fixed ſtarrs. Now becauſe there is no other body in the whole Univerſe, ſave the earth, it remaines that this light muſt neceſſarily be cauſed by that, which with a juſt gratitude repaies to the Moone ſuch illumination as it receives from her.

And as loving friends equally participate of the ſame joy and griefe, ſo doe theſe mutually partake of the ſame light from the Sunne, and the ſame darkeneſſe

Lib. I. Cap. 11.

darkeneſſe from the eclipſes, being allo ſeverally helped by one another in their greateſt wants: For when the Moone is in conjunction with the Sun, & her upper part receives all the light, then her lower Hemiſpheare (which would otherwiſe be altogether darke) is enlightened by the reflexion of the Sunne-beames from the earth. When theſe two Planets are in oppoſition, then that part of the earth which could not receive any light from the Sunne-beames, is moſt enlightened by the Moone, being then in her full; and as ſhee doth moſt illuminate the earth when the Sunne-beames cannot, ſo the gratefull earth returnes to her as great (nay greater) light when ſhee moſt wants it; ſo that alwayes that viſible part of the Moone which receives nothing from the Sunne, is enlightened by the earth, as is proved by *Galilæus*, with many more arguments, in that Treatiſe which he calls *Syſtema mundi*. True indeed, when the Moone comes to a quartile, then you can neither diſcerne this light, nor yet the darker part of her body, and that for a double reaſon. 1. Becauſe

1. Becauſe the neerer it comes to the full, the leſſe light dos it receive from the earth, whoſe illumination dos always decreaſe in the ſame proportion as the Moone dos increaſe.

2. Becauſe of the exuperancy of the light in the other parts. *Quippe illuſtratum medium ſpeciem recipit valentiorem*, the clearer brightneſſe involves the weaker, it being with the ſpecies of ſight, as it is with thoſe of ſound; and as the greater noiſe drowns the leſſe, ſo the brighter object hides that which is more obſcure. But as they do always in their mutuall viciſſitudes participate of one anothers light; ſo alſo doe they partake of the ſame defects and darknings; for when our Moone is eclipſed, then is their Sunne darkned; and when our Sun is eclipſed, thē is their Moon deprived of its light, as you may ſee affirmed by *Meſlin.* *Quod ſi terram nobis ex alto liceret intueri, quemadmodum deficientem lunam ex longinquo ſpectare poſſumus, videremus tempore eclipſis ſolis terræ aliquam partem lumine ſolis deficere, eodem planè modo ſicut ex oppoſito luna deficit.* "If we might behold

Scal. exerc. 62.

Epit. Aſtro. l. 4. *part.* 2.

Lib. 1. Cap. 11.

" hold this globe of earth at the same
" distance, as we doe the Moon in her
" defect, wee might discerne some
" part of it darkened in the Sunnes
" eclipses, just so as the Moone is in
" hers. For as our Moone is eclipsed by the interposition of our earth, so is their Moone eclipsed by the interposition of theirs. The manner of this mutuall illumination betwixt these two you may plainly discerne in this Figure following.

Where


A
B

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Where A represents the Sunne, B the Earth, and C the Moone; Now suppose the Moone C to be in a sextile of increase, when there is onely one small part of her body enlightened, then the earth B will have such a part of its visible Hemisphere darkned, as is proportionable to that part of the Moone which is enlightened; and as for so much of the Moone, as the Sunbeames cannot reach unto, it receives light from a proportionall part of the earth which shines upon it, as you may plainly perceive by the Figure.

You see then that agreement and similitude which there is betwixt our earth and the Moone. Now the greatest difference which makes them unlike, is this, that the Moone enlightens our earth round about, whereas our earth gives light onely to that Hemisphere of the Moone which is visible unto us, as may be certainly gathered from the constant appearance of the same spots, which could not thus come to passe, if the Moone had such a diurnall motion about its owne axis as perhaps our earth hath. And though some

suppose

ſuppoſe her to move in an epicycle, yet this doth not ſo turne her body round, that wee may diſcerne both Hemiſpheares; for according to that hypotheſis (ſay they) the motion of her eccentrick doth turne her face towards us, as much as the other doth from us.

But now, if any queſtion what they doe for a Moone who live in the upper part of her body? I anſwer, the ſolving of this, is the moſt uncertaine and difficult thing that I know of, concerning this whole matter. But yet unto mee this ſeemes a probable conjecture.

That the upper Hemiſpheare of the Moone doth receive a ſufficient light from thoſe Planets about it; and amongſt theſe, *Venus* (it may bee) beſtowes a more eſpeciall brightneſſe, ſince *Galilæus* hath plainly diſcerned that ſhe ſuffers the ſame increaſes and decreaſes; as the Moone hath, and 'tis probable that this may bee perceived there, without the help of a glaſſe, becauſe they are farre neerer it than wee. When *Venus* (ſaith *Keplar*) lies downe in the Perige or lower part of her ſuppoſed

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posed Epicycle, then is she in conjunction with her husband the Sunne, from whom after shee hath departed for the space of ten moneths, shee gets *plenum uterum*, and is in the full.

But you'll reply, though *Venus* may bestow some light when she is over the Moone, and in conjunction, yet being in opposition, she is not visible to them, and what shall they then doe for light?

I answer, then they have none; nor doth this make so great a difference betwixt those two Hemispheares, as there is with us, betwixt the places under the poles, and the line. And besides, 'tis considerable, that there are two kinde of Planets.

1. Primarie, such whose proper circles doe encompasse the body of the Sunne, whereof there are six. *Saturne*, *Jupiter*, *Mars*, *Ceres* or the *Earth*, *Venus*, *Mercury*. As in the Frontispice.

2. Secondary, such whose proper circles are not about the Sunne, but some of the other primarie Planets. Thus are there two about *Saturne*, foure about *Jupiter*, and thus likewise

dos

dos the Moone encompaſſe our earth. Now tis probable that theſe leſſer, ſecondary Planets, are not ſo accommodated with all conveniences of habitation, as the others that are more principall.

But it may ſeeme a very difficult thing to conceive, how ſo groſſe and darke a body as our earth, ſhould yeeld ſuch a cleere light as proceeds from the Moone; and therefore the Cardinall *de Cuſa* (who thinks every Starre to be a ſeverall wo ld) is of opinion that the light of the Sunne is not able to make them appeare ſo bright; but the reaſon of their ſhining is, becauſe wee behold them at a great diſtance through their regions of fire which doe ſet a ſhining luſtre upon thoſe bodies that of themſelves are darke. *Vnde ſi quis eſſet extra regionem ignis, terra iſta in circumferentia ſuæ regionis per medium ignis lucida ſtella appareret.* "So that if "a man were beyond the region of "fire, this earth would appeare "through that, as a bright Starre. But if this were the onely reaſon, then would the Moone be freed from ſuch

De doct. ig. l. 2. c. 12.

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increaſes and decreaſes as ſhee is now lyable unto.

Keplar thinks that our earth receives that light whereby it ſhines, from the Sunne, but this (ſaith he) is not ſuch an intended cleare brightnes as the Moon is capable of, and therefore he gueſſes, that the earth there, is of a more chokie ſoyle, like the Ile of *Crete*, and ſo is better able to reflect a ſtronger light, whereas our earth muſt ſupply this intention with the quantity of its body. But this I conceive to bee a needleſſe conjecture, ſince our earth, if all things were well conſidered, will bee found able enough to reflect as great a light. For

1. Conſider its opacity; if you marke theſe ſublunary things, you ſhall perceive that amongſt them, thoſe that are moſt perſpicuous, are not ſo well able to reverberate the Sunne-beames, as the thicker bodies. The rayes paſſe ſingly through a diaphanous matter, but in an opacous ſubſtance they are doubled in their returne, and multiplyed by reflexion. Now if the moone and the other Planets can ſhine ſo cleerely

cleerely by beating backe the Sunne-beames, why may not the earth alſo ſhine as well, which agrees with them in the cauſe of this brightneſſe their opacity?

2. Conſider what a cleare light we may diſcerne reflected from the earth in the middeſt of Summer, and withall conceive how much greater that muſt bee which is under the line, where the rayes are more directly and ſtrongly reverberated.

3. 'Tis conſiderable that though the Moon dos in the night time ſeeme to be of ſo cleere a brightneſſe, yet when wee looke upon it in the day, it appeares like ſome little whitiſh cloud: Not but that at both times, ſhe is of an equall light in her ſelfe. The reaſon of this difference is, becauſe in the night wee looke upon it through a darke and obſcure *medium*, there being no other enlightned body, whoſe brightneſſe may abate from this: Whereas in the day time, the whole heavens round about it, are of an equall clearenеſſe, and ſo make it to appeare with a weaker light. Now becauſe wee cannot ſee

how the enlightned parts of our earth doe looke in the night, therefore in comparing it with the Moone, wee must not consider her, as she is beheld through the advantage of a darke *medium*, but as she seemes in the day-time: Now, in any cleere Sun-shine-day, our earth does appeare as bright as the Moone, which at the same time does seeme like some duskish cloud (as any little observation may easily manifest.) Therefore we need not doubt but that the earth is as well able to give light, as the Moone. To this, it may be added that those very clouds, which in the day-time seeme to be of an equall light to the moone, doe in the evening become as darke as our earth; and as for those of them, which are looked upon at any great distance, they are often mistaken for the mountaines.

4. Tis considerable, that though the moone seeme to bee of so great a brightnesse in the night, by reason of its neerenesse unto those severall shadowes which it casts, yet is it of it selfe weaker than that part of twilight, which usually wee have for halfe an houre

houre after Sunne-set, becauſe wee cannot till after that time diſcerne any ſhadow to be made by it.

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5. Conſider the great diſtance at which we behold the Planets, for this muſt needs adde much to their ſhining; and therefore *Cuſanus* (in the above cited place) thinks that if a man were in the Sunne, that Planet would not appeare ſo bright to him, as now it doth to us, becauſe then his eye could diſcerne but little, whereas here, we may comprehend the beames as they are contracted in a narrow body. *Keplar* beholding the earth from a high mountaine when it was enlightned by the Sunne, confeſſes that it appeared unto him of an incredible brightnes, whereas then he could onely ſee ſome ſmall parts of it; but how much brighter would it have appeared if hee might in a direct line behold the whole globe of earth and theſe rayes gathered together? So that if we conſider that great light which the earth receives from the Sunne in the Summer, and then ſuppoſe wee were in the Moone, where wee might ſee the whole earth hang-

Lib. 1. Cap. 11.

ing in those vast spaces, where there is nothing to terminate the sight, but those beames which are there contracted into a little compasse; I say, if we doe well consider this, wee may easily conceive that our earth appeares as bright to those other inhabitants in the Moone, as theirs doth to us.

But here it may bee objected, that with us, for many days in the yeare, the heavens are so overclowded, that wee cannot see the Sunne at all, and for the most part, in our brightest dayes, there are many scattered clouds which shade the earth in sundry places; so that in this respect, it must needs be unlike the Moon and will not be able to yeeld so cleare, unintermitted a light, as it receives from that planet.

To this I answer.

1. As for those lesser brighter clouds which for the most part are scattered up and down in the cleerest days, these can be no reason why our earth should be of a darker appearãce, because these clouds being neere unto the earth, and so not distinguishable at so great a distance from it, and likewise being illumina-

minated on their back parts by the Sunne that ſhines upon them, muſt ſeeme as bright to thoſe in the Moone, as if the beames were immediately reflected from our earth. Lib. 1. *Cap.* 12.

2. When theſe clouds that are interpoſed, are of any large extenſion or great opacity, as it is in extraordinary laſting and great rains, then there muſt be ſome diſcernable alteration in the light of our earth; But yet this dos not make it to differ from the Moone: ſince it is ſo alſo with that Planet, as is ſhewed in the later part of the next chapter.

Propoſition 12.

That tis probable there may be ſuch Meteors belonging to that world in the Moone, as there are with us.

Plutarch diſcuſsing this point, affirmes that it is not neceſſary there ſhould be the ſame meanes of growth and fructifying in both theſe worlds, ſince nature might in her policy finde out more wayes than one how to bring

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about the ſame effect. But however, he thinks it is probable that the Moone her ſelfe ſendeth forth warme winds, and by the ſwiftneſſe of her motion there ſhould breathe out a ſweet and comfortable ayre, pleaſant dewes, and gentle moiſture, which might ſerve for refreſhing and nouriſhment of the inhabitants and plants in that other world.

But ſince they have all things alike with us, as ſea and land, and vaporous ayre encompaſsing both, I ſhould rather therefore thinke that nature there ſhould uſe the ſame way of producing meteors as ſhee doth with us (and not by a motion as *Plutarch* ſuppoſes:) becauſe ſhee doth not love to vary from her uſuall operations without ſome extraordinary impediment, but ſtill keepes her beaten path unleſſe ſhee bee driven thence.

One argument whereby I ſhall manifeſt this truth, may bee taken from thoſe new Stars which have appeared in divers ages of the world; and by their paralax have been diſcerned to have been above the Moone, ſuch as

was

was that in *Cassiopeia*, that in *Sagittarius*, with many others betwixt the Planets. *Hipparchus* in his time tooke especiall notice of such as these, and therefore fancied out such cõstellations in which to place the Starrs, shewing how many there were in every asterisme, that so afterwards, posterity might know whether there were any new Starre produced, or any old one missing. Now the nature of these Comets may probably manifest, that in this other world there are other meteors also; for these in all likelyhood are nothing else but such evaporations caused by the Sunne from the bodies of the Planets. I shall prove this by shewing the improbabilities and inconveniences of any other opinion.

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Plin. nat. hist. l. 2. c. 26.

For the better pursuite of this 'tis in the first place requisite, that I deale with our chiefe adversary, *Cæsar la Galla*, who doth most directly oppose that truth which is here to be proved. Hee endeavouring to confirme the incorruptibility of the Heavens, and being there to satisfie the argument which is taken from these Comets, He answers it

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it thus : *Aut argumentum desumptum ex paralaxi, non est efficax, aut si est efficax, eorum instrumentorum usum decipere, vel ratione astri, vel medii, vel distantiæ, aut ergo erat in suprema parte aeris, aut si in cœlo, tum forsan factum erat ex reflectione radiorum Saturni & Jovis, qui tunc in conjunctione fuerant.*
" Either the argument from the para-
" lax is not efficacious, or if it bee,
" yet the use of the instruments might
" deceive, either in regard of the star,
" or the *medium*, or the distance, and
" so this comet might be in the upper
" regions of the ayre; or if it were in
" the heavens, there it might be pro-
" duced by the reflexion of the rayes
" from *Saturne* and *Jupiter*, who were
" then in conjunction. You see what shifts hee is driven to, how he runnes up and downe to many starting holes, that he may find some shelter, and in stead of the strength of reason, he answers with a multitude of words, thinking (as the Proverbe is) that hee may use haile, when hee hath no thunder. *Nihil turpius* (saith * Seneca) *dubio & incerto, pedem modo referente, modo producente.*

* Epist. 95.

producente. "What can there be more "unseemely in one that should bee a "faire disputant, than to be now here, "now there, and so uncertaine, that "one cannot tell where to find him? Hee thinks that there are not Comets in the heavens, because there may bee many other reasons of such appearances; but what he knowes not; perhaps (hee sayes) that argument from the paralax is not sufficient, or if it be, then there may bee some deceit in the observation. To this I may safely say, that he may justly bee accounted a weake Mathematician who mistrusts the strength of this argument; nor can hee know much in Astronomy, who understands not the paralax, which is a foundation of that Science; and I am sure that hee is a timerous man, who dares not believe the frequent experience of his senses, or trust to a demonstration.

Vide Galilæum. Syst. mundi. Colloq. 3.

True indeed, I grant 'tis possible, that the eye, the *medium*, and the distance may all deceive the beholder; but I would have him shew which of all these was likely to cause an error in this

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this obſervation? Meerely to ſay they might be deceived, is no ſufficient anſwer; for by this I might confute the poſitions of all Aſtronomers, and affirme the ſtarres are hard by us, becauſe 'tis poſsible they may bee deceived in their obſerving diſtance. But I forbeare any further reply; my opinion is of that Treatiſe, that either it was ſet forth purpoſely to tempt a confutation, that hee might ſee the opinion of *Galilæus* confirmed by others, or elſe it was invented with as much haſte and negligence as it was printed, there being in it almoſt as many faults as lines.

Others thinke that theſe are not any new Comets, but ſome ancient ſtarres that were there before, which now ſhine with that unuſuall brightneſſe, by reaſon of the interpoſition of ſuch vapors, which doe multiply their light; and ſo the alteration will be here only, and not in the heavens. Thus *Ariſtotle* thought the appearance of the milkie way was produced. For hee held that there were many little ſtarres, which by their influence did conſtantly attract

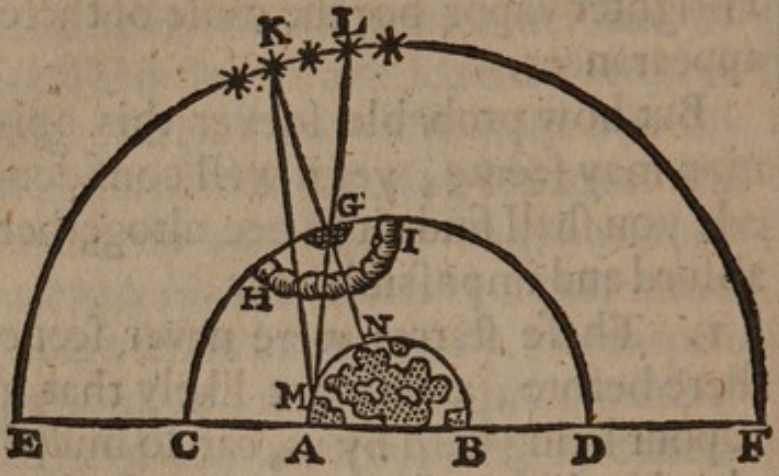
tract such a vapour towards that place of heaven, so that it alwayes appeared white. Now by the same reason may a brighter vapor bee the cause of these appearances.

But how probable soever this opinion may seeme, yet if well considered, you shall finde it to bee altogether absurd and impossible: for,

1. These starres were never seene there before, and tis not likely that a vapour being hard by us, can so multiply that light which could not before be at all discerned.

2. This supposed vapour cannot be either contracted into a narrow compasse, or dilated into a broad: 1. it could not bee within a little space, for then that starre would not appeare with the same multiplied light to those in other climates. 2. it cannot be a dilated vapour, for then other starres which were discerned through the same vapour, would seeme as bigge as that; this argument is the same in effect with that of the paralax, as you may see in this Figure.

Suppose



Suppoſe A B to be a Hemiſpheare of one earth, C D to be the upper part of the higheſt region, in which there might be either a contracted vapour, as G, or elſe a dilated one, as H I. Suppoſe E F likewiſe to repreſent halfe the heavens, wherein was this appearing Comet at K. Now I ſay, that a contracted vapour, as G, could not cauſe this appearance, becauſe an inhabitant at M could not diſcerne the ſame ſtarre with this brightneſſe, but perhaps another at L, betwixt which the

the vapour is directly interposed. Nor could it be caused by a dilated vapour, as H I, because then all the starres that were discerned through it, would bee perceived with the same brightnesse.

'Tis necessary therfore that the cause of this appearance should be in the heavens. And this is granted by the most &best Astronomers. But, say some, this doth not argue any naturall alteration in those purer bodies, since tis probable that the concourse of many little vagabond starres, by the union of their beames may cause so great a light. Of this opinion were *Anaxagoras* and *Zeno* amongst the ancient, and *Baptista Cisatus*, *Blancanus*, with others amongst our moderne Astronomers. For, say they, when there happens to be a concourse of some few starres, then doe many other flie unto them ftom all the parts of heaven like so many Bees unto their King. But 1. 'tis not likely that amongst those which wee count the fixed starres, there should be any such uncertaine motions, that they can wander from all parts of the heavens, as if Nature had neglected them, or forgot to

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to appoint them a determinate course. 2. If there be such a conflux of these, as of Bees to their King, then what reason is there, that they doe not still tarry with it, that so the Comet may not bee dissolved? But enough of this. You may commonly see it confuted by many other arguments. Others there are, who affirme these to bee some new created starres, produced by an extraordinary supernaturall power. I answer, true indeed, tis possible they might be so, but however, tis not likely they were so, since such appearances may be salved some other way; wherfore to fly unto a miracle for such things, were a great injury to nature, and to derogate from her skill; an indignity much mis-becoming a man who professes himselfe to be a Philosopher. *Miraculum* (saith one) *est ignorantiæ Asylum*, a miracle often serves for the receptacle of a lazy ignorance; which any industrious Spirit would be ashamed of, if being but an idle way to shift off the labour of any further search. But here's the misery of it, we first tye our selves unto *Aristotles* prin-

Clavius in sphæram. cap. 1.

principles, and then conclude that nothing could contradict them, but a miracle; whereas 'twould be much better for the Common-wealth of learning, if wee would ground our principles rather upon the frequent experiences of our owne, than the bare authority of others.

Some there are who thinke, that theſe Comets are nothing elſe, but exhalations from our earth, carryed up into the higher parts of the Heaven. So *Peno*, *Rothmannus & Galilæus*. But this is not poſsible, ſince by computation 'tis found, that one of them is above 300 times bigger than the whole Globe of Land and Water. Others therefore have thought that they did proceed from the body of the Sunne, and that that Planet only is *Cometarum officina, unde tanquam emiſſarii & exploratores emitterentur, brevi ad ſolem rediturí*: The ſhop or forge of Comets from whence they were ſent, like ſo many ſpies, that they might in ſome ſhort ſpace returne againe. But this cannot be, ſince if ſo much matter had proceeded from him alone, it would

Tycho Progym. l. 1. c. 9.

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have made a ſenſible diminution in his body. The Noble *Tycho* therefore thinks that they conſiſt of ſome ſuch fluider parts of the Heaven, as the milky way is framed of, which being condenſt together, yet not attaining to the conſiſtency of a Starre, is in ſome ſpace of time rarifyed againe into its wonted nature. But this is not likely; becauſe the appearance of the milky way dos not ariſe from ſome fluider parts of the heaven (as he ſuppoſes) but from the light of many leſſer ſtarrs which are thereabouts. And therefore it is uſually thus deſcribed. *Via lactea nihil aliud eſt quàm innumerabiles ſtellarum fixarum greges qui confuſo & pallenti lumine tractum illum inalbant.* The milky way is nothing elſe but the pale and confuſed light of many leſſer ſtarres, whereby ſome parts of the heaven are made to appeare white.

Fromond. Meteor. l. 2. c. 5. art. 2. Item Veſta tract. 5. c. 2.

And beſide, what likely cauſe can we conceive of this condenſation, unleſſe there bee ſuch qualities there, as there are in our ayre, and then why may not the Planets have the like qualities as our earth? and if ſo, then 'tis more

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more probable that they are made by the ordinary way of nature, as they are with us, and consist of such exhalations from the bodies of the Planets, as being very much rarified, may bee drawne up, through the orbe of grosse vaporous ayre that incompasses them. Nor is this a singular opinion; but it seemed most likely to *Camillus Glorioſus. Th. Campanella*, *Fromondus*, with some others. But if you aske, whither shall all these exhalations returne? I answer every one into his own Planet. If it be againe objected, that then there will be so many centers of gravity, and each severall Planet will be a distinct world; I reply, wee have not like probabilitie concerning the rest; but yet, perhaps all of them are so, except the Sunne, though *Cusanus* and some others think there is one also; and later times have discovered some lesser clouds moving round about him. But as for *Saturne*, he hath two Moones on each side. *Iupiter* hath foure, that incircle him with their motion. Which are likwise ecclipsed by the interposition of his body, as the Moone is by our earth.

De Comet. l. 5. c. 4. Apol. pro Galil. Meteor. l. 3. c. 2. Art. 6.

Lactant. Inst. l. 3 c 23.

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Venus is obſerved to increaſe and decreaſe as the Moone. And this perhaps hath been noted by former ages, as may be gueſt by that relation of Saint *Auſtin* out of *Varro*. *Mars*, and all the reſt, derive their light from the Sunne. Concerning *Mercury*, there hath been little or no obſervation, becauſe for the moſt part, hee lies hid under the Sunne-beames, and ſeldome appeares by himſelfe. But when he dos, yet the compaſſe of his body is ſo little, and his light of ſo cleare a brightneſſe, by reaſon of his neereneſſe to the Sunne, that the perſpective cannot make the ſame diſcoveries upon him, as from the reſt.

De Civit. Dei l. 21. cap. 8.

So that if you conſider their quantity, their opacity, or theſe others diſcoveries, you ſhall finde it probable enough, that each of them may bee a ſeverall world. Eſpecially, ſince every one of them is allotted to a ſeverall orbe, and not altogether in one, as the fixed ſtarres ſeeme to bee. But this would bee too much for to vent at the firſt: the chiefe thing at which I now ayme in this diſcourſe, is to prove that there

there may bee one in the Moone.

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It hath been before confirmed, that there was a ſpheare of thick vaporous ayre encompaſsing the Moone, as the firſt and ſecond regions doe this earth. I have now ſhewed, that thence ſuch exhalations may proceed as doe produce the Comets: now from hence it may probably follow, that there may be winde alſo and raine, with ſuch other Meteors as are common amongſt us. This conſequence is ſo dependant, that *Fromondus* dares not deny it, though hee would (as he confeſſes himſelfe;) for if the Sunne be able to exhale from them ſuch fumes as may cauſe Comets, why not then ſuch as may cauſe winds, and why not ſuch alſo as may cauſe raine, ſince I have above ſhewed, that there is Sea and Land, as with us? Now, raine ſeemes to be more eſpecially requiſite for them, ſince it may allay the heate and ſcorchings of the Sunne, when hee is over their heads. And nature hath thus provided for thoſe in *Peru*, with the other inhabitants under the line.

De meteor. l. 3. c. 2. Art. 6.

But if there bee ſuch great, and fre-

Lib. 1. Cap. 12.

quent alterations in the Heavens, why cannot we discerne them?

I answer:

1. There may be such, and wee not able to perceive them, because of the weaknesse of our eye, and the distance of those places from us; they are the words of *Fienus* (as they are quoted by *Fromondus* in the above cited place) *Possunt maximæ permutationes in cœlo fieri, etiamsi a nobis non conspiciantur; hoc visus nostri debilitas & immensa cœli distantia faciunt.* And unto him assents *Fromondus* himselfe, when a little after he sayes, *Si in sphæris planetarum degeremus, plurima forsan cœlestium nebularum vellera toto æthere passim dispersa videremus, quorum species jam evanescit nimiâ spatii intercapedine.* "If we "did live in the spheares of the Pla- "nets, we might there perhaps dis- "cerne many great clouds dispersed "through the whole Heavens, which are not now visible by reason of this great distance.

2. *Mæstin* and *Keplar* affirme, that they have seene some of these alterations. The words of *Mæstin* are these (as

(as I find them cited.) *In eclipsi Lunari vespere Dominicæ Palmarum Anni 1605. in corpore Lunæ versus Boream, nigricans quædam macula conspecta fuit, obscurior cætero toto corpore, quod candentis ferri figuram repræsentabat; dixisses nubila in multam regionem extensa pluviis & tempestuosis imbribus gravida, cujusmodi ab excelsorum montium jugis in humiliora convallium loca videre non rarò contingit.* "In "that lunary eclipse which happened "in the even of Palme-sunday, in the "yeere 1605, there was a certaine "blackish spot discerned in the Nor-"therly part of the Moone, being "darker than any other place of her "body, and representing the colour "of red hot iron; You might conje-"cture that it was some dilated cloud, "being pregnant with showers; for "thus doe such lower clouds appeare "from the tops of high mountaines.

Lib. 1. Cap. 11. Dissert. 2. cum nunc. Galil. item. Somn. Astron. nota ultima

And a little before this passage, the same Author speaking of that vaporous ayre about the Moone, tells us. *Quod circumfluus ille splendor diversis temporibus apparet limpidior plus minusve.* That it dos at divers times appeare of a diffe-

rent clearneſſe, ſometimes more, and ſometimes leſſe; which he gueſſes to ariſe from the clouds and vapors that are in it.

Unto this I may adde another teſtimony of *Bapt. Ciſatus*, as he is quoted by *Nicrembergius*, grounded upon an obſervation taken 23 yeeres after this of *Mæſlin*, and writ to this *Euſeb. Nicremberg.* in a letter by that diligent & judicious Aſtronomer. The words of it runne thus; *Et quidem in eclipſi nupera ſolari quæ fuit ipſo die natali Chriſti, obſervavi clarè in luna ſoli ſuppoſita, quidpiam quod valde probat id ipſum quod Cometæ quoq; & maculæ ſolares urgent, nempe cœlum non eſſe à tenuitate & variationibus aeris exemptum; nam circa lunam adverti eſſe ſphæram ſeu orbem quendam vaporoſum, non ſecus atque circum terram, adeoq; ſicut ex terra in aliquam uſque ſphæram vapores & exhalationes expirant, ita quoque ex luna.* "In that ſolary eclipſe which "happened on Chriſtmas day, when "the Moone was juſt under the Sun, "I plainly diſcerned that in her, which "may clearely confirme what the "Comets and Suns ſpots doe ſeeme "to

Miſt. nat. l. 2. c. 11.

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" to prove, *viz.* that the heavens are
" not so solid, nor freed from those
" changes which our aire is liable un-
" to; for, about the Moon I perceived
" such an orbe, or vaporous aire, as
" that is which doth encompasse our
" earth; and as vapours and exhala-
" tions are raised from our earth into
" this aire, so are they also from the
" Moone.

You see what probable grounds, and plaine testimonies I have brought for the confirmation of this Proposition: many other things in this behalfe might bee spoken, which for brevity sake I now omit, and passe unto the next.

Proposition 13.

That it is probable there may be inhabitants in this other World, but of what kinde they are, is uncertaine.

I Have already handled the Seasons, and Meteors belonging to this new World:

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World: tis requisite that in the next place I should come unto the third thing which I promised, and say somewhat of the inhabitants; Concerning whom there might bee many difficult questions raised; as, whether that place bee more inconvenient for habitation than our World (as *Keplar* thinks;) whether they are the seed of *Adam*; whether they are there in a blessed estate, or else what meanes there may be for their salvation? with many other such uncertaine enquiries, which I shall willingly omit, leaving it to their examination who have more leisure and learning for the search of such particulars.

Being for mine owne part content only to set downe such notes belonging unto these, which I have observed in other Writers. *Cum tota illa regio nobis ignota sit, remanent inhabitatores illi ignoti penitus* (saith *Cusanus*) since wee know not the regions of that place, we must be altogether ignorant of the inhabitants. There hath not yet beene any such discovery concerning these, upon which we may build a certainty,

De docct. ignorantia. l. 2. c. 12.

or

or good probability : well may wee gueſſe at them, & that too very doubtfully, but wee can know nothing; for, *if wee doe hardly gueſſe aright at things which bee upon earth, if with labour wee doe find the things that are at hand, how then can wee ſearch out thoſe things that are in heaven?* What a little is that which wee know, in reſpect of thoſe many matters contained within this great Univerſe? This whole globe of earth and water, though it ſeeme to us to bee of a large extent, yet it beares not ſo great a proportion unto the whole frame of Nature, as a ſmall ſand doth unto it; and what can ſuch little creatures as we, diſcerne, who are tied to this point of earth? or what can they in the Moone know of us? *If we underſtand any thing* (ſaith *Eſdras*) *tis nothing but that which is upon the earth, and hee that dwelleth above in the heavens, may onely underſtand the things that are above in the height of the heavens.*

So that 'twere a very needeleſſe thing for us to ſearch after any particulars; however, we may gueſſe in the generall that there are ſome inhabitants

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wiſd. 9.16.

2 *Eſd.* 4.21.

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bitants in that Planet: for why else did providence furnish that place with all such conveniences of habitation as have beene above declared?

But you will say, perhaps; is there not too great and intolerable a heate, since the Sunne is in their Zenith every moneth, and doth tarry there so long before he leaves it?

I answer, 1. This may, perhaps, be remedied (as it is under the line) by the frequency of mid-day showers, which may cloud their Sunne, and coole their earth. 2. The equality of their nights doth much temper the scorching of the day; and the extreme cold that comes from the one, requires some space before it can bee dispelled by the other, so that the heat spending a great while before it can have the victory, hath not afterwards much time to rage in. Wherfore notwithstanding this doubt, yet that place may remaine habitable. And this was the opinion of the *Cardinal de Cusa*, when speaking of this Planet, he sayes, *Hic locus Mundi est habitatio hominum & animalium atque vegetabilium.* "This part of the

De docct. ign. l. 2. c. 12.

"world

"world is inhabited by men,& beasts, "and plants. To him assented *Campanella*; but he cannot determine whether they were men or rather some other kinde of creatures. If they were men, then he thinks they could not be infected with *Adams* sinne; yet perhaps, they had some of their owne, which might make them liable to the same misery with us, out of which, it may bee, they were delivered by the same means as we,the death of Christ; and thus he thinks that place of the *Ephesians* may be interpreted, where the Apostle sayes, *God gathered all things together in Christ, both which are in earth, and which are in the heavens:* So also that of the same Apostle to the *Colossians*, where he sayes,that *it pleased the Father to reconcile all things unto himselfe by Christ, whether they be things in earth, or things in heaven.*

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Ephes. 1.10.

Col. 1.20.

But I dare not jest with divine truths, or apply these places according as fancy directs. As I thinke this opinion doth not any where contradict Scripture; so I thinke likewise, that it cannot bee proved from it. Wherefore

Campanella's

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Campanella's second conjecture may be more probable, that the inhabitants of that world, are not men as we are, but some other kinde of creatures which beare some proportion, and likenesse to our natures. Or it may be, they are of a quite different nature from any thing here below, such as no imagination can describe; our understandings being capable only of such things as have entered by our senses, or else such mixed natures as may bee composed from them. Now, there may be many other species of creatures beside those that are already knowne in the world; there is a great chasme betwixt the nature of men and Angels; It may bee the inhabitants of the Planets are of a middle nature between both these. Tis not improbable that God might create some of all kindes, that so he might more compleatly glorifie himselfe in the works of his Power and Wisedome.

Cusanus too, thinks they differ from us in many respects; I will set downe his words as they may be found in the above cited place, *Suspicamur in regione solis*

solis magis esse solares, claros & illuminatos intellectuales habitatores, spiritualiores etiam quàm in lunâ, ubi magis lunatici, & in terra magis materiales & crassi, ut illi intellectualis naturæ solares sint multum in actu & parum in potentia, terreni verò magis in potentia, & parum in actu, lunares in medio fluctuantes. Hoc quidem opinamur ex influentia ignili solis, aquatica simul & aerea lunæ, & gravedine materiali terræ, & consimiliter de aliis stellarum regionibus, suspicantes nullam habitationibus carere, quasi tot sint partes particulares mundiales unius universi, quot sunt stellæ quarum non est numerus, nisi apud eum qui omnia in numero creavit.

" Wee may conjecture (saith hee)
" the inhabitants of the Sunne are like
" to the nature of that Planet, more
" cleare and bright, more intellectu-
" all than those in the Moone where
" they are neerer to the nature of that
" duller Planet, and those of the earth
" being more grosse and materiall
" than either, so that these intellectu-
" all natures in the Sunne, are more
" forme than matter, those in the earth
" more

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" more matter than forme, and thoſe
" in the Moone betwixt both. This
" we may gueſſe from the fierie influ-
" ence of the Sunne, the watery and
" aereous influence of the Moone, as
" alſo the materiall heavineſſe of the
" earth. In ſome ſuch manner like-
" wiſe is it with the regions of the o-
" ther ſtarres; for, we conjecture that
" none of them are without inhabi-
" tants, but that there are ſo many
" particular worlds and parts of this
" one univerſe, as there are ſtarres,
" which are innumerable, unleſſe it
" be to him who created all things in
" number.

For hee held that the ſtars were not all in one equall orbe as wee commonly ſuppoſe; but that ſome were farre higher than others, which made them appeare leſſe; and that many others were ſo farre above any of theſe, that they were altogether inviſible unto us. An opinion which (as I conceive) hath not any great probability for it, nor certainty againſt it.

The Prieſt of *Saturne* relating to *Plutarch* (as hee faignes it) the nature of

of these Selenites, told him they were of divers dispositions, some desiring to live in the lower parts of the Moone, where they might looke downewards upon us, while others were more surely mounted aloft, all of them shining like the rayes of the Sunne, and as being victorious, are crowned with garlands made with the wings of *Eustathia* or *Constancie*.

It hath beene the opinion amongst some of the Ancients, that their heavens and Elysian fields were in the Moone where the ayre is most quiet and pure. Thus *Socrates*, thus *Plato*, with his followers, did esteeme this to bee the place where those purer soules inhabite; who are freed from the Sepulcher, and contagion of the body. And by the Fable of *Ceres*, continually wandring in search of her daughter *Proserpina*, is meant nothing else but the longing desire of men, who live upon *Ceres* earth, to attaine a place in *Proserpina*, the Moone or heaven.

Nat. Com. l. 3. c. 19.

Plutarch also seemes to assent unto this; but he thinks moreover, that there are two places of happines answerable

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to those two parts which he fancies to remaine of a man when he is dead, the soule and the understanding; the soule hee thinks is made of the Moone; and as our bodies doe so proceede from the dust of this earth, that they shall returne to it hereafter; so our soules were generated out of that Planet, and shall be resolved into it againe; whereas the understanding shall ascend unto the Sunne, out of which it was made, where it shall possesse an eternity of well-being, and farre greater happinesse than that which is enjoyed in the Moone. So that when a man dies, if his soule be much polluted, then must it wander up and downe in the middle region of the ayre where hell is, and there suffer unspeakable torments for those sins whereof it is guilty. Whereas the soules of better men, when they have in some space of time beene purged from that impurity which they did derive from the body, then doe they returne into the Moone, where they are possest with such a joy, as those men feele who professe holy mysteries, from which place (saith he) some

are

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are sent downe to have the superintendance of oracles, being diligent either in the preservation of the good, either from, or in, all perills, and the prevention or punishment of all wicked actions; but if in these imployments they mis-behave themselves, then are they againe to bee imprisoned in a body, otherwise they remaine in the Moone, till their souls bee resolved into it, and the understanding being cleared from all impediments, ascends to the Sunne which is its proper place. But this requires a diverse space of time, according to the divers affections of the soule. As for those who have beene retired and honest, addicting themselves to a studious and quiet life, these are quickly preferred to a higher happinesse. But as for such who have busied themselves in many broyles, or have beene vehement in the prosecution of any lust, as the ambitious, the amorous, the wrathfull man, these still retaine the glimpses and dreames of such things as they have performed in their bodies, which makes them either altogether unfit to remaine there, where they are,

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or elſe keepes them long ere they can put off their ſouls. Thus you ſee *Plutarchs* opinion concerning the inhabitants and neighbours of the Moone, which (according to the manner of the Academicks) hee delivers in a third perſon; you ſee hee makes that Planet an inferior kind of heaven, and though hee differ in many circumſtances, yet doth hee deſcribe it to bee ſome ſuch place, as wee ſuppoſe Paradiſe to be. You ſee likewiſe his opinion concerning the place of the damned ſpirits, that it is in the middle region of the aire; and in neither of theſe is hee ſingular, but ſome more late and Orthodox Writers have agreed with him. As for the place of Hell, many think it may be in the aire, as well as any where elſe.

De Civit. Dei l. 22. c. 16.

True indeed, S. *Auſtin* affirmes that this place cannot bee diſcovered; But others there are who can ſhew the ſituation of it out of Scripture; Some holding it to be in another world without this, becauſe our Saviour calls it σκότος ἐξώτερον outward darkneſſe. But the moſt will have it placed towards the center

Mat. 25. 30

Eph. 4. 9.

of

of our earth, becauſe 'tis ſaid, Chriſt deſcended into the lower parts of the earth; and ſome of theſe are ſo confident, that this is its ſituation, that they can deſcribe you its bigneſſe alſo, and of what capacity it is. *Francis Ribera* in in his Comment on the *Revelations*, ſpeaking of thoſe words, where 'tis ſaid, *that the blood went out of the wine-preſſe, even unto the horſes-bridles by the ſpace of one thouſand and ſix hundred furlongs*, interprets them to be meant of hell, and that that number expreſſes the diameter of its concavity, which is 200 *Italian* miles; But *Leſſius* thinkes that this opinion gives them too much roome in hell, and therefore he gueſſes that 'tis not ſo wide; for (ſaith hee) the diameter of one league being cubically multiplyed, will make a ſpheare capable of 800000 millions of damned bodies, allowing to each ſix foot in the ſquare; whereas (ſayes he) tis certaine, that there ſhall not bee one hundred thouſand millions in all that ſhall bee damned. You ſee the bold *Jeſuit* was carefull that every one ſhould have but roome enough in hell, and by the

Lib. 1. *Cap.* 13.

Rev. 14. 20.

De Morib. div. l. 13. *c.* 24.

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strangenesse of the conjecture, you may guesse that hee had rather bee absurd, than seeme either uncharitable or ignorant. I remember there is a relation in *Pliny*, how that *Dionysiodorus* a Mathematician, being dead, did send a letter from this place to some of his friends upon earth, to certifie them what distance there was betwixt the center and superficies: hee might have done well to have prevented this controversie, and enformed them the utmost capacity of that place. However, certaine it is, that that number cannot be knowne; and probable it is, that the place is not yet determined, but that hell is there where there is any tormented soule, which may bee in the regions of the ayre, as well as in the center: And therefore perhaps it is that the Divell is stiled the prince of the ayre. But of this only occasionally, and by reason of *Plutarchs* opinion concerning those that are round about the Moone; as for the Moone it selfe, hee esteemes it to bee a lower kind of heaven, and therefore in another place he calls it a terrestriall starre, and an

Cur silent oracula.

Olym-

Olympian or celeſtiall earth; anſwerable, (as I conceive) to the paradiſe of the Schoolemen. And, that paradiſe was either in, or neere the Moone, is the opinion of ſome later Writers, who derived it (in all likelyhood) from the aſſertion of *Plato*, and perhaps, this of *Plutarch*. *Toſtatus* layes this opinion upon *Iſiodor. Hiſpalenſis*, and the venerable *Bede*; and *Pererius* fathers it upon *Strabus* and *Rabanus* his Maſter. Some would have it to bee ſituated in ſuch a place as could not bee diſcovered, which cauſed the penman of *Eſdras* to make it a harder matter *to know the outgoings of Paradiſe, than to weigh the weight of the fire, or meaſure the blaſts of wind, or call againe a day that is paſt.* But notwithſtanding this, there bee ſome others, who think, that it is on the top of ſome high mountaine under the line; and theſe interpreted the torrid Zone to be the flaming ſword whereby Paradiſe was guarded. 'Tis the conſent of divers others, that Paradiſe is ſituated in ſome high and eminet place. So *Toſtatus*: *Eſt etiam Paradiſus ſitu altiſſima, ſupra omnem terræ altitudinem,* "Paradiſe

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Sir W. Raw. l. 1. *c.* 3. *ſect.* 7.

In Geneſ.

2 *Eſdr.* 4. 7.

In Geneſ.

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" radiſe is ſituated in ſome high place " above the earth : and therefore in his Comment upon the 49 of *Geneſis*, he underſtands the bleſsing of *Jacob* concerning the everlaſting hills to bee meant of Paradiſe, and the bleſsing it ſelfe to bee nothing elſe but a promiſe of Chriſts comming, by whoſe Paſſion the gates of Paradiſe ſhould bee opened. Unto him aſſented *Rupertus*, *Scotus*, and moſt of the other Schoolemen, as I find them cited by *Pererius*, and out of him in Sir *Walter Rawleigh*. Their reaſon was this: becauſe in probability, this place was not overflowed by the Flood, ſince there were no ſinners there, which might draw that curſe upon it. Nay *Toſtatus* thinks, that the body of *Enoch* was kept there; and ſome of the Fathers, as *Tertullian* and *Auſtin*, have affirmed, that the bleſſed ſoules were reſerved in that place till the day of Judgement; and thereford 'tis likely that it was not overflowed by the Flood, It were eaſie to produce the unanimous conſent of the Fathers, to prove that Paradiſe is yet really exiſtent. Any diligent peruſer of them

Comment. in 2. Gen. v. 8. L. 1. c. 3. ſect. 6. 7.

them, may easily observe how they doe generally interpret the Paradise whereto Saint *Paul* was wrapt, and that wherein our Saviour promised the Thiefe should be with him, to bee locally the same from whence our first parents were banished. Now there cannot be any place on earth designed where this should bee: And therefore it is not altogether improbable that it was in this other world.

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2 *Cor.* 12. 4. *Luke* 23. 43.

And besides, since all men should have went naked if *Adam* had not fell, 'tis requisite therefore that it should be situated in some such place where it might be priviledged from the extremities of heat and cold. But now this could not be (they thought) so conveniently in any lower, as it might in some higher ayre. For these and such like considerations, have so many affirmed, that Paradise was in a high elevated place. Which some have conceived could bee nowhere but in the Moone: For it could not be in the top of any mountaine; nor can wee thinke of any other body separated from this earth, which can be a more convenient

place

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place for habitation than this Planet; therefore they concluded that it was there.

It could not bee on the top of any mountaine.

Gen. 7. 19.

1. Becauſe we have expreſſe Scripture, that the higheſt of them was overflowed.

2. Becauſe it muſt be a greater extenſion, and not ſome ſmall patch of ground, ſince tis likely all men ſhould have lived there, if *Adam* had not fell. But for a ſatisfaction of the argumẽts, together with a farther diſcourſe of Paradiſe, I ſhall referre you to thoſe who have written purpoſely upon this ſubject. Being content for my owne part to have ſpoken ſo much of it, as may conduce to ſhew the opinion of others concerning the inhabitants of the Moone; I dare not my ſelfe affirme any thing of theſe *Selenites*, becauſe I know not any ground wheron to build any probable opinion. But I thinke that future ages will diſcover more; and our poſterity, perhaps, may invent ſome meanes for our better acquaintance with theſe inhabitants.

Propoſiti-

Propoſition 14.

That tis poſſible for ſome of our poſteritie, to find out a conveyance to this other world; and if there be inhabitants there, to have commerce with them.

ALL that hath been ſaid, concerning the people of the new world, is but conjecturall, and full of uncertainties; nor can we ever looke for any evident or more probable diſcoveries in this kind, unleſſe there bee ſome hopes of inventing means for our conveyance thither. The poſsibilitie of which, ſhall bee the ſubject of our enquiry in this laſt Propoſition.

And, if we doe but conſider by what ſteps and leaſure, all arts doe uſually riſe to their growth, we ſhall have no cauſe to doubt why this alſo may not hereafter be found out amongſt other ſecrets. It hath conſtantly yet been the method of providence, not preſently to ſhew us all, but to leade us on by degrees,

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degrees, from the knowledge of one thing to another.

'Twas a great while, ere the Planets were distinguished from the fixed stars and some time after that, ere the morning and evening starre were found to be the same. And in greater space (I doubt not) but this also, and other as excellent mysteries will be discovered. Time, who hath alwayes been the father of new truths, and hath revealed unto us many things, which our Ancestors were ignorant of, will also manifest to our posteritie, that which wee now desire, but cannot know. *Veniet tempus* (saith *Seneca*) *quo ista quæ nunc latent, in lucem dies extrahet, & longioris ævi diligentia.* Time will come, when the indeavors of after ages, shall bring such things to light as now lie hid in obscuritie. Arts are not yet come to their solstice. But the industrie of future times, assisted with the labors of their forefathers, may reach that height which wee could not attaine to. *Veniet tempus quo posteri nostri nos tam aperta nescisse mirentur.* As wee now wonder at the blindnesse of our Ance-

Nat. Qu. l. 7. cap. 25.

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Anceſtors, who were not able to diſcerne ſuch things, as ſeeme plaine and obvious unto us; ſo will our poſterity, admire our ignorance in as perſpicuous matters.

In the firſt ages of the world the Ilanders thought themſelves either to bee the only dwellers upon earth, or elſe if there were any other, they could not poſsibly conceive how they might have any commerce with them, being ſevered by the deepe and broade Sea. But after times found out the invention of ſhips, in which notwithſtanding, none but ſome bold, daring men durſt venture, according to that of the Tragœdian.

Audax nimium qui freta primus
Rate tam fragili perfida rupit.

Sen. Med. act. 1. Vide Hora. Od. 3. Juvenal. ſat. 12. Claud. præf. ad 1. lib. de rap. Proſer.

Too bold was he, who in a ſhip ſo fraile,
Firſt venturd on the trecherous waves [to ſaile.

And yet now, how eaſie a thing is this even to a timorous and cowardly nature? And queſtionleſſe, the invention of ſome other means for our conveiance to the Moone, cannot ſeeme more incredible to us, than this did at firſt

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first to them, and therefore we have no just reason to bee discouraged in our hopes of the like successe.

Yea, but (you will say) there can be no sayling thither, unlesse that were true which the Poëts doe but faine, that she made her bed in the Sea. Wee have not now any *Drake*, or *Columbus*, to undertake this voyage, or any *Dædalus* to invent a conveiance through the ayre.

I answer, Though wee have not, yet why may not succeeding times, rayse up some spirits as eminent for new attempts and strange inventions, as any that were before them? Tis the opinion of *Keplar*, that as soone as the art of flying is found out, some of their nation will make one of the first Colonies, that shall transplant into that other world. I suppose, his appropriating this preheminence to his owne Countreymen, may arise from an overpartiall affection to them. But yet thus far I agree with him, That whenever that Art is invented, or any other, wherby a man may be conveyed some twenty miles high, or thereabouts, then

Dissert. cum Nunc. Syder.

then, tis not altogether improbable that some or other may be successefull in this attempt.

For the better clearing of which I shall first lay downe, and then answer those doubts that may make it seeme utterly impossible.

These are chiefly three.

The first, taken from the naturall heavinesse of a mans body, whereby it is made unfit for the motion of ascent, together with the vast distance of that place from us.

2. From the extreme coldnes of the æthereall ayre.

3. The extreme thinnesse of it.

Both which must needs make it impassible, though it were but as many single miles thither, as it is thousands.

For the first. Though it were supposed that a man could flie, yet wee may well think hee would be very slow in it, since hee hath so heavy a body, and such a one too, as nature did not principally intend, for that kind of motion. Tis usually observed, that amongst the varietie of birds, those which doe most converse upon the earth, and are swift-

est

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eſt in their running, as a Pheaſant, Partridge, &c. together with all domeſticall fowle, are leſſe able for flight, than othhrs which are for the moſt part upon the wing, as a Swallow, ſwift, &c. And therefore wee may well think, that man being not naturally endowed with any ſuch condition as may inable him for this motion; and being neceſſarily tied to a more eſpeciall reſidence on the earth, muſt needs be ſlower than any fowle, and leſſe able to hold out. Thus is it alſo in ſwimming; which Art though it bee growne to a good eminence, yet he that is beſt skilled in it, is not able either for continuance, or ſwiftneſſe, to equall a fiſh; Becauſe he is not naturally appointed to it. So that though a man could fly, yet hee would be ſo ſlow in it, and ſo quickly weary, that hee could never think to reach ſo great a journey as it is to the Moone.

But ſuppoſe withall that hee could fly as faſt, and long, as the ſwifteſt bird: yet it cannot poſsibly bee conceived, how he ſhould ever be able to paſſe through ſo vaſt a diſtance, as there is

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is betwixt the Moone and our earth. For this Planet, according to the common grounds, is usually granted to bee at the least, 52 semidiameters of the earth from us. Reckoning for each semidiameter 3456 English miles, of which the whole space will be about 179712.

So that though a man could constantly keep on in his journey thither by a straite line, though he could fly a thousand miles in a day; yet he would not arrive thither under 180 dayes, or halfe a yeare.

And how were it possible for any to tarry so long without dyet or sleep?

1. For Diet. I suppose there could be no trusting to that fancy of *Philo* the *Jew* (mentioned before,) who thinks that the musick of the spheares should supply the strength of food. *Prop.* 3.

Nor can wee well conceive how a man should be able to carry so much luggage with him, as might serve for his *Viaticum* in so tedious a journey.

2. But if he could: yet he must have some time to rest and sleep in. And I

believe hee shall scarse find any lodgings by the way. No Inns to entertaine passengers, nor any castles in the ayre (unlesse they bee inchanted ones) to receive poore pilgrims or errant Knights. And so consequently, he cannot have any posible hopes of reaching thither.

Notwithstanding all which doubts, I shall lay downe this position.

That supposing a man could fly, or by any other meanes, raise himselfe twenty miles upwards, or thereabouts, it were posible for him to come unto the Moone.

As for those arguments of the first kind, that seeme to overthrow the truth of this, they proceed upon a wrong ground. Whilst they suppose, that a condensed body, in any place of the ayre, would alwayes retaine in it a strong inclination of tending downewards, towards the center of this earth. Whereas 'tis more probable, that if it were but somewhat above this orbe of vaporous ayre, it might there rest immoveable, & would not have in it any propension to this motion of descent.

For

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For the better illuſtration of this, you muſt know, that the heavineſſe of a body, or (as *Ariſtotle* defines it) the the proneſſe of it to tend downe unto ſome center, is not any abſolute quality intrinſicall unto it, as if where-ever the body did retaine its eſſence, it muſt alſo retaine this qualitie: or as if nature had implanted in every condenſed body *Appetitionem centri, & fugam extremitatis.* Such a love to the center and hatred to the extremities. Becauſe one of theſe being leſſe than a quantitie, and the other no more, cannot have any power of attraction or depulſion in them. According to that common principle *Quantitatis nulla eſt efficacia.*

De cælo lib 4 cap. 1.

But now the true nature of gravitie is this. Tis ſuch a reſpective mutuall deſire of union, whereby condenſed bodies, when they come within the ſphere of their owne vigor, doe naturally apply themſelves, one to another by attraction or coition. But being both without the reach of eithers vertue, they then ceaſe to move, and though they have generall aptitude, yet

* A magneticall naturall attraction. So *Kepler Somn. Aſtron. N. 66. Coper. l. 1. cap. 26. Foſcarin in epiſt. ad Sebaſt. Fantonum.*

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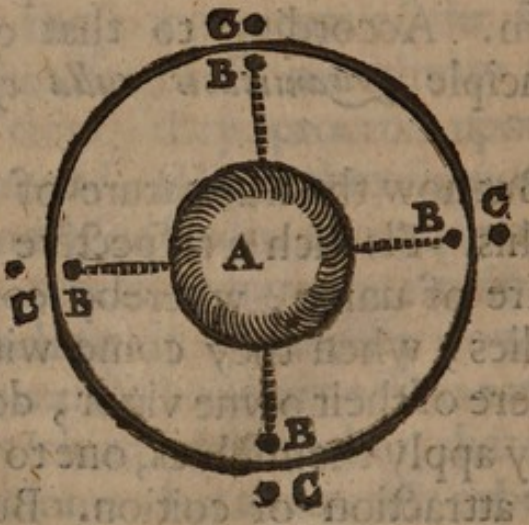
yet they have not any presest inclination or proneſſe to one another. And ſo conſequently, cannot bee ſtyled heavy.

The meaning of this will bee more clearely illuſtrated by a ſimilitude. As any light body (ſuppoſe the Sunne) dos ſend forth his beames in an orbicular forme; So likewiſe any magneticall body, for inſtance a round loadſtone dos caſt abroad his magneticall vigor in a ſpheare. Thus.

Gilbert. de Mganete. l. 2. cap. 7.



Where ſuppoſe the inward circle at *A* to repreſent the Loadſtone, and the outward

outward one betwixt B C, the orbe that dos terminate its vertue.

Now any other body that is like affected comming within this sphere, as B, will presently descend towards the center of it, and in that respect may be styled heavy. But place it without this sphere as C, and then the desire of union ceaseth, and so consequently the motion also.

To apply then what hath been said. This great globe of earth and water, hath been proved by many observations, to participate of Magneticall properties. And as the Loadstone dos cast forth its owne vigor round about its body, in a magneticall compasse: So likewise dos our earth. The difference is, that it is another kind of affecti on which causes the union betwixt the Iron and Loadstone, from that which makes bodies move unto the earth. The former is some kind of neereneſſe and similitude in their natures, for which, Philosophie as yet has not found a particular name. The latter dos arise from that peculiar qualitie, whereby the earth is properly distinguished

from the other elements, which is its Condenſitie. Of which the more any thing dos participate, by ſo much the ſtronger will bee the deſire of union to it. So gold and others metalls which are moſt cloſe in their compoſition, are likewiſe moſt ſwift in their motion of diſcent.

And though this may ſeeme to bee contradicted by the inſtance of metalls, which are of the ſame weight, when they are melted, and when they are hard: As alſo of water, which dos not differ in reſpect of gravitie, when it is frozen and when it is fluid: yet we muſt know that metalls are not rarified by melting, but mollified. And ſo too for frozen waters, they are not properly condenſed, but congealed into a harder ſubſtance, the parts being not contracted cloſer together, but ſtill poſſeſsing the ſame extenſion. But yet (I ſay) tis very probable, that there is ſuch a ſpheare about the earth, which dos terminate its power of attracting other things unto it. So that ſuppoſe a body to bee placed within the limits of this ſphere, and then it muſt needs

tend

tend downewards, towards the center of it. But on the contrary, if it be beyond this compaſſe, then there can bee no ſuch mutuall attraction; & ſo conſequently, it muſt reſt immoveable from any ſuch motion. LIB. I. *Cap.* 14.

For the farther confirmation of this, I ſhall propoſe two pertinent obſervations.

The firſt taken in the preſence of many Phyſitians, and related by an eminent man in that profeſsion, *Hieron. Fracaſtorius.* There being divers needles provided of ſeverall kindes, like thoſe in a Mariners Chart, they found, that there was an attractive power, not only in the magnet; But that iron alſo and ſteele, and ſilver did each of them draw its owne mettle. Whence hee concludes, *Omne trahit quod ſibi ſimile eſt.* And as theſe peculiar likeneſſes, have ſuch a mutuall efficacy; ſo tis probable, that this more generall qualification of condenſitie, may bee the cauſe, why things ſo affected deſire union to the earth. And though 'tis likely that this would appeare betwixt two leſſer condenſed bodies, (as ſup-

Lib. de Sympath. & Antip. cap. 7.

Vid. Bapt. Maſul. exer. Acad. de attract. exer. 4.

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pose two peeces of earth) if they were both placed at libertie in the æthereall ayre, yet being neere the earth, the stronger species of this great globe dos as it were drownd the lesse.

'Tis a common experiment, that such a lump of ore or stone, as being on the ground, cannot be moved by lesse than six men, being in the bottom of a deep mine, may be stirred by two. The reason is, because then tis compassed with attractive beams, there being many above it, as well as below it. Whence we may probably inferre (saith the learned *Verulam*) "that the nature of "gravitie, dos worke but weakly also far from the earth; Because the "appetite of union in dense bodies, "must bee more dull in respect of distance. As we may also conclude from the motion of birds, which rise from the ground but heavily, though with much labor; Whereas being on high, they can keep themselves up, and soare about by the meere extension of their wings. Now the reason of this difference, is not (as some falsly conceive) the depth of ayre under them. For a bird

Nat. Hist. Cent. 1. exper. 33.

bird is not heavier when there is but a foote of ayre under him, than when there is a furlong. As appeares by a ship in the water, (an instance of the same nature) which dos not sinke deeper, and so consequently is not heavier, when it has but five fatham depth, than when it has fifty. But the true reason is, the weakness of the desire of union in dense bodies at a distance.

So that from hence, there might be just occasion to taxe *Aristotle* and his followers, for teaching that heavines is an absolute qualitie of it selfe, and really distinct from condensitie: whereas it is onely a modification of it, or rather, another name given to a condensed body in reference to its motion.

For if it were absolute, then it should alwayes be inherent in its subject, and not have its essence depend upon the bodies being here or there. But it is not so. For,

1. Nothing is heavy in its proper place, according to his owne principle, *Nihil grave est in suo loco*. And then

2. Nothing is heavy, which is so farre distant from that proper orbe to which

which it dos belong, that it is not within the reach of its vertue. As was before confirmed.

But unto this it may be objected. Though a body being so placed, be not heavy *in actu secundo*; yet it is *in actu primo*: because it retaines in it an inward pronesse to move downewards, being once severed from its proper place. And this were reason enough why the quality of heavinesse should have an absolute being.

I answer, this distinction is only appliable to such naturall powers as can suspend their acts; and will not hold in Elementary qualities, whose very essence dos necessarily require an exercise of the second act, as you may easily discerne by an induction of all the rest. I cannot say, that body has in it the quality of heate, coldnesse, drinesse, moisture, hardnesse, softnesse, &c. which for the present, has not the second act of these qualities. And if you meane by the essence of them, a power unto them: why, there is not any naturall body but has a power to them all.

From

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From that which hath beene ſaid concerning the nature of gravity, it will follow; That if a man were above the ſphere of this magneticall vertue, which proceeds from the earth, hee might there ſtand as firmely as in the open aire, as he can now upon the ground: And not only ſo, but he may alſo move with a farre greater ſwiftneſſe, than any living creatures here below, becauſe then hee is without all gravity, being not attracted any way, and ſo conſequently will not be liable to ſuch impediments, as may in the leaſt manner reſiſt that kinde of motion which hee ſhall apply himſelfe unto.

If you yet enquire, how wee may conceive it poſſible, that a condenſed body ſhould not be heavy in ſuch a place?

I anſwer, by the ſame reaſon as a body is not heavy in its proper place. Of this I will ſet down two inſtances.

When a man is in the bottome of a deepe river, though hee have over him a multitude of heavy waters, yet he is not burdened with the weight of them.

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them. And though another body, that should be but of an equall gravity, with these waters, when they are taken out, would be heavy enough to presse him to death; yet notwithstanding whilst they are in the channell, they doe not in the least manner, crush him with their load. The reason is, because they are both in their right places; and tis proper for the man being the more condensed body, to be lower than the waters. Or rather thus, Because the body of the man, dos more nearely agree with the earth, in this affection, which is the ground of its attraction, and therefore doth that more strongly attract it, than the waters that are over it. Now, as in such a case, a body may lose the operation of its gravity, which is, to move, or to presse downewards: So may it likewise, when it is so far out of its place, that this attractive power cannot reach unto it.

Tis a pretty notion to this purpose, mentioned by * *Albertus de Saxonia*, and out of him by * *Francis Mendoca*; That the aire is in some part of it navigable.

* *Phys. l. 3. Q. 6. art. 2.*
* *Viridar. l. 4 prob. 47.*

navigable. And that upon this Staticke principle ; any braſſe or iron veſſell (ſuppoſe a kettle) whoſe ſubſtance is much heavier than that of the water, yet being filled with the lighter aire, it will ſwimme upon it, and not ſinke. So ſuppoſe a cup, or wooden veſſel, upon the outward borders of this elementary aire, the cavity of it being filled with fire, or rather æthereall aire, it muſt neceſſarily upon the ſame ground remaine ſwimming there, and of it ſelfe can no more fall, than an empty ſhip can ſinke.

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Tis commonly granted, that if there were a hole quite through the center of the earth, though any heavy body (as ſuppoſe a milſtone) were let fall into it, yet when it came unto the place of the center, it would there reſt immoveable in the aire. Now, as in this caſe, its owne condenſity, cannot hinder, but that it may reſt in the open aire, when there is no other place, to which it ſhould be attracted: So neither could it be any impediment unto it, if it were placed without the ſphere of the earths magneticall vigor, where

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where there ſhould be no attraction at all.

From hence then (I ſay) you may conceive, that if a man were beyond this ſphere, hee might there ſtand as firmely in the open aire, as now upon the earth. And if he might ſtand there, why might hee not alſo goe there? And if ſo; then there is a poſſibility likewiſe of having other conveniences for travelling.

And here tis conſiderable, that ſince our bodies will then bee devoide of gravity, and other impediments of motion; wee ſhall not at all ſpend our ſelves in any labour, and ſo conſequently not much need the reparation of diet: But may perhaps live altogether without it, as thoſe creatures have done, who by reaſon of their ſleeping for many dayes together, have not ſpent any ſpirits, and ſo not wanted any foode: which is commonly related of Serpents, Crocodiles, Beares, Cuckoes, Swallowes, and ſuch like. To this purpoſe, * *Mendoca* reckons up divers ſtrange relations. As that of *Epimenides*, who is ſtoried to have

* *Viridar. lib. 4. prob. 24.*

have slept 75 yeeares. And another of a rusticke in *Germany*, who being accidentally covered with a hay-ricke, slept there for all autumne, and the winter following, without any nourishment. Lib. 1. Cap. 14.

Or, if this will not serve: yet why may not a Papist fast so long, as well as *Ignatius* or *Xaverius*? Or if there be such a strange efficacy in the bread of the Eucharist, as their miraculous relations doe attribute to it: why then, that may serve well enough, for their *viaticum*.

Or, if wee must needs feed upon something else, why may not smells nourish us? * *Plutrach*, and * *Pliny* and divers other ancients, tell us of a nation in *India* that lived only upon pleasing odors. And tis the common opinion of Physitians, that these doe strangely both strengthen and repaire the spirits. Hence was it that *Democritus* was able for divers dayes together, to feede himselfe with the meere smel of hot bread.

* *De facie in Luna.*

* *Nat. hist. lib. 7. ca. 2.*

Diog. Laert. lib. 1. ca. 9.

Or if it bee necessary that our stomacks must receive the food: why then

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then tis not impossible that the purity of the æthereall aire, being not mixed with any improper vapors, may be so agreeable to our bodies, as to yeeld us sufficient nourishment; According to that of the Poet;

Virgil. ---------- *Vescitur aurâ*
Æthereâ ----------

Twas an old *Platonicke* principle, that there is in some part of the world such a place where men might be plentifully nourished, by the aire they breath: Which cannot more properly be assigned to any one particular, than to the æthereall aire above this.

Arist. de Sens. cap. 5. I know tis the common opinion that no *Element* can prove *Aliment*, because tis not proportionate to the bodies of living creatures which are compounded. But,

1. This æthereall aire is not an element; and though it be purer, yet tis perhaps of a greater agreeablenesse to mans nature and constitution.

2. If we consult experience and the credible relations of others, wee shall finde it probable enough that many things receive nourishment from meer elements. First,

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First; for the earth; * *Aristotle* and * *Pliny*, those two great naturalists, tell us of some creatures, that are fed only with this. And it was the curse of the serpent, *Gen.* 3. 14. *Vpon thy belly shalt thou goe, and dust shalt thou eate all the dayes of thy life.*

The earth

* *Hist. Animal. lib.* 8. *cap* 5.
* *Hist. l.* 10. *cap.* 72.

So likewise for the water. * *Albertus Magnus* speaks of a man who lived seven weeks together by the meere drinking of water. * *Rondoletius* (to whose diligence these later times are much beholding for sundry observations concerning the nature of Aquatils) affirmes that his wife did keep a fish in a glasse of water, without any other food for three yeares: In which space it was constantly augmented, till at first it could not come out of the place at which it was put in, and at length was too big for the glasse it selfe, though that were of a large capacity. *Cardan* tells us of some wormes, that are bred & nourished by the snow, from which being once separated, they dye.

The water

* *De Anim. lib.* 7.

* *De Pisc. l.* 1. *cap.* 12.

Subtil. l. 9.

Thus also is it with the aire, which wee may well conceive dos chiefly concurre to the nourishing of all vege-

The aire

tables. For if their food were all sucked out from the earth, there must needs be then, some sensible decay in the ground by them; especially since they do every yeare renew their leaves, and fruits: which being so many, and so often, could not be produced without abundance of nourishment. To this purpose is the experimēt of trees cut down which will of themselves put forth sproutes. As also that of *Onyons*, & the *Semper-vive*, which will strangely shoot forth, and grow as they hang in the open aire. Thus likewise is it with some sensible creatures; the *Camelion* (saith * *Pliny* and * *Solinus*) is meerely nourished by this: And so are the birds of Paradise, treated of by * many; which reside constantly in the aire, Nature having not bestowed upon them any legs, and therefore they are never seene upon the ground but being dead. If you aske, how they multiply? Tis answered, they lay their egges on the backes of one another, upon which they sit til their young ones be fledg'd. * *Rondoletius* from the history of *Hermolaus Barbarus*, tels us of a Priest (of whom

* *Hist. li. 8. cap. 33. Polyhistor. cap. 53.*

* *Lop. hist. Ind. Occid. cap 96. Maio'us Colloq. 3.* Tis likely that these birds doe chiefly reside in the æthereall aire, wher they are nourished and upheld.

* *De Piscibus, lib. 1. cap. 13.*

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whom one of the Popes had the custody) that lived forty yeares upon meer aire. As also of a maide in *France*, and another in *Germany*, that for diverse yeares together did feed on nothing but this: Nay, hee affirmes that hee himselfe had seene one, who lived till ten yeares of age without any other nourishment. You may find most of these, and some other examples to this purpose, gathered together by *Mendoca Viridar. lib.* 4. *Prob.* 23, 24. Now, if this elementary aire which is mixed with such improper vapors, may accidentally nourish some persons; perhaps then, that pure æthereall aire may of it selfe be more naturall to our tempers.

But if none of these conjectures may satisfie; yet there may happily be some possible meanes for the conveiance of other foode, as shall be shewed afterwards.

Againe, seeing we do not then spend our selves in any labour, we shall not, it may bee, neede the refreshment of sleepe. But if we doe, we cannot desire a softer bed than the aire, where wee may repose our selves firmely and

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safely as in our chambers.

But here you may aske, whether there be any meanes for us to know, how far this sphere of the earths vertue dos extend it selfe?

I answer, tis probable that it dos not reach much farther than that orbe of thick vaporous aire, that incompasseth the earth; becausse tis likely the Sunne may exhale some earthly vapors, near unto the utmost bounds of the sphere alloted to them.

Now there are divers wayes used by Astronomers, to take the altitude of this vaporous aire. As,

1. By observing the height of that aire which causeth the *Crepusculum*, or twilight; For the finding of which, the Antients used this meanes: As soone as ever they could discerne the aire in the east to be altered with the least light, they would by the situation of the starres find out how many degrees the Sun was below the *Horizon*, which was usually about 18. From whence they would easily conclude, how high that aire must be above us, which the Sun could shine upon, when hee was 18 degrees

grees below us. And from this obſervation, it was concluded to bee about 52 miles high.

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But in this Concluſion, the Antients were much deceived, becauſe they proceeded upon a wrong ground, whilſt they ſuppoſed that the ſhining of the Suns direct rayes upon the aire, was the only reaſon of the *Crepuſculum*; Whereas tis certain that there are many other things which may alſo concurre to the cauſing of it. As,

Keplar. Ep. Coper. l. 1. *part.* 3.

1. Some bright clouds below the *Horizon*, which being illuminated by the Sunne, may be the meanes of conveying ſome light to our aire, before the direct rayes can touch it.

2. The often refraction of the rayes, which ſuffer a frequent repercuſſion from the cavitie of this ſphere, may likewiſe yeeld us ſome light.

3. And ſo may the orbe of enlightned aire compaſſing the Sunne, part of which muſt riſe before his body.

2. The ſecond way whereby we may more ſurely find the altitude of this groſſer aire, is by taking the highth of the higheſt cloud: which may be done,

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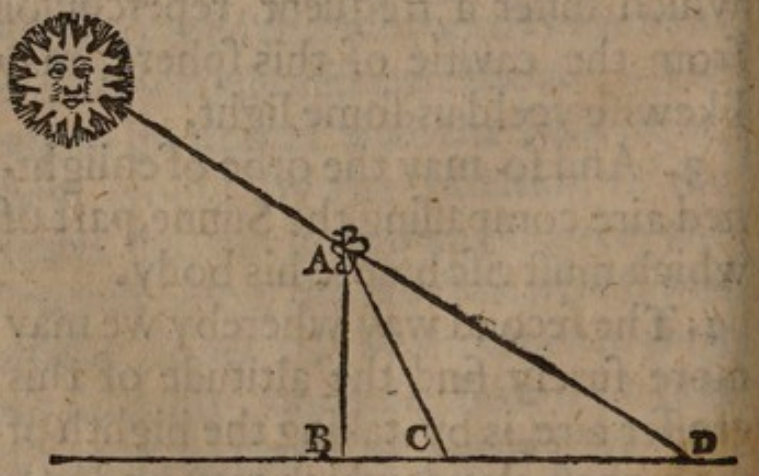
1 Either as they use to measure the altitude of things that cannot be approached unto, *viz.* by two stations, when two persons shall at the same time, in severall places, observe the declination of any cloud from the vertical point. Or, 2. which is the more easie way, when a man shall choose such a station, where he may at some distance, discerne the place on which the cloud dos cast its shadow, and withall dos observe, how much both the cloud and the Sun decline from the vertical point. From which he may easily conclude the true altitude of it, as you may more plainely conceive, by this following *Diagram.*

Stevinius. Geog. l. 3. prop 3.



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Where *A B* is a perpendicular from the cloud, *C* the ſtation of him that meaſures, *D* the place where the ſhadow of the cloud dos fall.

The inſtrument being directed from the ſtation *C*, to the cloud at *A*, the perpendicular will ſhew the Angle *B A C*. Then letting the Sun ſhine through the ſights of your inſtrument, the perpendicular of it will give the angle *B A D*. Afterwards having meaſured the diſtance *C D* by paces, you may according to the common rules, find the heigth *B A*. *Pitiſc. Trigon.*

But if without making the obſervation, you would know of what altitude the higheſt of theſe are found by obſervation; * *Cardan* anſwers, not above two miles; * *Keplar*, not above 1600 paces, or thereabouts. * *Subt. l. 17.* * *Epit. Coper. l. 1 p. 3.*

3. Another way to finde the height of this vaporous aire, is, by knowing the difference of altitude, which it cauſeth, in refracting the beames of any ſtar neere the *Horizon*. And from this obſervation alſo, it is uſually concluded to bee about two or three miles high.

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But now you must not conceive, as if the orbe of magneticall vigor, were bounded in an exact superficies, or as if it did equally hold out just to such a determinate line, and no farther. But as it hath bin said of the first region, which is there terminated where the heat of reflexion dos begin to languish: So likewise is it probable, that this magneticall vigor dos remit of its degrees proportionally to its distance from the earth, which is the cause of it: And therefore though the thicker clouds may be elevated no higher, yet this orbe may be continued in weaker degrees a little beyond them. We will suppose it (which in all likelyhood is the most) to bee about twenty miles high. So that you see the former Thesis remaines probable; that if a man could but fly, or by any other meanes get twenty miles upwards, it were possible for him to reach unto the Moone.

But it may bee againe objected: Though all this were true; though there were such an orbe of aire which did terminate the earths vigor: And though

though the heavineſſe of our bodies could not hinder our paſſage, through the vaſt ſpaces of the ætheriall aire; yet thoſe two other impediments may ſeeme to deny the poſſibility of any ſuch voyage.

1. The extreme *coldneſſe* of that aire. If ſome of our higher mountaines for this reaſon bee not habitable; much more then will thoſe places bee ſo, which are farther from any cauſe of heate.

2. The extreme thinneſſe of it, which may make it unfit for expiration. For if in ſome mountaines (as *Ariſtotle* tells us of *Olympus*, and out him * S. *Auſtine*) the aire bee ſo thin that men cannot draw their breath, unleſſe it were through ſome moiſtned ſpunges; much more then muſt that aire be thin, which is more remotely ſituated from the cauſes of impurity and mixture. And then beſide, the refraction that is made by the vaporous aire incompaſſing our earth, may ſufficiently prove that there is a great difference betwixt the æthereall aire and this, in reſpect of rarity.

* *In Gen. ad literam. li. 3. cap 2.*

To

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To the first of these I answer, that though the second region, be naturally endowed with so much coldnesse as may make it fit for the production of meteors; yet it will not hence follow, that all that aire above it, which is not appointed for the like purpose, should partake of the same condition: But, it may seeme more probable that this æthereal aire, is freed from having any quality in the extremes. And this may be confirmed, from those common arguments, which are usually brought to prove the warmnesse of the third region. As you may see in * *Fromundus*, and others who treate of that subject.

* *Meteor. lib. 1. ca. 2. art. 1.*

Tis the assertion of *Pererius*, that the second region, is not cold meerly for this reason, because it is distant from the ordinary causes of heat, but because it was actually made so at the first, for the condensing of the clouds, and the production of other meteors that were there to be generated; which (as I conceive) might bee sufficiently confirmed from that order of the creation observed by *Moses*, who tells us that

Comment. in Gen. 1. 8.

that the waters above the firmament (by which, in the greateſt probability, we are to underſtand the clouds in the ſecond region) were made the ſecond day, *Gen.* 1.7,8. whereas the Sunne it ſelfe (whoſe reflection is the cauſe of heate) was not created till the fourth day, *ver.* 16.19.

To the other objection I anſwer, that though the aire in the ſecond region (where by reaſon of its coldneſſe there are many thicke vapors) doe cauſe a great refraction; yet tis probable that the aire which is next the earth, is ſometimes, & in ſome places, of a farre greater thinneſſe, nay as thin as the æthereall aire it ſelfe; ſince ſometimes there is ſuch a ſpeciall heat of the Sun, as may rarifie it in an eminent degree; And in ſome dry places, there are no groſſe impure exhalations to mixe with it.

But here it may be objected. If the aire in the ſecond region were more condenſed and heavy than this wherein wee breath, then that muſt neceſſarily tend downewards and poſſeſſe the lower place.

To

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To this some answer, that the hanging of the clouds in the open aire, is no lesse than a miracle. They are the words of *Pliny*. *Quid mirabilius aquis in cælo stantibus?* what more wonderfull thing is there than that the waters should stand in the heavens? Others prove this from the derivation of the word שמים from שאה *stupescere* and מים *aquæ*: Because the waters do hang there after such a stupendous inconceivable manner; Which seems likewise to bee favoured by Scripture, where tis mentioned as a great argument of Gods omnipotency, that hee holds up the clouds from falling. *He binds up the waters in his thicke clouds, and the cloud is not rent under them.*

Hist. l. 31. cap. 1.

Job 26. 8.

But that which unto me seemes full satisfaction against this doubt, is this consideration; that the naturall vigor whereby the earth dos attract dense bodies unto it, is lesse efficacious at a distance: and therefore a body of lesse density, which is neare unto it, as suppose this thin aire wherein we breath, may naturally bee lower in its situation, than another of a greater condensity

that

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that is farther of; as ſuppoſe the clouds in the ſecond region. And though the one bee abſolutely and in it ſelfe more fit for this motion of deſcent; yet by reaſon of its diſtance, the earths magneticall vertue cannot ſo powerfully worke upon it.

As for that relation of *Ariſtotle*; If it were true; yet it dos not prove this aire to be altogether impaſſible, ſince moiſtned ſpunges might helpe us againſt its thinneſſe: But tis more likely that hee tooke it upon truſt, as hee did ſome other relations concerning the height of the mountaines, wherein tis evident that he was groſſely miſtaken. As where he tells us of *Caucaſus*, that it caſts its ſhadow 560 miles. And this relation being of the ſame nature, wee cannot ſafely truſt unto him for the truth of it.

Meteor. l. 1. c. 11.

If it be here enquired, what meanes there may bee conjectured, for our aſcending beyond the ſphere of the earths magneticall vigor.

I anſwer. 1. Tis not perhaps impoſſible that a man may be able to flye, by the application of wings to his owne body;

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body ; As Angels are pictured, as *Mercury* and *Dædalus* are fained, and as hath bin attempted by divers, particulary by a Turke in Constantinople, as *Busbequius* relates.

Mr. Burton. Melanch. pa. 2. sect. 2 mem. 3.

2. If there bee such a great *Ruck* in *Madagascar*, as * *Marcus Polus* the Venetian mentions, the feathers in whose wings are twelve foot long, which can soope up a horse and his rider, or an elephant, as our kites doe a mouse; why then tis but teaching one of these to carry a man, and he may ride up thither, as *Ganymed* dos upon an eagle.

* *Lib. 3. c. 40.*

3. Or if neither of these wayes will serve : Yet I doe seriously, and upon good grounds, affirme it possible to make a flying Chariot. In which a man may sit, and give such a motion unto it, as shall convey him through the aire. And this perhaps might bee made large enough to carry divers men at the same time, together with foode for their *viaticum*, and commodities for traffique. It is not the bignesse of any thing in this kind, that can hinder its motion, if the motive faculty be answerable thereunto. We see a great

great ſhip ſwimmes as well as a ſmall corke, and an Eagle flies in the aire as well as a little gnat.

This engine may be contrived from the ſame principles by which *Archytas* made a wooden dove, and *Regiomontanus* a wooden eagle.

I conceive it were no difficult matter (if a man had leiſure) to ſhew more particularly, the meanes of compoſing it.

The perfecting of ſuch an invention, would be of ſuch excellent uſe, that it were enough, not only to make a man famous, but the age alſo wherein hee lives. For beſides the ſtrange diſcoveries that it might occaſion in this other world, it would be alſo of inconceiveable advantage for travelling, above anyother conveiance that is now in uſe.

So that notwithſtanding all theſe ſeeming impoſſibilities, tis likely enough, that there may be a meanes invented of journying to the Moone; And how happy ſhall they be, that are firſt ſucceſſefull in this attempt?

------ *Fæliceſq́; animæ, quas nubila ſupra,*
Et turpes fumos, plenumq́; vaporibus orbem,
Inſeruit

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Inſeruit cælo ſancti ſcintilla Promethei.

Having thus finiſhed this diſcourſe, I chanced upon a late fancy to this purpoſe under the fained name of *Domingo Gonſales*, written by a late reverend and learned Biſhop: In which (beſides ſundry particulars wherein this later Chapter did unwittingly agree with it) there is delivered a very pleaſant and well contrived fancy concerning a voyage to this other world.

Hee ſuppoſeth that there is a naturall and uſuall paſſage for many creatures betwixt our earth and this planet. Thus hee ſaies; thoſe great multitudes of locuſts, wherewith diverſe countries have bin deſtroyed, do proceed from thence. And if we peruſe the authors who treat of them, wee ſhall finde that many times they fly in numberleſſe troopes, or ſwarmes, and for ſundry dayes together before they fall, are ſeene over thoſe places in great high clouds, ſuch as comming nearer, are of extenſion enough to obſcure the day, & hinder the light of the Sunne. From which, together with

with diverſe other ſuch relations, he concludes, that tis not altogether improbable, they ſhould proceed from the Moone. Thus likewiſe he ſuppoſeth the Swallowes, Cuckoes, Nightingales, with divers other fowle, which are with us only halfe the year, to flye up thither, when they goe from us. Amongſt which kinde, there is a wilde Swan in the Eaſt Indies, which at certain ſeaſons of the year doe conſtantly take their flight thither. Now this bird being of great ſtrength, able to continue for a long flight, as alſo going uſually in flocks, like our wilde-geeſe; he ſuppoſeth that many of them together, might be taught to carry the weight of a man; eſpecially if an engine were ſo contrived (as he thinks it might) that each of them ſhould beare an equall ſhare in the burden. So that by this means, tis eaſily conceiveable, how once every yeare a man might finiſh ſuch a voyage; going along with theſe birds at the beginning of winter, and againe returning with them at the Spring.

And here, one that had a ſtrong

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fancy, were better able to set forth the great benefit and pleasure to be had by such a journey. And that whether you consider the strangenesse of the persons, language, arts, policy, religion of those inhabitants, together with the new traffique that might be brought thence. In briefe, doe but consider the pleasure and profit, of those later discoveries in *America*, and wee must needs conclude this to be inconceiveably beyond it.

But such imaginations as these, I shall leave to the fancy of the Reader.

------- Sic itur ad astra.
Reptet humi quicunq; velit -------

Cœlo restat iter, cœlo tentabimus ire.

FINIS.

1. Booke. *Errata.*

Pag. 47. lin 24 *read* Scheiner. p. 48. l 22. Nicremberg'us p. 50. l. 11. not *for* nor p. 52. l. 16. hir *for* his p. 73. l. 22. Malapertius p. 77. l 17. obsolete *for* absolute p 90. l. 12. Philolaus *ibid* l. 15. Rheticus p. 112. l 20. (*Dele* its center, *and read*) motion of that magnetical globe to which it did belong. p. 137. l. 21. Cisatus p. 143. l. 20. light *for* right. p. 184 l. 23. *read* in that late p. 202. l 9. must be of p. 219. l. 25. *In the margin.* 1. p. 221. l. 15. *In the margin.* 2. p. 223. l. 17. Plutarch.

The Propositions that are proved in this Discourse.

Proposition 1.

That the strangenesse of this opinion is no sufficient reason why it should be rejected, because other certaine truths have beene formerly esteemed ridiculous, and great absurdities enterained by common consent.

By way of Preface.

Proposition 2.

That a plurality of worlds dos not contradict any principle of reason or faith.

Proposition 3.

That the heavens doe not consist of any such pure matter which can priviledge them

from the like change & corruption, as these inferiour bodies are liable unto.

Prop. 4.

That the Moone is a solid, compacted, opacous body.

Prop. 5.

That the Moon hath not any light of her owne.

Prop. 6.

That there is a world in the Moone, hath beene the direct opinion of many ancient, with some moderne Mathematicians, and may probably be deduced from the tenents of others.

Prop. 7.

That those spots and brighter parts which by our sight may be distinguished in the Moone, doe shew the difference betwixt the Sea and Land in that other World.

Prop.

Prop. 8.

That the ſpots repreſent the Sea; and the brighter parts the Land.

Prop. 9.

That there are high Mountaines, deepe vallies, and ſpacious plaines in the body of the Moone.

Prop. 10.

That there is an Atmo-ſphæra, or an orbe of groſſe vaporous aire, immediately encompaſſing the body of the Moone.

Prop. 11.

That as their world is our Moone, ſo our world is their Moone.

Prop. 12.

That tis probable there may be ſuch Meteors belonging to that world in the Moone, as there are with us.

Prop. 13.

That tis probable there may bee inhabitants in this other World, but of what kinde they are, is uncertaine.

Prop. 14.

That tis possible for some of our posterity to finde out a conveyance to this other world, and if there be inhabitants there, to have commerce with them.

FINIS.

A DISCOVRSE concerning A NEW PLANET.

Tending to prove, That 'tis probable our Earth is one of the *Planets*.

The second Booke, now first publiſhed.

Digna res eſt Contemplatione, ut ſciamus in quo rerum ſtatu ſcimus: pigerimam ſortiti, an velociſſimam ſedem: circa nos Deus omnia, an nos agat. Sen. Nat. Queſt. Lib. 7. Cap. 2.

LONDON,
Printed by *R.H.* for *Iohn Maynard*, and are to be ſold at the *George* in *Fleetſtreet*, neer S. *Dunſtans* Church. 1640.

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To the Reader.

NOt to trouble you with an *Invective* againſt thoſe multitudes of Pamphlets which are every day preſt into the World; or an *Apology*, why this was publiſhed amongſt the reſt (the uſuall matter for ſuch kind of Epiſtles:) Let me in briefe admoniſh you ſomthing concerning the

chiefe ſcope and manner } of this following diſcourſe.

To the Reader.

'Tis not the *purpose* of it, to set downe an exact Treatise of this kind of *Astronomy*; but rather to remove those common prejudices, which usually deterre men from taking any Argument tending this way, into their considerations. For we may obserue, that in those points which are cryed downe by the more generall opinion, men doe for the most part rest themselves in the superficiall knowledge of things, as they seem at their first appearances, thinking they can say enough to any Paradox, against which they can urge the most obvious and easie Objections; and therefore seldome or never search into the depth of these points, or enter into any serious impartiall examination of those

thoſe grounds on which they are bottomed. Which as it muſt needs be a great hinderance to the proficiencie of all kind of Learning: ſo more eſpecially is it in this particular. We might diſcerne a greater comelineſſe and order in this great Fabricke of the World, and more eaſily underſtand the appearances in Aſtronomy, if we could with indifferencie attend to what might bee ſaid for that opinion of *Copernicus*, which is here defended.

2 *For the manner.* It is not maintained with ſuch heate and religion, as if every one that reads it, were preſently bound to yeeld up his aſſent: But as it is in other Warres where *victory* cannot bee had, Men muſt be con-

tent with peace: So likewiſe is it in this, and ſhould bee in all other Philoſophicall contentions. If there bee nothing able to convince and ſatisfie the indifferent Reader, hee may ſtill injoy his owne opinion. All men have not the ſame way of apprehending things; but according to the varietie of their temper, cuſtome, and abilities, their Vnderſtandings are ſeverally faſhioned to different aſſents: Which had it beene but well conſidered by ſome of our hot * adverſaries, they would not have ſhewed more *violence* in oppoſing the *Perſons* againſt whom they write, than *ſtrength* in confuting the *cauſe*.

* *Fromond. Al. Koſſ.*

'Tis an excellent rule to bee ob-

obſerved in all diſputes, That Men ſhould give *ſoft Words* and *hard Arguments*, that they would not ſo much ſtrive to *vex*, as to *convince* an Enemy. If this were but diligently practiſed in all caſes, and on all ſides, wee might in a good meaſure bee freed from thoſe vexations in the ſearch of Truth, which the wiſe *Solomon*, by his owne experience did ſo much complaine of, *Eccleſiaſtes*, 1. 18. *In much Wiſedome there is much Griefe, and he that increaſeth Knowledge, increaſeth Sorrow.*

To conclude: Though there ſhould be nothing in this diſcourſe conducible to your Information and Benefit; yet it may ſerve in the *Peruſall*, as it did in

in the *Compoſure* for the recreation of ſuch leiſure houres, as may conveniently bee ſpared from more weighty imploiments.

***

Farewell.

The

THE PROPOSITIONS that are insisted on in this Discourse.

PROP. I.

THat the seeming Novelty and Singularity of this opinion, can bee no sufficient reason to prove it erroneous.

PROP. II.

That the places of Scripture which seeme to intimate the diurnall motion of the Sun or Heavens, are fairely capable of another interpretation.

PROP.

Imprimatur
A. FREVVEN, *Vicecan.*

Imprimatur LONDINI,
SAMUEL BAKER.

That the Earth may be a Planet.

PROP. I.

That the ſeeming Noveltie and Singularitie of this opinion, can be no ſufficient reaſon to prove it erronious.

IN the ſearch of Theologicall Truths, it is the ſafeſt method, firſt of all to looke unto Divine Authority; becauſe that carryes with it as cleer an evidence to our Faith, as any thing elſe can be to

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our reason. But on the contrary, in the examination of Philosophicall points, it were a prepostorous course to begin at the testimony and opinion of others, and then afterwards to descend unto the reasons that may bee drawne from the Nature and Essence of the things themselves: becauſe theſe inartificiall Arguments (as the Logicians cal them) doe not carry with them any cleere and convincing evidence; and therefore should come after those that are of more necessary dependance, as serving rather to confirme, than resolve the Iudgement.

But yet, so it is, that in those points which are besides the common opinion, men are carried away at the first by the generall cry, and seldome or never come so farre as to examine the reasons that may bee urged for them. And therfore, since it is the purpose of this discourse to remove those prejudices which may hinder our judgement in the like case, 'tis requisite that in the first place there bee some satisfaction given to those Arguments that may bee taken

ken from the Authoritie of others.

Which Arguments are insisted on by our adversaries with much heate and violence.

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What (say they) shall an upstart Noveltie thrust out such a Truth as hath passed by successive tradition through all Ages of the World? and hath bin generally entertained, not onely in the opinion of the vulgar, but also of the greatest Philosophers and most learned men? * Shall wee thinke that amongst the multitude of those who in severall times have been eminent for new inventions and strange discoveries, there was none able to finde out such a Secret as this, besides some fabulous Pithagorians, and of late *Copernicus?* Is it possible that the World should last for above five thousand yeares together, and yet the Inhabitants of it be so dull and stupid, as to be unacquainted with it's motion? Nay, shall wee thinke that those excellent men, whom the Holy Ghost made use of in the penning of Scripture, who were extraordinarily inspired with supernaturall Truths,

* *Alex. Ross. de Terræ motu, contra Lansb. lib. 1. sect. 1. cap. 10.*

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should notwithstanding be so grossely ignorant of so common a matter as this? Can wee beleeve, if there were any such thing, that *Iosuah*, and *Iob*, and *David*, and *Solomon*, &c. should know nothing of it? Certainly it must needs argue a strong affectation of Singularitie, for a man to take up any groundlesse fancy against such antient and generall Authority.

I answer: As wee should not bee so fondly conceited of our selves, and the extraordinary Abilities of these present ages, as to thinke every thing that is antient to be absolute: Or, as if it must needs bee with opinions, as it is with cloths, where the newest is for the most part best. So neither should we be so superstitiously devoted to Antiquitie, as to take up every thing for Canonicall, which drops from the pen of a Father, or was approved by the consent of the Antients. 'Tis an excellent saying,

* Alcinous. * Δεῖ ἐλευθέριον εἶναι τὴν γνώμην τὸν μέλλοντα φιλοσοφεῖν.

It behoves every one in the search of Truth, alwaies to preserve a Philosophicall liberty: not to be so inslaved to the opinion

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opinion of any man, as to thinke what ever he sayes to be infallible. We must labour to find out what things are in themselves by our owne experience, and a through examination of their natures, not what another sayes of them. And if in such an impartiall enquiry, we chance to light upon a new way, and that which is besides the common rode, this is neither our fault, nor our unhappinesse.

Not our fault, because it did not arise from Singularity or Affectation. Not our unhappinesse, because it is rather a Priviledge to be the first in finding out such Truths, as are not discernable to every common eye. If Noveltie should alwaies be rejected, neither would Arts have arrived to that perfection wherein now wee enjoy them, nor could we euer hope for any future reformation: though all Truth be in it self Eternall; yet in respect of mens opinions, there is scarse any so antient, but had a beginning, and was once counted a Noveltie; and if for this reason it had been condemned as an errour, what a generall darknesse

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and ignorance would then have been in the World, in comparison of that light which now abounds; according to that of the Poet:

† Horat. lib. 2. ep. 1.

* *Quod si tam Antiquis Novitas invisa fuisset,*
Quam nobis, quid nunc esset vetus aut quid habe-
Quod legeret tereretq; viritim publicum usum? (ret,

If our Forefathers had but hated thus,
All that were new, what had been old to us?
Or, how might any thing confirmed be,
For publicke use, by it's Antiquitie?

But for more full satisfaction of all those scruples that may arise from the seeming Novelty or Singularity of this opinion, I shall propose these following considerations.

Consid. 1. Suppose it were a Noveltie: Yet 'tis in Philosophy, and that is made up of nothing else; but receives addition from every dayes experiment. True indeed, for Divinity wee have an infallible rule that do's plainly inform us of all necessary Truths; and therfore the Primitive Times are of greater Authority, because they were neerer to those holy Men who were

were the pen-men of Scripture. But now for Philosophy, there is no such reason: what ever the Schoole-men may talke; yet *Aristotles* works are not necessarily true, and hee himselfe hath by sufficient Arguments proved himselfe to be liable unto errour. Now in this case, if wee should speake properly, Antiquity do's consist in the old age of the World, not in the youth of it. In such Learning as may be increased by fresh experiments and new discoveries: 'tis we are the Fathers, and of more Authority than former Ages; because wee have the advantage of more time than they had, and Truth (wee say) is the Daughter of Time. However, there is nothing in this opinion so Magisterially proposed, but the Reader may use his owne liberty; and if all the reasons considered together, doe not seeme convincing unto him, he may freely reject it.

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In those naturall points which carry with them any doubt or obscurity, it is the safest way to suspend our assents: and though we may dispute *pro* or *con*; yet not to settle our opinion on either side.

Lib. 2. *Cap.* 1. *Consid.* 2.

In weighing the Authority of others, 'tis not their multitude that should prevaile, or their skill in some things that should make them of credit in every thing, but wee should examine what particular insight and experience they had in those times for which they are cited. Now 'tis plaine, that common people judge by their senses; and therefore, their voices are altogether unfit to decide any Philosophicall doubt, which cannot well be examined or explained without discourse and reason. And as for the antient Fathers, though they were men very eminent for their holy lives and extraordinary skill in Divinitie; yet they were most of them very ignorant in that part of Learning which concernes this opinion, as appeares by many of their grosse mistakes in this kinde, as that concerning the *Antipodes*, &c. and therefore it is not their opinion neither, in this businesse, that to an indifferent seeker of Truth will bee of any strong Authority.

* *Alex. Ross. l. 1. sect. c. 8.*

But against this it is * objected, That the instance of the *Antipodes* do's not argue

argue any ſpeciall ignorance in theſe learned Men: Or, that they had leſſe skil in ſuch humane Arts than others; ſince *Ariſtotle* himſelf, and *Pliny*, did deny this as well as they.

I anſwer:

1 If they did, yet this do's make more to the preſent purpoſe: For if ſuch great Schollers, who were ſo eminent for their knowledge in naturall things, might yet notwithſtanding be groſſely miſtaken in ſuch matters as are now evident and certaine: Why then wee have no reaſon to depend upon their aſſertions or Authorities, as if they were infallible.

2 Though theſe great Naturaliſts, for want of ſome experience were miſtaken in that opinion, whileſt they thought no place was habitable but the temperate *Zones*; yet it cannot be from hence inferred, that they denied the poſſibilitie of *Antipodes*: ſince theſe are ſuch Inhabitants as live oppoſite unto us in the other temperate *Zone*; and 'twere an abſurd thing to imagine that thoſe who lived in different *Zones*, can be

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be *Antipodes* to one another; and argues that a man did not understand, or else had forgotten that common distinction in *Geography*, wherein the relation of the Worlds Inhabitants unto one another, are reckoned up under these three heads; *Antæci*, *Perieci*, and *Antipodes*. But to let this passe: 'Tis certaine, that some of the Fathers did deny the being of any such, upon other more absurd grounds. Now if such as *Chrisostome*, *Lactantius*, &c. who were noted for great Schollers, and such too as flourished in these latter times, when all humane Learning was more generally profest, should notwithstanding be so much mistaken in so obvious a matter: Why then may wee not think that those Primitive Saints, who were the pen-men of Scripture, and eminent above others in their time for holinesse and knowledge, might yet be utterly ignorant of many Philosophicall Truths, which are commonly knowne in these dayes? 'Tis probable, that the Holy Ghost did informe them onely with the knowledge of those things whereof they were to be

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be the pen-men, and that they were not better skilled in points of Philosophy than others. There were indeed some of them who were supernaturally indowed with humane Learning; yet this was, because they might thereby bee fitted for some particular ends, which all the rest were not appointed unto: thus *Solomon* was strangely gifted with all kinde of knowledge, in a great measure, because he was to teach us by his owne experience the extreme vanity of it, that we might not so settle our desires upon it, as if it were able to yeeld us contentment. So too the Apostles were extraordinarily inspired with the knowledge of Languages, because they were to preach unto all Nations. But it will not hence follow, that therfore the other holy pen-men were greater Schollers than others. 'Tis likely that *Iob* had as much humane Learning as most of them, because his Booke is more especially remarkable for lofty expressions, and discourses of Nature; and yet 'tis not likely that he was acquainted with all those mysteries which later Ages have discovered; *Eccl.* 1. 18.

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vered; becauſe when God would convince him of his owne folly and ignorance, he propoſes to him ſuch queſtions, as being altogether unanſwerable; which notwithſtanding, any ordinary Philoſopher in theſe dayes might have reſolued. As you may ſee at large in the thirty eighth Chapter of that Booke.

The occaſion was this: *Iob* having * before deſired that he might diſpute with the Almighty concerning the uprightneſſe of his owne wayes, and the unreaſonableneſſe of thoſe afflictions which he underwent, do's at length obtaine his deſire in this kinde; and God vouchſafes in this thirty eighth chapter, to argue the caſe with him. Where he do's ſhew *Iob* how unfit he was to judge of the wayes of Providence, in diſpoſing of Bleſſings and Afflictions, when as he was ſo ignorant in ordinary matters, being not able to diſcerne the reaſon of naturall and common events. As * why the Sea ſhould bee ſo bounded from overflowing the land? What is the † bredth of the Earth? what is the * reaſon of the Snow or Hayle? what was the

* *Cap.* 13. 3.

* *V.* 8, 10, 11.

† *Ver.* 18.
* *Ver.* 22.

the † cause of the Raine or Dewe, of Ice and Frost, and the like. By which questions, it seemes *Iob* was so utterly pusled, that hee is faine afterwards to humble himselfe in this acknowledgement: **I have uttered that I understood not, things too wonderfull for me, which I knew not: wherefore I abhorre my selfe, and repent in dust and ashes.*

LIB. 2. *Cap.* 1. † *V.* 28. 29.

* *Cap.* 42. 3.

So that 'tis likely these holy Men had not these humane Arts by any speciall inspiration, but by instruction and study, and other ordinary meanes; and therefore *Moses* his skill in this kinde is called the Learning of the Egyptians. Now because in those times all Sciences were taught onely in a rude and imperfect manner; therefore 'tis likely that they also had but a darke and confuse apprehension of things, and were liable to the common errours. And for this reason is it, why **Tostatus* (speaking of *Iosuahs* bidding the Moone stand still as well as the Sun) sayes, *Quod forte erat imperitus circa Astrorum doctrinam, sentiens ut vulgares sentiunt*: That perhaps hee was unskilfull in Astronomy, having the

Acts 7. 22.

* *Iosh.* c. 10. *Quæst.* 19.

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the same grosse conceit of the Heavens, as the vulgar had. From all which it may be inferred, that the ignorance of such good Men and great Schollers concerning these Philosophical points, can bee no sufficient reason, why after examination we should deny them, or doubt of their Truth.

Consid. 3. 'Tis considerable, that in the rudiments and first beginnings of *Astronomy*, and so in severall Ages after, this opinion hath found many Patrons, and those too Men of eminent note and learning. Such was more especially *Pythagoras*, who was generally and highly esteemed for his divine wit, and rare inventions; under whose mysterious sayings, there be many excellent Truths to bee discovered.

But against his testimony, it is againe †objected; If *Pythagoras* were of this opinion, yet his Authority should not be of any credit, because he was the author of many other monstrous absurdities.

† *Alex. Ross. l. 2. sect. 2. c. 10.*

To this I answer: If a mans errour in some particulars should take away his credit

credit for every thing elſe, this would abolish the force of all humane Authority; for *humanum eſt errare.* Secondly, 'tis probable that many of *Pythagora's* sayings which ſeeme ſo abſurd, are not to be underſtood according to their letter, but in a myſticall ſenſe. — Lib. 2. Cap. 1.

2 But he objects again, that *Pythagoras* was not of this opinion; and that for two reaſons: Firſt, becauſe no antient author that he had read aſcribes it unto him. Secondly, it is contradictory to his other opinions, concerning the Harmony that was made by the motion of the Heavens; which could not conſiſt with this other of the Earth's motion.

To the firſt I anſwer: The Objector could not chuſe but know that this aſſertion is by many antient authors aſcribed to that ſect, whereof *Pythagoras* was the chief. He might have ſeene it expreſly in * *Ariſtotle* himſelfe: Οἱ δὲ Πυθαγόρειοι λέγουσιν ἐπὶ μὲν τοῦ μέσου πῦρ εἶναι, τὴν τε γῆν ἓν τῶν ἄστρων οὖσαν κύκλῳ φερομένην περὶ τὸ μέσον, νύκτα τε καὶ ἡμέρας ποιεῖν.

* De Cœlo, lib. 2. ca. 13.

In which the Philoſopher do's compendiouſly reckon up the three chiefe particulars implyed in the opinion of

the

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the *Pythagorians*. First, the Suns being in the centre of the World. Secondly, the earth's annuall motion about it, as being one of the planets: thirdly, it's diurnal revolution, wherby it caused day & night.

To his second reason I answer: First, that *Pythagoras* thought the Earth to be one of the Planets (as appeares by *Aristotles* testimony concerning him) and to move amongst them the rest. So that his opinion concerning the motion of the heavens, is not inconsistent with that of the earth. Secondly, but as for the cœlestiall harmony, he might perhaps under this mysticall expression, according to his usuall custome, shadow forth unto us that mutuall proportion & harmonical consent, which he did conceive in the severall bignes, distance, motions of the orbs. So that notwithstanding these objections, it is evident that *Pythagoras* was of this opinion, and that his Authority may adde somwhat for the confirmation of it. Vnto him assented* *Aristarchus Samius*, who flourished about 280 yeares before the Birth of our Saviour, and was by reason of this opinion, arraigned for pro-

* *Archimedes de arænæ numero.*

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prophanes and sacriledge by the *Ariopagites*, because he had blasphemed the deity of *Vesta*, affirming the earth to move. To them agreed *Philaus*, *Heraclides*, *Pontius*, *Nicetas*, *Syracusanus*, *Ecphantus*, *Lucippus*, and *Plato* himself (as some think.) So likewise *Numa Pompilius*, as *Plutarch* relates it in his life; who in reference to this opinion, built the temple of *Vesta* round, like the universe: in the middle of it was placed the perpetuall vestall fire; by which he did represent the Sunne in the centre of the world. All these men were in their severall times of speciall Note, as well for their extraordinarie learning, as for this opinion.

4. *Consid.*

'Tis considerable, that since this Science of *Astronomy* hath bin raised to any perfection, there have been many of the best skill in it, that have assented unto that assertion which is here defended. Amongst whom was the Cardinall *Cusanus*, but more especially *Copernicus*, who was a man very exact and diligent in these studies for above 30 yeres together, from the yeare 1500 to 1530, and upwards: and since him, most of the best

De docta ignor. lib. 2. cap. 12.

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Astronomers have been of this side. So that now, there is scarce any of note and skil, who are not *Copernicus* his followers, and if we should goe to most voices, this opinion would carry it from any other. It would be too tedious to reckon up the names of those that may be cited for it; I wil only mention some of the chief: Such were *Ioachinus Rheticus*, an elegant writer, *Christopherus Rothman*, *Mestlin*, a man very eminent for his singular skill in this Science; who though at the first he were a follower of *Ptolomy*, yet upon his second and more exact thoughts, he concluded *Copernicus* to be in the right, & that the usual *Hypothesis*, **præscriptione potiùs quàm ratione valet*, do's prevaile more by prescription then reason. So likewise *Erasmus Reinholdus*, who was the man that calculated the Pratenicall Tables from *Copernicus* his observations; and did intend to write a Commentarie upon his other Works, but that he was taken out of this life before hee could finish those resolutions. Vnto these also I might adde the Names of *Gilbert*, *Keplar*, *Gallilæus*, with sundry others, who have

* *Præf. ad Narrat. Rhetici.*

Ibid.

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have much beautified and confirmed this *Hypotheſis*, with their new inventions. Nay I may ſafely affirme, that amongſt the varietie of thoſe opinions that are in *Aſtronomy*, there are more (of thoſe which have skill in it) that are of this opinion, not only than any other ſide, but than all the reſt put together. So that now it is a greater Argument of Singularitie to oppoſe it.

5 *Conſid.*

'Tis probable, that many other of the Antients would have aſſented unto this opinion, if they had been acquainted with thoſe experiments which later times have found out for the confirmation of it: And therefore * *Rheticus* and † *Keplar* doe ſo oten wiſh that *Ariſtotle* were now alive againe. Queſtionleſſe he was ſo rational & ingenious a man (not halfe ſo obſtinate as many of his followers) that upon ſuch probabilities as theſe, he would quickly have renounced his owne Principles, and have come over to this ſide: for in one place, having propoſed ſome queſtions about the heavens, which were not eaſie to bee reſolved: He ſets downe this rule, That in dif-

* *in Narratione.*

† *Myſt. Coſmogr. cap. 1. Item præf. ad 4. l. Aſtr. Copern.*

de Cœl. l. 2. c. 12.

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ficulties, a man may take a liberty to ſpeake that which ſeems moſt likely to him: and in ſuch caſes, an aptneſſe to gueſſe at ſome reſolution, for the ſatiſfying of our Philoſophicall thirſt, do's deſerve rather to beſtiled by the name of Modeſtie, than Boldnes. And in another place, he referres the Reader to the different opinions of Aſtronomers, adviſing him to examine their ſeverall tenents, as well *Eudoxus* as *Calippus*; and to entertaine that (not which is moſt antient, but) which is moſt exact and agreeable to reaſon. And as for *Ptolomy*, 'tis his counſell, that wee ſhould endeavour to frame ſuch ſuppoſitions of the Heavens, as might be more ſimple, being void of all ſuperfluities: and he confeſſes, that his *Hypotheſis* had many implications in it, together with ſundry intricate and unlikely turnings; and therefore in the ſame place, hee ſeems to admoniſh us, that wee ſhould not bee too confident the Heavens were really in the ſame Forme, wherein Aſtronomers did ſuppoſe them. So that 'tis likely, 'twas his chief intent to propoſe unto us ſuch

Met. lib. 12. cap. 8.

Alm. lib. 13. cap. 2.

a frame of the cœleſtiall bodies, from which wee might, in ſome meaſure, conceive of their different appearances; and according to which, wee might be able to calculate their motions. But now, 'tis *Copernicus* his endeavour, to propound unto us, the true naturall Cauſes of theſe ſeverall Motions, and Appearances: It was the intent of the one, to ſettle the Imagination; and of the other, to ſatisfie the judgement. So, that wee have no reaſon to doubt of his aſſent unto this Opinion, if hee had but clearely underſtood all the grounds of it.

'Tis reported of *Clavius*, that when lying upon his Death-bed, he heard the firſt Newes of thoſe Diſcoveries which were made by *Galilæus* his Glaſſe, he brake forth into theſe words: *Videre Aſtronomos, quo pacto conſtituendi ſunt orbes Cæleſtes, ut hæc Phænomena ſalvari poſſint*: That it did behoove Aſtronomers, to conſider of ſome other *Hypotheſis*, beſide that of *Ptolomy*, whereby they might ſalve all thoſe new appearances.

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pearances. Intimating that this old one, which formerly he had defended, would not now serve the turne: and doubtlesse, if it had been informed how congruous all these might have been unto the opinion of *Copernicus*, hee would quickly have turned on that side. 'Tis considerable, that amongst the followers of *Copernicus*, there are scarce any, who were not formerly against him; and such, as at first, had been throughly seasoned with the Principles of *Aristotle*; in which, for the most part, they have no lesse skil, than those who are so violent in the defence of them. Whereas on the contrary, there are very few to bee found amongst the followers of *Aristotle* and *Ptolomy*, that have read any thing in *Copernicus*, or doe fully understand the Grounds of his opinion; and I thinke, not any, who having been once setled with any strong assent on this side, that have afterwards revolted from it. Now if we do but seriously weigh with our selves, that so many ingenious, considering men, should reject that opinion which they were nursed up in, and which is generally approved

proved as the truth; and that, for the embracing of such a *Paradox* as is condemned in Schooles, and commonly cryed downe, as being absurd and ridiculous; I say, if a man doe but well consider all this, he must needs conclude, that there is some strong evidence for it to bee found out by examination; and that in all probabilitie, this is the righter side.

7 *Consid.* 'Tis probable, that most of those Authors who have opposed this opinion, since it hath bin confirmed by new discoveries, were stirred up thereunto by some of these 3 insufficient grounds.

1 An over-fond and partial conceit of their proper inventions. Every man is naturally more affected to his owne brood, than to that of which another is the Author; though perhaps, it may bee more agreeable to reason. 'Tis very difficult for any one, in the search of Truth, to find in himselfe such an indifferencie, as that his judgement is not at all swayd by an overweening affection unto that which is proper unto himselfe. And this perhaps might bee the first reason that moved the noble *Tycho* with so much

heat to oppose *Copernicus*, that so hee might the better make way for the spreding of that *Hypothesis*, which was of his owne invention. To this I might likewise refer that opinion of *Origanus* and Mr. *Carpenter*, who attribute to the earth only a diurnall revolution. It do's more especially concerne those men that are *Leaders* of severall sides, to beat downe any that should oppose them.

2 A servile and superstitious feare of derogating from the authoritie of the antients, or opposing that meaning of Scripture phrases; wherein the supposed infallible Church, hath for a long time understood them. 'Tis made part of the new Creed, set forth by *Pius* the fourth, 1564, That no man should assent unto any interpretation of Scripture, which is not approved of by the authoritie of the Fathers. And this is the reason why the Iesuites, who are otherwise the greatest affectors of those opinions, which seeme to be new and subtill, doe yet forbeare to say any thing in defence of this; but rather take all occasions to inveigh against it. * One of them do's expressely

* *Serrarius Commen. in Ios. cap. 10. Quæst. 14. So Lipsius Physiol. l. 2.*

expreſſely condemn it for a hereſie. And ſince him, it hath bin called in by † two Seſſions of the Cardinals, as being an opinion both abſurd and dangerous. And therefore likewiſe doe they puniſh it, by caſting the Defenders of it into the Popes trueſt Purgatorie, the Inquiſition: but yet neither theſe Councels, nor any (that I know of) ſince them, have proceeded to ſuch a peremptorie cenſure of it, as to conclude it a hereſie: fearing perhaps, leſt a more exact examination, and the diſcoverie of future times, finding it to bee an undeniable Truth, it might redound to the prejudice of their Church, and it's infallibilitie. And therefore he that is moſt bitter againſt it, in the heat and violence of oppoſition, will not call it a hereſie: the worſt that he dares ſay of it, is, That it is *opinio temeraria quæ altero ſaltem pede intravit hæreſios limen*; A raſh opinion, and bordering upon hereſie. Though unto this likewiſe he was incited by the eagerneſſe of diſputation, and a deſire of victorie, for it ſeemes many eminent men of that Church before him, were a great

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† *Ann. Dom.* 1616. *item* 1633.

Fromondus *Antariſt. cap.* 6.

great deale more milde and moderate in their censures of it.

Paul the third, was not so much offended at *Copernicus*, when he dedicated his Worke unto him.

The Cardinall of *Cusa*, do's expresly maintaine this opinion.

Scombergius, the Cardinall of *Capua*, did with much importunitie and great approbation, beg of *Copernicus* the commentaries that he writ in this kind. And it seems the Fathers of the Councell of *Trent*, were not such confident defenders of *Ptolomy's hypothesis* against *Copernicus*, as many now are. For speaking of those intricate subtilties, which the Fancies of men had framed, to maintain the practice of the Church, they compared them to Astronomers, who (say they) do faine *Excentricks* and *Epicÿcles*, and such engines of Orbes, to save the *Phenomena*; though they know there are no such things. But now, because this opinion of *Copernicus* in later times hath been so strictly forbidden, and punished, it will concerne those of that Religion, to take heed of medling in the defence of it, but rather

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rather to submit the liberty of their reason, unto the command of their Superiors, and (which is very absurd) even in naturall Questions, not to assent unto any thing, but what authoritie shall allow of.

3 A iudging of things by sence, rather than by discourse and reason: a tying of the meaning of Scripture, to the letter of it; and from thence concluding Philosophicall points, together with an ignorance of all those grounds and probabilities in Astronomie, upon which this opinion is bottomed. And this in all likelihood, is the reason why some men, who in other things perhaps are able Schollers, doe write so vehemently against it: and why the common people in generall doe cry it downe, as being absurd and ridiculous. Vnder this head I might referre the opposition of Mr. *Fuller*, *Al. Ross*, &c.

But now, no prejudice that may arise from the bare authoritie of such enemies as these, will be liable to sway the judgement of an indifferent considering man; and I doubt not but that hee, who will

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will throughly weigh with himselfe these particulars that are here propounded, may find some satisfaction for these Arguments, which are taken from the seeming Noveltie and Singularitie of this Opinion.

PROP. II.

That there is not any place in Scriptures, from which (being rightly understood) wee may inferre the diurnall motion of the Sunne or Heavens.

IT were happy for us, if we could exempt Scripture from Philosophicall controversies: if we could bee content to let it bee perfect for that end unto which it was intended, for a rule of our Faith and Obedience; and not stretch it also to be a Iudge of such naturall truths, as are to be found out by our

our owne induſtry and experience. Though the Holy Ghoſt could eaſily have given us a full reſolution of all ſuch particulars ; *yet hee hath left this travell to the ſonnes of men to bee exerciſed therewith*, *Mundum reliquit diſputationibus hominum:* that being buſied for the moſt part in an inquiſition after the creatures, we might find the leſſe leiſure to wait upon our luſts, or ſerve our more ſinfull inclinations. *Eccleſ.* 3. 10, 11.

But however, becauſe our Adverſaries generally doe ſo much inſult in thoſe Arguments that may be drawne from hence ; and more eſpecially, becauſe *Pineda* doth for this reaſon with ſo many bitter and empty reproaches, revile our learned countryman Dr. *Gilbert*. In that renewing of this opinion, he omitted an anſwer to the ſcripture expreſſions: therfore 'tis requiſite, That in the proſecuting of this diſcourſe, wee ſhould lay down ſuch ſatisfaction as may cleere all doubts that may be taken thence: Eſpecially ſince the prejudice that may ariſe from the miſapprehenſion of thoſe Scripture phraſes, may much diſable the *Comment. in Eccleſ. c.* 1. *v.* 4.

the Reader from looking on any other Argument, with an equall and indifferent minde.

The places that seem to oppose this, are of two kinds. First, such as imply a motion in the Heavens: or secondly, such as seeme to expresse a rest and immobilitie in the Earth.

Those of the first kind seem to beare in them the cleerest evidence, and therfore are more insisted on by our Adversaries. They may be referred unto these three heads.

1 All those Scriptures where there is any mention made of the rising, or setting of the Sunne or Starres.

2 That story in *Iosuah*, where the Sunne standing still, is reckoned for a miracle.

3 That other wonder in the dayes of *Hezekiah*, when the Sunne went back ten degrees in the Diall of *Ahaz*. All which places doe seeme to conclude, That the diurnall motion is caused by the Heavens.

To this I answer in generall; That the Holy Ghost in these Scripture

ture expreſſions, is pleaſed to accommodate himſelfe unto the conceit of the vulgar, and the uſuall opinion: whereas, if in the more proper phraſe it had been ſaid, That the Earth did riſe and ſet; or, that the earth ſtood ſtill, &c. the people who had been unacquainted with that ſecret in Philoſophy, would not have underſtood the meaning of it, and therfore it was convenient, that they ſhould be ſpoken unto in their own Language.

But you will reply, It ſhould ſeeme more likely, if there had been any ſuch thing, that the Holy Ghoſt ſhould uſe the trueſt expreſſions: for then he would at the ſame time have informed them of the thing, and reformed them in an errour: ſince his authoritie alone had been ſufficient to have rectified the miſtake.

I anſwer:

1 Though it were, yet 'tis beſide the chiefe ſcope of thoſe places, to inſtruct us in any Philoſophicall points, as hath been proved in the former book; eſpecially when theſe things are neither neceſſary in themſelves, nor do neceſſarily induce to a more ful underſtanding of

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of that which is the maine businesse of those Scriptures. But now the people might better conceive the meaning of the Holy Ghost, when he do's conforme himselfe unto their capacities and opinions, than when hee talks exactly of things in such a proper phrase, as is beyond their reach: And therefore 'tis said in *Isaiah*, *I am the Lord which teacheth thee* utilia, *profitable things*: where the glosse ha's it, *non subtilia*, not such curiosities of Nature as are not easily apprehended.

2 'Tis not only besides that which is the chiefe purpose of those places, but it might happen also to be somwhat opposite unto it. For men being naturally unapt to beleeve any thing that seemes contrary to their senses, might upon this begin to question the authoritie of that Booke which affirmed it, or at least to retch Scripture some wrong way, to force it to some other sence which might be more agreeable to their owne false imagination. †*Tertullian* tels us of some Hereticks, who when they were plainly confuted out of any Scripture, would presently accuse those texts or Books to be

†*Præscript. cap.* 17.

be fallible, and of no authority; and rather yeeld Scripture to bee erroneous, than forgoe thoſe Tenents for which they thought there was ſo good reaſon. So likewiſe might it have been in theſe points which ſeem to beare in them ſo much contradiction to the ſences and common opinion: and therfore 'tis excellent adviſe ſet down by S. † *Auſtin. Quod nihil credere de re obſcurâ temere debemus, neforte quod poſtea veritas patefeccrit, quamvis libris ſanctis ſive teſtamenti veteris, ſive novi, nullo modo eſſe poſſit adverſum, tamen propter amorem noſtri erroris oderimus*: That wee ſhould not haſtily ſettle our opinions concerning any obſcure matter, leſtafterwards, the truth being diſcovered, (which however it may ſeeme, cannot bee repugnant to any thing in Scripture) wee ſhould hate that, out of love to the error that wee have before entertained. A little reading may informe us how theſe Texts have bin abuſed to ſtrange and unmeant Allegories, which have mentioned any naturall truth in ſuch a manner as was not agreeable to mens conceits. And beſides, if

† *In Geneſ. ad lit. lib. 2, in fine.*

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the Holy Ghoſt had propounded unto us any ſecrets in Philoſophie, we ſhould have bin apt to be ſo buſied about them, as to neglect other matters of greater importance. And therefore Saint *Auſtin* propoſing the queſtion, what ſhould be the reaſon, Why the Scripture do's not cleerely ſet down any thing concerning the Nature, Figure, Magnitude, and Motion of the Heavenly Orbes; hee anſwers it thus: The Holy Ghoſt being to deliver more neceſſarie Truths, would not inſert theſe, leſt men according to the varietie of their diſpoſitions, ſhould neglect the more weighty matters, and beſtow their thoughts about the ſpeculative naturall points, which were leſſe needfull. So that it might ſeeme more convenient, that the Scripture ſhould not meddle with the revealing of theſe unlikely Secrets, eſpecially when it is to deliver unto us many other myſteries of greater neceſſitie, which ſeeme to be directly oppoſite to our ſenſe and reaſon. And therefore, I ſay, the holy Ghoſt might purpoſely omit the treating of theſe Philoſophicall Secrets, till time

Ibid. cap. 9.

and

and future discoverie, might with leisure settle them in the opinion of others: As he is pleased in other things of a higher kind, to apply himselfe unto the infirmitie of our apprehensions, by being represented, as if hee were a humane nature, with the parts and passions of a man. So in these things likewise, that he might descend to our capacities, do's he vouchsafe to conforme his expressions unto the errour and mistake of our judgements.

But before we come to a further illustration, let us a little examine those particular Scriptures, which are commonly urged to prove the motion of the Sun or Heavens. These (as was said) might be distributed under these three heads.

1 Those places which mention the rising or setting of the Sunne, as that in the * Psalme, *The Sun like a Bridegroome commeth out of his chamber, and rejoyceth as a gyant to runne his race: His going forth is from the end of Heaven, and his circuit unto the end of it, and there is nothing hid from the heate thereof.* And that in *Eccleſi-*

* Ps. 19. 5. 6.

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Eccles. 1. 5.

aſtes, The Sunne ariſeth, and the Sunne goeth downe, &c.

In which Scriptures, we may obſerve divers phraſes that are evidently ſpoken in reference to the appearance of things, and the falſe opinion of the vulgar. And therefore 'tis not altogether unlikely, That this, which they ſeem to affirme concerning the motion of the Heavens, ſhould alſo bee underſtood in the ſame ſence.

The Sun like a Bridegroome commeth out of his chamber; alluding perhaps unto the conceit of ignorant people: as if it took reſt all the while it was abſent from us, and came out of it's chamber, when it aroſe.

And reioyceth as a Gyant to run his race; becauſe in the Morning it appeares bigger than at other times; and therfore in reference to this appearance, may then be compared unto a *Giant*.

His going forth is from the end of Heaven, and his circuit unto the ends of it. Alluding againe unto the opinion of the vulgar: who not apprehending the roundneſſe of the Heavens, doe conceive it to have

have two ends: one where the Sun riseth, the other where it setteth.

And there is nothing hid from the heate thereof, speaking still in reference to the common mistake, as if the Sunne were actually hot in it self; and as if the heate of the weather were not generated by reflection, but did immediately proceed from the body of the Sun.

So likewise, for that in *Ecclesiastes*, where 'tis said, *the Sun riseth, and the Sun goeth downe*, &c. which phrases being properly understood, doe import that he is sometimes in a higher place than at others: whereas, in a circumference, there is no place higher or lower, each part being at the same distance from the centre, which is the bottome. But now understand the phrase in reference to the Suns appearance, and then we grant that he do's seem sometimes to rise, and sometimes to go downe, because in reference to the Horizon, (which common people apprehend to bee the bottome, and in the utmost bounds of it to joyne with the heavens,) the Sun do's appeare in the Morning to rise up from it, and in

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the Evening to goe down unto it. Now I say, because the Holy Ghost, in the manner of these expressions, do's so plainly allude unto vulgar errours, and the false appearance of things: therefore 'tis not without probabilitie, that hee should be interpreted in the same sence, when he seemes to imploy a motion in the Sun or Heavens.

2 The second place, was that relation in *Iosuah*: where 'tis mentioned as a miracle, That the Sunne did stand still. And *Iosuah* said, *Sunne stand thou still upon Gibeon, and thou Moone in the valley of Ajalon. So the Sun stood still in the midst of Heaven, and hasted not to goe downe about a whole day. And there was no day like that, before it or after it.* In which place likewise, there are divers phrases wherin the Holy Ghost do's not expresse things according to their true nature, and as they are in themselves: but according to their appearances, and as they are conceived in common opinion. As,

Ios. 10. 12, 14 *Galilæus* maintaines the literall sense of this place: towards the end of that treatise, which hee calls *Nov-Antiq. pat. doctrina.*

1 When he sayes, *Sun stand thou still upon Gibeon*, or over *Gibeon*. Now the whole Earth being so little in compari-

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son to the body of the Sun, and but as a point, in respect of that Orbe wherein the Sun is supposed to move, and *Gibeon* being, as it were, but a point of this Globe of Earth: therefore the words cannot be understood properly, but according to appearance.' Tis probable that *Iosuah* was then at *Azecha*, a little East from *Gibeon*, and the Sunne being somewhat beyond the Meridian, did seeme unto him as he was in that place, to bee over against *Gibeon*; and in reference to this appearance, and vulgar conceit, do's hee command it to stand still upon that place.

Tostat. in locum, Quæst. 16. 17. Arias Montanus in locum.

2 And so secondly for that other expression; *And thou Moone in the valley of Ajalon.* This Planet was now a little East from the Sun, it being about three or foure dayes old (as † Commentators guesse. *Ajalon* was three miles from *Gibeon* Eastward, and *Iosuah* commanded the Moone to stand still there: because unto him it did then seeme to be over against that valley; whereas, 'tis certaine, if he had been there himselfe, it would still have seemed to be as much distant

† *Tostat. ib. Quæst. 18. Serrarius in Iosh. 10. Quæs. 21. 22.*

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from him. Iust as men commonly speak in shewing another the Stars: we point to a Star over such a chimney, or such a tree, because to us it appeares so; wheras the Star in it selfe is not sensibly more over them, than it is over us. So that in in this phrase likewise the Holy Ghost doth conforme himselfe unto the appearance of things, and our grosser conceit.

3 *And the Sun stood still in the midst of Heaven.* Now to speake properly, and as the thing is in it selfe, Heaven ha's no midst but the centre; and therefore, this also must be interpreted in reference to the opinion of the vulgar, and by the midst of Heaven, wee are to understand such a place as was not very neere to either of the ends, the East or West.

4 *And there was no day like that, before it or after it*: which words are not to be understood absolutely, for there are alwaies longer daies under the Poles: but in respect to the opinion of the vulgar; that is, there was never any day so long which these ignorant people knew of.

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3 As for this last place concerning the Sunnes returning ten degrees in the diall of *Ahaz*: I thinke it may probably be affirmed, That it is to be understood only concerning the shadow: which though it doe necessarily happen in all horizontall dialls, for any laritude betwixt the Tropickes: and so consequently in all declining dialls, the elevation of whose Pole is lesse than the Sunnes greatest declination; as *Clavius de Horol. cap.* 21. observes: yet the circumstances of this relation in scripture, makes the event to differ from that other which is common and naturall: which against it's nature did seem to go backwards, when as the Sunne it selfe was not in the least manner altered from it's usuall course. Of this opinion were *Abarbinell, Arius Montanus, Burgensis, Vatablas Sanctius*, &c.

2. *King.* 20. 11. *Isai.* 38. 8.

The reasons for it may be these;

1 The miracle is proposed onely concerning the shadow; *Wilt thou that the shadow shall ascend or returne by ten degrees*: there being not in the offer of this wonder, any the least mention made

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made concerning the Sunnes going backwards.

2 'Tis likely wee ſhould have had ſome intimation concerning the extraordinarie length of the day, as it is in that of *Ioſuah*; but in this relation, the chiefe matter that the ſtory takes notice of, is the alteration of the ſhadow.

3 Had it been by the ſuppoſed returne of the Sunnes body, this had been a greater miracle then thoſe which were performed upon more ſolemne occaſions; it had been more wonderfull then it's ſeeming reſt in *Ioſuahs* time; then the ſupernaturall Eclipſe at our Saviours death, when the Moone was in the full. And then it is not likely, that the Holy Ghoſt in relating of this miracle, ſhould chiefly inſiſt in expreſſing how the ſhadow returned, and that onely in the diall of *Ahaz*.

4 This Figure did not appeare in the Sun it ſelfe; becauſe in the 2. *Chron.* 32.31. 'Tis ſaid, that *the Embaſſadors of the king of Babylon did come unto Hezekiah, to enquire of the wonder that was done in the land*; and therefore it ſeems the miracle did

did not consist in any change of the Heavens.

5 If it had been in the Sunne, it would have been as well discerned in other parts of the world, as in the land of Iudæa. And then,

1 What need the King of *Babylon* send thither to enquire after it? If you reply, because it was occasioned by *Hezekiahs* recoverie; I answer, 'tis not likely that the heathens would ever beleeve so great a miracle should bee wrought meerly for a signe of one mans recovery from a disease. But would either be apt to thinke that it was done for some more remarkable purpose, and that by some of their owne gods, unto whom they attributed a far greater power, than unto any other. 'Tis more probable, that they might heare some flying rumour of a miracle that was seene in Iudæa: which because it happened only in *Hezekiahs* house and diall; and that too upon his recoverie from a dangerous sicknesse, they might be more apt to beleeve that it was a signe of it.

2 Why have we no mention made of

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of it in the writings of the Antients? It is no way likely, that so great a miracle as this was (if it were in the Sun) should have been passed over in silence; Especially, since it happened in those later times, when there were many heathen writers that flourished in the world, *Hesiod*, *Archilochus*, *Symonides*; and not long after, *Homer*, with divers others; and yet none of them have the least mention of any such prodigie. Wee have many relations of matters that were lesse observable, which were done about that time; the Historie of *Numa Pompilius*, *Gyges*; the fight betwixt the three Brethren, with divers such stories. And 'tis scarse credible, that this should have been omitted amongst the rest.

Nay, we have (as many guesse) some hints from prophane antiquitie, of the miracle wrought by *Iosuah*. Vnto which, 'tis thought the Antients did allude in the fable of *Phaëton*; when the Sun was so irregular in his course, that hee burnt some part of the world. And questionlesse then, this which happened in later times, would not have been so wholly forgotten.

forgotten. 'Tis an Argument urged by * *Origen*, That the Eclipse at our Saviours Passion was not universall, because no prophane author of those times mentions it. Which consequence is the very same with that which is urged in this other case; but by the way, his antecedent was false, since † *Tertullian* affirmes, That it was recorded amongst the Romane *Annals*.

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* *Tractat. 35. in Mat.*

† *Apologet. cap. 21.*

Now as for that story in *Herodotus*, where after he had related the flight of *Senacherib*, he tels us, how the Sunne did foure times in the space of 10340 yeres invert his course, and rise in the West; which would seeme so unto other nations, if he had only returned, as many conclude, from this Scripture. As for this story, (I say) it cannot well bee urged as pertinent to the present busines, because it seems to have reference unto times that never were.

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So that all these things being well considered, we shall find it more probable, that this miracle doth consist in the returne of the shadow.

If you object, That the Scripture do's

Isa. 38. 8. Ionah. 4. 8.

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do's expreſly ſay, *the Sunne it ſelfe returned tenne degrees*; I anſwer, 'tis a frequent manner of ſpeech in Scripture, to put the cauſe for the effect; as that in *Ionas*, Where 'tis ſaid, That *the Sunne did beat upon the head of Ionas*; that is, the beames of the Sunne. So that of the *Pſalmiſt*, *The Sunne ſhall not ſmite thee by day*, that is, the heate which proceeds from the Sunnes reflection. In the ſame ſence may the phraſe bee underſtood in this place; and the Sunne may be ſaid to returne backe, becauſe the light, which is the effect of it, did ſeeme to doe ſo; or rather, becauſe the ſhadow, which is the effect of that, did change it's courſe.

Ion. 4. 8.

Pſal. 121. 6.

This later Scripture then, will not at all make to the preſent purpoſe: as for thoſe of the two former kinds, I have alreadie anſwered, That they are ſpoken in reference to the appearance of things, and vulgar opinion. For the further illuſtration of which, I ſhall endeavour to confirme theſe two particulars.

1 That the Holy Ghoſt in many other

other places of Scripture, do's accommodate his expreſſions unto the errour of our conceits: and do's not ſpeake of divers things as they are in themſelves, but as they appeare unto us. Therefore 'tis not unlikely, that theſe phraſes alſo may bee liable unto the ſame interpretation.

2 That divers men have fallen into great abſurdities, whileſt they have looked for the grounds of Philoſophy, from the words of Scripture; and therefore it may bee dangerous in this point alſo, to adhere ſo cloſely unto the Letter of the Text.

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Prop. III.

That the Holy Ghoſt, in many places of Scripture, do's plainly conforme his expreßions unto the errors of our conceits; and do's not ſpeake of divers things as they are in themſelves, but as they appeare unto us.

THere is not any particular by which Philoſophy hath been more endamaged, than the ignorant ſuperſtition of ſome men: who in ſtating the controverſies of it, doe ſo cloſely adhere unto the meere words of Scripture. *Quam plurima occurrunt in libris ſacris ad naturam pertinentia*, &c. They are the words of † *Valleſius*. „ There are ſundry „ things in holy Writ concerning natu- „ rall points, which moſt men think are „ not ſo to be underſtood, as if the Holy „ Ghoſt did intend to unfold unto us „ any thing in that kinde: but re-

† *Proæm. ad Phil. ſacram*

ferring

„ ferring all to the ſalvation of our „ ſoules, do's ſpeak of other matters ac- „ cording to common opinion. And a little after, *Ego, divina hæc eloquia*, &c. „ I for my part am perſuaded, that theſe „ divine Treatiſes were not written by „ the holy and inſpired pen-men, for the „ interpretation of Philoſophy, becauſe „ God left ſuch things to be found out „ by mens labour and induſtrie. But yet „ whatſoever is in them concerning na- „ ture is moſt true: as proceeding from „ the God of nature, from whom no- „ thing could be hid. And queſtionleſſe, all thoſe things which the Scripture do's deliver concerning any naturall point, cannot be but certaine and infallible, being underſtood in that ſence, wherein they were firſt intended; but now that it do's ſpeake ſomtimes according to common opinion, rather than the true nature of the things themſelves, was intimated before; wherfore (by the way) * *Fromondus* his triumph upon the later part of this quotation, is but vaine, and to no purpoſe. 'Tis a good rule ſet downe by a learned † Commentator,

* *Veſt. Trac. 3. cap. 2.*

† *Sanctius in Iſa. 13. 5. Item in Zachar. lib. 9. num. 45.*

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to bee obſerved in the interpretation of Scripture: *Scriptura ſacra ſæpè non tam ad veritatem ipſam, quam ad hominum opinionem, ſermonem accommodat*; that it do's many times accommodate it's expreſſions, not ſo much to the truth it ſelfe, as to mens opinions. And in this ſence is that ſpeech of *Gregorie* concerning Images and Pictures, attributed by * *Calvin* unto the Hiſtorie of the Creation; *viz.* *Librum eſſe ideotarum*, that it is a Booke for the ſimpler and ignorant people. For it being written to informe them, as well as others, 'tis requiſite that it ſhould uſe the moſt plaine and eaſie expreſſions. To this purpoſe likewiſe is that of † *Merſennus*, *Mille ſunt Scripturæ loca*, &c. „ There are very many places of Scrip- „ ture, which are not to bee interpreted „ according to the Letter; and that for „ this reaſon, becauſe God would apply „ himſelfe unto our capacity and ſence: *Preſertim in ijs, quæ ad res naturales, oculiſque ſubjectas pertinent*; more eſpecially in thoſe things which concerne nature, and are ſubject to our eyes. And therefore in the very ſame place, though hee be

* *Comment. in Gen. c. 1.*

† *In Gen. c. 1. v. 10. art. 6*

Vide Hiero. in Ier. 28. Aquinas in Job. 26. 7.

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be eager enough against *Copernicus*, yet hee concludes that opinion not to be a hereſie; becauſe (ſaith he) thoſe Scriptures which ſeeme to oppoſe it, are not ſo evident, but that they may bee capable of another interpretation: Intimating, that it was not unlikely they ſhould be underſtood in reference to outward appearance and common opinion; And that this manner of ſpeech is frequently uſed in many other places of ſcripture, may be eaſily manifeſt from theſe following examples. Thus though the Moone may be prooved by infallible obſervation, to bee leſſe than any of the viſible Stars, yet becauſe of its appearance, and vulgar opinion, therefore doth the Scripture in compariſon to them, call it one of the great Lights. Of which place, ſaith *Calvin*, *Moſes populariter ſcripſit, nos potius reſpexit quam ſydera.* *Moſes* did not ſo much regard the nature of the thing, as our capacitie; and therefore uſes a popular phraſe: ſo as ordinarie people without the help of Arts and Learning, might eaſily underſtand him; And in another place, *Non fuit Spiritus*

Gen. 1. 16. *Pſal. 136. 7.*

LIB. 2. *Comment. in Psa. 136.*

Sancti concilium Astrologiam docere: It was „ not the purpose of the Holy Ghost to „ teach us Astronomy: but being to pro- „ pound a Doctrine, that concernes the „ most rude and simple people, hee do's „ (both by *Moses*, and the Prophets) con- „ forme himself unto their phrases and „ conceits: lest any should thinke to ex- „ cuse his owne ignorance with the pre- „ tence of difficultie: As men common- „ ly do in those things which are delive- „ red after a learned and sublime man- „ ner. Thus *Zanchi* † likewise, *Moses majorem rationem habuit nostri humanique judicij*, &c. „ When *Moses* calls the Moon „ a great light: he had a more especiall „ reference to mens opinions of it, than „ to the truth of the thing it self, because „ he was to deale with such, who do usu- „ ally judge rather by their sense, than „ by their reason. Nor will that di- stinction of *Fromondus* and others avoid this interpretation, when he tells us of *magnum Materiale*: which referres to the bulke and quantitie of the body; and *magnum Formale*, which imports the greatnesse of it's light. For we grant, that it

† *De operibus Dei, par. 2. li. 6. cap. 1.*

it is really unto us a greater light then any of the Stars, or than all of them together: yet there is not any one of them, but is in it's ſelfe a bigger light than this; And therefore when wee ſay this ſpeech is to be underſtood according to it's appearance, we do not oppoſe this to reality: But 'tis implied, that this reality is not abſolute, and in the nature of the thing it ſelfe, but only relative, and in reference to us. I may ſay a candle is a bigger light then a Star, or the Moone, becauſe it is really ſo to me. How ever any one will thinke this to be ſpoken, onely in relation to it's appearance, and not to be underſtood as if the thing were ſo in it ſelfe. But (by the way) it do's concerne *Fromondus* to maintaine the Scriptures authority, in revealing of naturall ſecrets; becauſe, from thence it is that he fetches the chiefe Argument for that ſtrange Aſſertion of his, concerning the heavineſſe of the winde; Where *Iob ſayes*, that *God makes the weight for the winde*. Thus likewiſe, becauſe the common people uſually thinke the rain to proceed from ſome waters in the *expanſum*: therefore

De Meteor. lib. 4. cap. 2. art. 5.

Iob, 28. 25.

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doth *Moses* in reference to this erroneous conceit, tell us of waters above the Firmament, and the Windowes of Heaven: Of which saith *Calvin*, *Nimis serviliter literæ se astringunt*. &c. „ Such men „ too servilely tye themselves unto the „ letter of the text, who hence conclude, „ that there is a Sea in the Heavens: „ when as we know that *Moses* and the „ Prophets, to accommodate themselv's „ unto the capacitie of ruder people, do „ use a vulgar expression; and therefore „ it would be a preposterous course, to „ reduce their phrases unto the exact „ rules of Philosophy. Let me adde, that from this mistake, 'tis likely did arise that groundlesse observation of the antient Iewes; who would not admit any to read the beginning of *Genesis*, till he was arrived to thirty yeres of age. The true reason of which, was this: not because that Booke was harder than any other; but because *Moses* conforming his expression to vulgar conceits, and they examining of them by more exact rules of Philosophy, were faine to force upon them many strange

Comment. in Psal. 148. 4.

Alle-

Allegories, and unnaturall Myſteries. LIB. 2.

Thus alſo, becauſe for the moſt part we conceive the Starres to be innumerable, therefore doth the Holy Ghoſt often ſpeak of them in reference to this opinion. So *Ieremy*, *As the hoaſt of Heaven cannot be numbred, neither the ſand of the Sea meaſured, ſo will I multiply the ſeed of David*: So likewiſe when God would comfort *Abraham* with the promiſe of a numberleſſe poſterite, hee bids him looke up to Heaven, and tells him, that his Seed ſhould be like thoſe Stars for number: Which, ſaith **Clavius*, *Intelligendum eſt ſecundum communem ſententiam vulgi, exiſtimantis infinitã eſſe multitudinẽ ſtellarum, dum eas nocte ſerena confusè intuetur*, is to be underſtood according to the common opinion of the vulgar, who think the Stars to be of an infinite multitude, whileſt they behold them all (as they ſeeme confuſed) in a cleere night. And though many of our Divines doe commonly interpret this ſpeech to be a *Hyperbole*; yet being well conſidered, we ſhall finde that *Abrahams* poſteritie, in

Ier. 33. 22.

Gen. 15. 5.

* In 1. cap. Sphæræ.

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some few generations, were farre more than there are visible Starres in the Firmament; and of such onely do's God speake, because hee bids *Abraham* looke up to the Heavens.

Now all these, even unto six differences of Magnitude, are reckoned to bee but 1022. True indeed, at the first viewing of the Heavens, it may seeme an incredible thing, that they should be of no greater a number; but the reason of this is, because they appeare scattered and confused: so that the eye cannot place them in any such order, as to reckon them up, or take any distinct surveigh of them. Now 'tis a knowne truth, *Quod fortius operatur pluralitas partium, ubi ordo abest; nam inducit similitudinem infiniti, & impedit comprehensionem:* That a pluralitie of Parts without order, ha's a more strong operation, because it ha's a kinde of seeming infinitie, and so hinders comprehension. And then besides, there are more appearances of Starres many times, than there are bodies of them; For the eye, by reason of it's weakenesse and disabilitie, to discerne any thing at so great

Sir *Fr. Bac.* table of colours, *num.* 5.

great a distance; as also, because of those beames which proceed from such remote bodies in a twinkling and wavering manner, and so mixe and confound themselves at their entrance into that Organ: it must needs receive more representations than there are true bodies. But now, if a man doe but leisurely and distinctly compare the Stars of the heaven with those of this number, that are noted in a Cœlestiall Globe, hee shall scarse find any in the Skie which are not marked with the Globe; nay, he may observe many in the Globe, which hee can scarse at all discerne in the heavens.

Now this number of the Starres is commonly distributed into 48 Constellations; in each of which, though wee should suppose tenne thousand Starres, (which can scarse be conceived) yet would not all this number equall that of the children of Israel. Nay, 'tis the assertion of *Clavius*, that *Abrahams* posteritie in some few generations, were farre more then there could be Stars in the Firmament, though they stucke so close that they touched one another: And

In prim. ca. Sphæræ.

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And he proves it thus: A great circle in the Firmament, do's containe the diameter of a Starre of the first Magnitude 14960 times. In the diameter of the Firmament, there are contained 4760 diameters of such a Star: now if wee multiply this circumference by a diameter, the Quotient will be 71209600, which is the full number of Starres, that the eighth Sphære (according to *Ptolomies* grounds,) would containe, if they stood so close, that they touched one another.

Num. 1. 46. The children of Israel were reckoned at their going out of Ægypt, 603550, of such as were one and twenty yeares old, and upwards, and were able to go to war; besides children, & women, and youths, and old men, and the Levites; which in probabilitie, did alwaies treble the other number. Now if they were so many at one time, we may well conceive, that in all those severall generations, both before and since, the number was much augmented; and long before this time, did far exceed this supposed multitude of the Stars. From all which, wee may inferre, that the Scripture expressions in this

this kind, are to be understood acording to appearance and common opinion.

Another place usually cited for the same purpose, to shew that the Holy Ghost do's not speake exactly concerning naturall secrets; as that in the *Kings* and *Chronicles*, which relates unto us the measure of *Solomons* brazen Sea, whose diameter was ten cubites, and it's circumference thirty; whereas to speake Geometrically, the more exact proportion betwixt the diameter and the circumference, is not as ten to thirty, but rather as seven to twenty two. 1. *Kin.* 7. 23. 2. *Chro.* 4. 2.

But against this 'tis * objected by our adversaries, * *Ross. lib.* 1. *sect.* 1. *c.* 8.

1 This Sea was not perfectly round, but rather inclining to a semicircular Forme, as * *Iosephus* affirmes. *Antiq. Iud. lib.* 8. *cap.* 2.

I reply: If it were so, yet this is so much from helping the matter, that it makes it much worse; for then the disproportion will be far greater.

But secondly, Scripture, which is to be beleeved before *Iosephus*, do's tell us in expresse tearms, that it was round all about, 1. *Kings*, 7. 23.

2 The

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Ross ibid.

2 The proportion of the diameter to the circumference, is not exactly the same: as seven to two and twenty, but rather lesse. I answer, though it be, yet 'tis neerer unto that, then any other number.

Ibid.

3 The scripture do's but according to it's usuall custome, suppresse the lesse number, and mention only that which is bigger and more full. So in some * places, *Abrahams* posteritie is said to remaine in the land of Ægypt for foure hundred yeares; when as notwithstanding † other scriptures tell us, that they tarried there thirty yeares longer. Thus likewise in one * place, the number of *Iacobs* house, who came into Egypt, is reckoned to be seventy; whereas ,, elsewhere, they are said to be seventy five.

* Gen. 15. 13 Acts, 7. 6.

† Exod. 12. 41. Gal. 3. 17.

* Gen. 46. 27.

,, Acts, 7. 14.

I answer: All this is so far from destroying the force of the present Argument, that it do's rather confirme it, and more cleerely evidence unto us, that the Scripture do's not only, not speak exactly in these subtle and more secret points of Philosophy; but also, in the ordinarie obvious numbring of things, do's conforme unto common custome, and often

often use the round number for the whole.

4 'Tis yet objected by † another adversarie, That wee have no reason to expect, the Holy Ghost should reveale unto us this secret in Nature; because neither *Archimedes*, nor any other, had then found it out. I reply, and why then should we thinke that the Scripture must needs informe us of the Earths Motion; when as neither *Pithagoras*, nor *Copernicus*, nor any else, had then discovered it?

† *Fromond. Vesta. 4. tract. 3. c. 2.*

5 In taking the compasse of this vessell, they measured somewhat below the brim, where it was narrower than at the top, and so the circumference there, might bee exactly but thirty cubites; whereof it's diameter was ten.

Ibid.

I answer: 'tis evident this is a meere shift, there being not the least ground for it in the Text. And then besides, why might not we affirme, That the diameter was measured from that place, as wel as the circumference? since 'tis very probable, that the Holy Ghost did speak *ad idem*; and not tell us the bredth of one place

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place, and the compasse of another. So that all our adversaries evasions cannot well avoid the force of the Argument that is taken from this Scripture.

Again, common people usually conceive the Earth to be such a plaine, as in it's utmost parts is terminated by the Heavens, so that if a man were in the farthermost coasts of it, hee might touch the skie. And hence also, they think that the reason why some countries are hotter than others, is, because they lie neerer unto the Sun. Nay, *Strabo* tells us of some Philosophers too, who in this point have grossely erred; affirming, that there was a place towards the utmost coasts of *Lusitania*, where a man might heare the noise that the Sunne made, as he quencht his Beames in his descent to the Ocean; which, though it be an absurd mistake, yet we may note, that the Holy Ghost in the expression of these things, is pleased to conforme himselfe unto such kinde of vulgar and false conceits; And therefore, often speaks of the * *ends of Heaven*, and the † *ends of the world*. In this sence, they that come from any

* *Psa.19.6. Mat.24.31.*
† *Ps.22.27, &c.*

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any far countrey, are ſaid to come from the *end of Heaven*, *Iſaiah*, 13.5. And in another place, *From the ſide of the Heavens*, *Deut*. 4.32. All which phraſes, doe plainly allude unto the errour of vulgar capacities (ſaith *Sanctius*) which hereby is better inſtructed, then it would be by more proper expreſſions. † *Comment. in Iſa.* 13.5.

Thus likewiſe, becauſe ignorant people cannot well apprehend how ſo great a weight as the Sea and Land, ſhould hang alone in the open aire, without being founded upon ſome *Baſis* to uphold it: therefore in this reſpect alſo, do's Scripture apply it ſelfe unto their conceits, where it often mentions the *foundations of the Earth*. Which phraſe, in the letter of it, do's manifeſtly allude unto mens imaginations in this kinde. *Job* 38.4. *Pſa.* 102.25.

Thus alſo the common people uſually conceive the Earth to be upon the Water; becauſe, when they have travelled any way as farre as they can, they are at length ſtopped by the ſea. Therefore doth Scripture in reference to this, affirme, That *God ſtretched the Earth upon the Waters, founded the Earth upon the Seas, and* *Pſal.* 136.6. *Pſal.* 24.2.

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and eſtabliſhed it upon the Flouds; Of which places ſaith *Calvin*, *Non diſputat Philoſophicè David, de terræ ſitu; ſed populariter loquens, ad rudium captum ſe accommodat:* 'Twas not *Davids* intent to ſpeak philoſophically concerning the Earths ſcituation; but rather, by uſing a popular phraſe, to accommodate his ſpeech unto the capacities of the ruder people.

In this ſence likewiſe, are wee to underſtand all thoſe places of Scripture, wherein the coaſts of Heaven are denominated from the relations of Before, Behinde, the right hand, or the left. Which do not imply (ſaith * *Scaliger*) any abſolute difference in ſuch places, but are ſpoken meerely in reference to mens eſtimations, and the common opinion of thoſe people, for whom the Scriptures were firſt penned. Thus becauſe it was the opinion of the Iewiſh Rabbies, that man was created with his face to the Eaſt; therefore the Hebrew word קדם, ſignifies *Ante*, or the Eaſt; אחור, *Poſt*, or the Weſt; ימין, *Dextra*, or the South; שמאל, *Siniſtra*, or the North. You may ſee all of them put together in that place

* *Subtil. Exercit, 67.*

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place of *Iob, Behold I goe forward, and he is not there, and backward, but I cannot perceive him; on the left hand, where he doth work, but I cannot behold him. He hideth himselfe on the right hand, that I cannot see him.* Which expressions, are by some interpreters referred unto the foure coasts of Heaven, according to the common use of those originall words. From hence it is, that many of the Antients have concluded hell to be in the North, which is signified by the left hand: unto which side our Saviour tels us, that the Goats shall be divided. Which opinion, likewise seems to be favoured by that place in *Iob*, where 'tis said, *Hell is naked before God, and destruction hath no covering.* And presently 'tis added, *Hee stretched out the North over the empty place.* Vpon these grounds, S. *Ierome* interprets that speech of the Preacher, *Eccles.* 11.3. *If the tree fals towards the South, or towards the North, in the place where the tree falleth, there shal it be.* Concerning those who shal go either to heaven or hell. And in this sence also do's some expound that of *Zachary*, 14.4 Where 'tis said, *that the mount of Olives*

Iob. 23.8.9.

Mat. 25.33.

Iob, 26.6,7.

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shall cleere in the midst; halfe of it shall remove towards the North, and halfe of it towards the South. By which is intimated, that amongst those Gentiles, who shall take upon them the profession of Christ, there are two sorts; Some that go to the North, that is to Hell; and others to the South, that is to Heaven. And therefore it is (say they) that God so* often threatens evill out of the North; and upon this ground it is (saith †*Besoldus*) that there is no Religion that worships that way. We read of the *Mahumetans*, that they adore towards the South; the *Iewes* towards the West; *Christians* towards the East, but none to the North.

But of this onely by the way. However, certaine it is that the Holy Ghost do's frequently in Scripture set forth the severall coasts of Heaven by those relative tearmes of right hand and left hand, &c. which expressions doe not denote any reall intrinsicall difference betwixt those places, but are rather fitted for the apprehension of those men, from whose fancy it is that they have such denominations. And though *Aristotle*

* *Ier.* 1. 14. 15. *item ca.* 4. 6. 6. 1.

† *Li. de nat. popul. ca.* 4.

* *De Cælo, lib.* 2. *cap.* 2.

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ſtotle concludes theſe ſeverall poſitions to be naturall unto the Heavens, yet his authoritie in this particular is not available, becauſe he delivers it upon a wrong ground, ſuppoſing the Orbs to be living creatures, and aſſiſted with intelligences. Wee may obſerve, that the meaning of theſe coaſts by the relations of right hand and left hand, &c. is ſo far from having any ground in the nature of thoſe ſeverall places, that theſe relations are not onely variouſly applyed unto them by divers religions (as was ſaid before,) but alſo by divers Arts and Profeſſions. Thus becauſe *Aſtronomers* make their obſervations towards the South patts of the Horizon, where there bee moſt Stars that riſe and ſet: therefore do they account the Weſt to be at their right hand, and the Eaſt their left. The *Coſmographers* in taking the latitude of places, and reckoning their ſeverall climates muſt looke towards the North Pole; and therefore, in their phraſe, by the right hand is meant the Eaſt; and by the left hand, the Weſt: and thus (ſaith *Plutarch*,* are we to underſtand theſe expreſſions

* *De placit. Philoſ. li. 2. cap. 10.*

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pressions in *Pythagoras*, *Plato*, *Aristotle*. The Poets count the South to bee towards the left, and the North the right hand. Thus † *Lucan* speaking of the *Arabians* comming unto *Thessalie*, sayes:

† *Lib.* 3.

Ignotum vobis Arabes venistis in orbem:
Vmbras mirati nemorum, non ire siniſtras.

The *Augures* taking their observations at the East, count the South to be at their right hand, and the North their left: So that these denominations have not any reall ground in the nature of the things, but are imposed upon them by the Scripture phrase, in reference to the account and opinion of the *Iewes*.

D. *Hakwel*, *Apol. lib.* 1. *c.* 1. *sect.* 2.

Thus also, because heretofore it was generally received, that the Heart was the principall seat of the Faculties; therefore doth the Spirit apply himself unto this common Tenent; and in many places, attributes Wisedome and Vnderstanding to the Heart. Whereas, to speake properly, the reason and discursive Faculties have their principall residence in the Head (saith *Galen* and *Hypocrates*,

Prov. 8, 5. 10, 8. *Eccles.* 1. 13, 16, 17, & 8. 5.

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crates, together with the generalitie of our later Phyſitians,) becauſe they are hindred in their operations by the diſtempers of that part, and recovered by medicines applyed unto it.

So likewiſe are wee to underſtand thoſe other places: *Iſaiah*, 59.5. where ſome tranſlations reade it, *Ova Aſpidum ruperunt*, they have broken the Vipers eggs; alluding to that common but fabulous ſtory of the Viper, who breakes his paſſage through the bowells of the female. So *Pſal.* 58.4,5. where the Prophet ſpeaks of the deafe Adder, *that ſtops her eares againſt the voice of the charmer.* Both which relations (if we may beleeve many naturaliſts) are as falſe as they are common: and yet becauſe they were entertained with the generall opinion of thoſe days, therfore doth the holy Ghoſt vouchſafe to allude unto them in Holy Writ. 'Tis a plaine miſtake of *Fromendus*, when in anſwer to theſe places, he is feigne to ſay, that they are uſed proverbially only, and doe not poſitively conclude any thing. For when *David* writes theſe words, that they are *like the deafe*

Voſſa Trac. 3. cap. 3.

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Adder which ſtoppeth her eares, &c. This affirmation is manifeſtly implyed, That the deafe Adder do's ſtop her eares againſt the voice of the charmer: which becauſe it is not true in the letter of it, (as was ſaid before) therefore 'tis very probable, that it ſhould bee interpreted in the ſame ſence wherein here it is cited.

In reference to this alſo, wee are to conceive of thoſe other expreſſions; *Cold commeth out of the North*, *Iob*, 37.9. and againe, *faire weather comes out of the North*, *ver*. 22. So *ver*. 17. *thy garments are quieted when he warmeth the Earth by the South winde*. And *Prov*. 25.23. *The North wind driveth away raine*. Which phraſes do not containe in them any abſolute generall truth, but can ſo farre only bee verified, as they are referred to generall climates: and though unto us who live on this ſide of the Line, the North wind be coldeſt and drieſt; and on the contrary, the South wind moiſt and warme, by reaſon that in one of theſe places there is a ſtronger heate of the Sun to exhale moiſt vapors, than in the other: yet it is cleane

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clean otherwiſe with the inhabitants beyond the other Tropicke ; for there the North wind is the hoteſt, and moiſt, and the South the coldeſt and dry : So that with them, theſe Scriptures cannot properly bee affirmed, that *cold or that faire weather commeth out of the North*; but rather on the contrary. All which notwithſtanding, do's not in the leaſt manner derogate from the truth of theſe ſpeeches, or the omniſciencie of the ſpeaker : but doe rather ſhew the Wiſdome and Goodneſſe of the bleſſed Spirit, in vouchſafing thus to conforme his Language unto the capacitie of thoſe people unto whom theſe ſpeeches were firſt directed. In the ſame ſence are we to underſtand all thoſe places where *the Lights of Heaven* are ſaid to be darkened, *and the Conſtellations not to give their light*, *Iſai.* 13. 10. Not as if they were abſolutely in themſelves deprived of their light, and did not ſhine at all ; but becauſe of their appearance to us ; and therefore, in another place anſwerable to theſe, God ſayes, *he will cover the Heavens*, and ſo make the Starres thereof

Ioel, 2. 31. *Item* c. 3. 15.

darke, *Ezech.* 37. 2. Which argues, that they themselves were not deprived of this light (as those other speeches seem to imply) but wee.

In reference to this, likewise are wee to conceive of those other expressions, that *the Moone shall blush, and the Sunne bee ashamed, Isai.* 24. 23. That *they shall be turned into bloud, Math.* 24. 29. Not that these things shall bee so in themselves (saith S. *Ierome,*) but because they shall appeare so unto us. Thus also *Marke,* 13. 25. *The Starres shall from Heaven*; that is, they shall be so wholly covered from our sight, as if they were quite fallen from their wonted places. Or if this bee understood of their reall Fall, as it may seeme probable by that place in the *Revelations,* 6. 13. *And the Stars of Heaven fell unto the Earth, even as a Figge-tree casteth her untimely Figges, when she is shaken by a mighty Winde:* then is it to be interpreted not of them that are truly Stars, but them that appeare so: alluding unto the opinion of the unskilfull vulgar (saith * *Sanctius*) that thinke the Meteors to be Starres. And † *Mersennus* speaking

comment. in Ioel. ca. 3.

* *Comment. in Isai. cap.* 13. §.

† *Comment. in Gen. c. 3. ve. 10. art. 6.*

king of the same Scripture, sayes: *Hoc de veris Stellis minimè volunt Interpretes intelligi, sed de Cometis & alijs ignitis Meteoris:* Interpreters do by no means understand this of true Starres, but of the Comets and other fiery Meteors. Though the falling of these be a naturall event, yet may it be accounted a strange prodigie, as well as an Earthquake, and the darkening of the Sunne and Moone, which are mentioned in the verse before.

In reference to this, doth the Scripture speake of some common naturall effects, as if their true causes were altogether inscrutable, and not to bee found out, because they were generally so esteemed by the vulgar. Thus of the wind it is * said, *That none know whence it commeth, nor whither it goeth.* In another † place God is said *to bring it out of his treasures*; and [a] elsewhere it is called *the* [b] *breath of God*; And so likewise of the thunder: Concerning which, [c] *Iob* proposes this question, *The thunder of his power who can understand?* and therefore too [d] *David* do's so often stile it, *the voice of God.* All which places seeme to imply,

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* Iohn, 3. 8.

† Ier 10. 13, Item ca. 51. 16.

(a) Iob. 37. 10.

(b) ☐v)

(c) Io. 26. 14.

(d) Psal 2. 9. 3, 4. &c.

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ply, that the cause of these things was not to be discovered, which yet later Philosophers pretend to know: so that according to their construction, these phrases are to be understood in relation unto their ignorance unto whom these speeches were immediately directed.

For this reason is it: Why, though there be in nature many other causes of Springs and Rivers than the Sea, yet *Solomon* (who was a great Philosopher, and perhaps not ignorant of them) do's mention onely this, because most obvious, and easily apprehended by the vulgar. Vnto all these Scriptures, I might adde that in *Amos*, 5.8. which speakes of the Constellation commonly called the seven Starres; whereas, later discoveries have found that there are but sixe of them discernable to the bare eye, as appeares by *Galilæus* his glasse: the seventh of them being but a deceipt of the eye arising from their too great neernes; and if a man try in a cleere night to number them distinctly, he shall find that there will sometimes appeare but sixe, and sometimes more.

Eccles. 1.7.

Iob 9.9. *Item* 38.34.

Vide Fromond. Met. l. 3. *c.* 1. *ar.* 1.

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True indeed, the originall word of this Scripture כימה, do's not neceſſarily imply any ſuch number in it's ſignification, but yet our Engliſh tranſlation renders it the ſeven Starres; and if it had been expreſly ſo in the Originall too, it might have ſpoken true enough, becauſe they are uſually eſteemed of that number. And when it had been ſaid, *He made the ſeven Stars and Orion*, we might have eaſily underſtood the words thus: Hee made thoſe Conſtellations that are commonly knowne unto us under ſuch names.

From all theſe Scriptures 'tis cleerly manifeſt, that it is a frequent cuſtome for the Holy Ghoſt to ſpeake of naturall things, rather according to their appearance and common opinion, than the truth it ſelfe. Now it is very plaine, and our enemies themſelves do grant it, that if the World had bin framed according to the Syſteme of *Copernicus*, *futurum eſſet ut vulgus, de Solis motu & Terræ ſtatu proinde ut nunc loqueretur*. The vulgar phraſe would have been the ſame as now it is, when it ſpeakes of the Sunnes motion,

Fromond. Antar. c. 6.

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motion, and the Earth's ſtanding ſtill.

Wherefore 'tis not improbable, that ſuch kind of Scripture expreſſions are to be underſtood only in relation to outward appearances, and vulgar opinion.

Prop. IIII.

That divers learned men have fallen into great abſurdities, whileſt they have looked for the grounds of Philoſophy from the words of Scripture.

IT ha's bin an antient and common opinion amongſt the *Iewes*, that the Law of *Moſes* did containe in it, not only thoſe things which concerne our Religion and Obedience, but every ſecret alſo that may poſſibly be known in any Art or Science; ſo that there is not a demonſtration in Geometrie,

Schickard. Beebin. Haperu. Diſp. 5 num. 8.

rie, or rule in Arithmeticke; not a mysterie in any trade, but it may be found out in the *Pentateuch*. Hence it was (say they) that *Solomon* had all his wisedome and policie: Hence it was that hee did fetch his knowledge concerning the nature of Vegetables, from the Cedar of *Lebanon*, to the Hysop that growes upon the wall. Nay from hence, they thought a man might learne the art of Miracles, to remoove a Mountaine, or recover the dead. So strangely have the learneder sort of that Nation been befooled, since their owne curse hath lighted upon them.

Not much unlike this foolish superstition of theirs, is that custome of many Artists amongst us; who upon the invention of any new secret, will presently find out some obscure text or other to father it upon; as if the Holy Ghost must needs take notice of every particular, which their partiall fancies did over-vallue.

Nor are they altogether guiltlesse of this fault, who looke for any secrets of nature from the words of Scripture; or will

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will examine all it's expressions by the exact rules of Philosophy.

Vnto what strange absurdities this false imagination of the learneder *Iewes* hath exposed them, may be manifest by a great multitude of Examples. I will mention only some few of them. Hence it is, that they proove the shin-bone of *Og* the Giant to bee above three leagues long; Or (which is a more modest relation) that *Moses* being fourteen cubites in stature, having a Speare tenne Ells in length, and leaping up ten cubits, could touch this Giant but on the Ancle. All which, they can confirme unto you by a Cabalisticall interpretation of this story, as it is set downe in Scripture. Hence it is, that they tell us of all those strange Beasts which shall be seen at the comming of the *Messias*; as first, the Ox, which *Iob* calls *Behemoth*, that every day devoures the grasse on a thousand mountaines, as you may see it in the * *Psalme*, where *David* mentions the cattell, or בהמות upon a thousand hils. If you aske how this Beast do's to finde pasture enough, they answer, that hee remaines constantly

Schickard. ib. Disp. 6. num. 2.

Buxtor. Synag. Iuda. cap. 36.

* *Psa.* 50. 10.

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constantly in one place, where there is as much grasse grows up in the night, as was eaten in the day.

They tell us also of a Bird, which was of that quantitie, that having upon a time cast an egge out of her neast, there were beaten down by the fall of it, three hundred of the tallest Cedars, and no lesse than threescore villages drowned. As also of a Frog, as *big* as a Town capable of sixty houses; which Frog, notwithstanding his greatnesse, was devoured by a Serpent, and that Serpent by a Crow; which Crow as she was flying up to a Tree eclipsed the Sun, and darkned the World; by which you may guesse what a pretty twig that Tree was. If you would know the proper name of this Bird, you may finde it in *Psal.* 50. 11. where it is called ציר, or in our Translation, the Foule of the mountains. It seems it was somewhat of kinne to that other Bird they tell us of, whose legges were so long, that they reached unto the bottome of that Sea where there had bin an axe head falling for 7 yeres together, before it could come to the bottome.

Vide Parap. Chald.

Many

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Many other relations there are, which containe such horrible absurdities, that a man cannot well conceive how they should proceed from reasonable creatures. And all this arising from that wrong Principle of theirs; That Scripture did exactly containe in it all kind of Truths; and that every meaning was true, which by the Letter of it, or by Cabalisticall interpretations might be found out.

Now as it hath been with them, so likewise hath it happened in proportion unto others: who by a superstitious adhering unto the bare words of scripture, have exposed themselves unto many strange errours. Thus * S. *Basil* holds, That next to the Sun, the Moon is bigger than any of the Stars, because *Moses* do's call them onely two great Lights.

* *Enarrat. in Gen.*

Thus others maintaine, That there are waters properly so called above the starry Firmament, because of those vulgar expressions in Scripture, which in their literall sence doe mention them. Of this opinion were many of the Antients, *Philo*, *Iosephus*; and since them the Fathers,

Fathers, [a] *Iustin Martyr*, [b] *Theodoret*, [c] *Austin*, [d] *Ambrose*, * *Basil*, and almost all the rest. Since them, sundry other learned men, as *Beda*, *Strabus*, *Damascen*, *Tho. Aquinas*, &c. If you aske for what purpose they were placed here, *Iustin Martyr* tells us, for these two ends: First, to coole the heate that might otherwise arise from the motion of the solid Orbs; and hence it is (say they) that *Saturne* is colder than any of the other Planets, because though he moove faster, yet hee is neerer to these waters: secondly, to presse and keep downe the Heavens, lest the frequencie and violence of winds might breake and scatter them asunder; which opinion, together with both it's reasons, are now accounted absurd and rediculous.

† S. *Austin* concludes the visible Stars to be innumerable, because Scripture phrases seeme to imply as much.

That the Heavens are not round, was the opinion of [a] *Iustin Martyr*, [b] *Ambrose*, [c] *Chrysostome*, [d] *Theodoret*, * *Theophilact*, doubted of by † S. *Austin* and divers others. Nay, S. *Chrysostome* was so confi-

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(a) *Respons. ad ques. 93. Orthod.*
(b) *Qust. 11. sup. Gen.*
(c) *De Civ. Dei, lib. 11. cap. ult.*
(d) *Hexam. lib. 2. cap. 2.*
* *Homil. 3. in Gen.*

† *De civit. dei, l. 16. c. 23*
(a) *Respon. ad quest. 98.*
(b) *Hexam. lib. 1. cap. 6.*
(c) *Homil. 14. in epist. ad Hebr.*
(d) *In ca. 8. Hebr.*
* *In idem c.*
† *In Gen. ad lit. li. 1. c. 9. Item l. 2. c. 6*

dent of it, that he propoſes the queſtion in a triumphant manner: Πȣ̃ εἰσιν οἱ σφαιροειδῆ ȣ̓ρανὸν εἶναι ἀποφαινόμενοι. Where are thoſe men that can proove the Heavens to have a ſphæricall Forme? The reaſon of which was this, Becauſe 'tis ſaid in one Scripture, *that God ſtretched forth the Heavens as a curtain, Pſal.* 104.2. *and ſpreadeth them as a tent to dwell in, Iſai.* 40.22. And ſo in that place of the Epiſtle to the *Hebrewes,* 8.2. they are called *a Tent or Tabernacle*: which becauſe it is not ſphæricall, therefore they conclude alſo, that the Heavens are not of that Forme; whereas now, the contrary is as evident as demonſtration can make a thing. And therefore, * S. *Ierome* in his time, ſpeaking of the ſame errour, gives it this plaine cenſure: *Eſt in Eccleſia ſtultiloquium, ſi quis Cœlum putet fornicis modo curvatum,* Eſaiæ *quem non intelligit ſermone deceptus.* 'Tis *fooliſh ſpeaking* in the Church, if any through miſapprehenſion of thoſe words in *Iſaiah,* ſhall affirm the Heavens not to be round.

* *Lib* 3. *Comment. in Galat. ca.* 5.

That the Seas not overflowing the land is a miracle, was the opinion of a *Baſil*

[a] *Basil*, [b] *Chrisostome*, [c] *Theodoret*, [d] *Ambrose*, [a] *Nazianzen*, and since them, [b] *Aquinas*, [c] *Luther*, [d] *Calvin*, * *Marlorate*, with sundry others. Which they prooved from these Scripture expressions, that in *Iob* 38.8.11. *Who hath shut up the Sea with doores, when it brake forth, as if it had issued out of the womb; when I did break up for it my decreed place; and set bars and doores, and said, hitherto shalt thou come, and no further, and here shall the pride of thy waves be staid.* So likewise, *Prov.* 8.29. *God gave to the Sea his decree, that the Waters should not passe his commandement.* And *Ierem.* 5.22. *I have placed the sand for a bound of the Sea by a perpetuall decree that they cannot passe it: and though the waves thereof crosse themselves, yet can they not prevaile; though they roare, yet can they not passe over, that they turne not againe to cover the Earth.* In all which places (say they) 'tis implied, that the water of it selfe, were it not withheld from it's own naturall inclination by a more speciall power of God, would overflow the Land.

Others inferre the same conclusion with that in *Ecclesiastes*, where the rivers

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(a) *Homil. 4. Hexam.*
(b) *Commen. in Iob.*
(c) *In Psal. 107.*
(d) *Hexam. lib. 3. c. 2, 3.*
(a) *Orat. 34.*
b) *Aquinas part. 1. quest. 69. art. 1.*
(c) *Commen. in Psal. 24. Item in Ps. 136. 6.*

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are said to come from the Sea, which they could not doe, unlesse that were higher. I answer: They should as well consider the later part of that scripture, which sayes, that the Rivers returne to that place from whence they came, and then the force of this consequence will vanish. To this purpose, some urge that speech of our Saviour, where hee bids *Simon* to launch forth into the deep; the Latine word is, *in altum*; from whence, they gather that the Sea is higher than the Land. But this savours so much of Monkish ignorance, that it deserves rather to be laughed at, than to bee answered.

Luke 5. 4. Εἰς τὸ βάθος.

But now if we consider the true properties of this Element, according to the rules of Philosophy: we shall finde, that it's not overflowing the Land is so farre from being a miracle, that it is a necessarie consequence of it's nature; and 'twould rather be a miracle, if it should be otherwise, as it was in the generall deluge. The reason is, because the water of it self must necessarily descend to the lowest place; which it cannot do, unlesse

unleſſe it be collected in a ſphæricall Forme, as you may plainly diſcerne in this Figure.

Where the Sea at D. may ſeeme to be higher than a mountaine at B, or C. becauſe the riſing of it in the midſt do's ſo intercept our ſight from either of thoſe places, that wee cannot looke in a ſtreight line, from the one to the other. So that it may ſeem to be no leſſe than a miracle, by which the ſea (being a heavy body) was withheld from flowing down to thoſe lower places of B, or C. But now, if you conſider that the aſcending of a body is it's motion from the centre, and deſcent is it's approaching unto it:

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you shall find, that for the Sea to moove from D. to B, or C. is a motion of Ascent, which is contrary to it's nature, because the mountaine at B, or C. are farther off from the centre, than the Sea at D. the Lines A, B. and A, C. being longer than the other A, D. So that for the Sun to keep alwaies in it's channell, is but agreeable to it's nature, as being a heavy body. But the meaning of those Scriptures, is, to set forth the power and wisedome of God: who hath appointed these channels for it, and beset it with such strong banks to withstand the fury of it's waves. Or if these men doe so much rely on naturall points, upon the bare words of Scripture, they might easily bee confuted from those other places, where God is said to have founded the Earth upon the Seas, and establisht it upon the Flouds. From the literall interpretation of which, many of the Antients have fallen into another errour: affirming the Water to be in the lower place; and as a *basis*, whereon the weight of the Earth was borne up. Of this opinion were [a] *Clemens Alexandrinus*, [b] *Athanasius*,

(a) *Recog.* 8.
(b) *Orat. cont. Idolos.*
(c) *In Psal.* 136. 6
(d) *In Ps.* 24

nasius, c *Hillarie*, d *Eusebius*, and others. So that it seemes, if a man should resolutely adhere to the bare words of the scripture, he might find contradiction in it: of which, the naturall meaning is altogether incapable. * S. *Ierome* tells us of some who would proove Starres to have understanding, from that place in *Isaiah*, 45.12. *My hands have stretched out the Heavens, and all their hoast have I commanded.* Now (say they) none but intelligent creatures are capable of Precepts; and therefore, the Starres must needs have rationall Soules. Of this opinion was †*Philo* the Iew: nay, many of the Rabbies conclude, that they do everie houre sing praises unto God with an audible reall voice. Because of that in *Iob* 38.7. which speakes of *the Morning Starres singing together*. And *Psal.* 19.3,4. where 'tis said of the Heavens, that *there is no speech nor language where their voice is not heard, and their words are gone to the ends of the World*. And whereas wee translate that place in the tenth of *Iosuah*, concerning the standing still of the Heavens: the originall Word, דמם do's properly signifie

* *Comment. in Isai. l. 13.*

† *De plant. Noe.*

Tostatus in Iosh. cap. 10. quest. 13, 14.

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nifie Silence, and according to their opinion, *Iosuah* did onely bid them hold their peace. From such grounds, 'tis likely did * *Origen* fetch his opinion, that the Stars should be saved. I might set downe many other the like instances, were it not for being alreadie weary of raking into the errours of antiquitie, or uncovering the nakednesse of our Forefathers. That excuse of † *Acosta* may justly serve to mitigate the mistakes of these antient Divines: *Facilè condonandum est patribus, si cum cognoscendo colendóque Creatori toti vacarent, de creaturâ minus aptè aliqua ex parte opinati sant.* Those good men were so wholly busied about the knowledge and worship of the Creator, that they had not leisure enough for an exact search into the Essence of the Creatures. However, these examples that have been alreadie cited, may sufficiently manifest, how frequently others have been deceived, in concluding the points of Philosophy from the expressions of Scripture. And therefore, 'tis not certaine, but that in the present case also, it may bee insuffi-

cient

*Tom. 1. in Ioban.

† De nat. novi orbis, lib. 1. cap. 2.

cient for such a manner of arguing.

PROP. V.

That the Scripture in it's proper construction, do's not any where affirme the Immobilitie of the Earth.

THe same answer which was insisted on before, concerning the conformitie of Scripture expressions to mens capacitie and common opinion, may well enough satisfie all those other Arguments, which seeme thence to affirme the Earth's setledneſſe and Immobilitie; since this is as well agreeable to outward appearance and vulgar apprehension as the other. But now for more full satisfaction, I shall set downe the particular places that are urged for it; which being throughly examined, wee may plainly discerne, that none of them in their

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their proper meaning, will serve to infer any such conclusion.

One of these sayings is that of the Preacher, *Eccles.* 1.4. *One generation commeth, and another passeth, but the Earth endureth for ever*; where the originall word is, עמד and the vulgar, *stat*; from whence our * adversaries conclude that it is immooveable.

* *Vallesius Sacra Phil. cap.* 62. *Fuller, Miscell. l.* 1. *c.* 15. *Pineda Comment. in locum.*

I answer: the meaning of the word as it is here applyed, is *permanet*; or as we translate it, *endureth*. For it is not the purpose of this place to deny all kinde of motion to the whole Earth: but that of generation and corruption, to which other things in it are liable. And though *Pineda*, and others, keep a great deale of impertinent stirre about this Scripture, yet they grant this to be the naturall meaning of it: which you may more cleerely discerne, if you consider the chiefe scope of this Booke; wherein the Preachers intent is, to shew the extraordinarie vanitie of all earthly contentments, *ver.* 2. the utter unprofitablenesse of all a mans labours, *ver.* 3. and this hee illustrates by the shortnesse and uncertaintie

taintie of his life; in which respect, he is below many of his fellow creatures, as may bee manifested from these foure comparisons.

1 From the Earth, which though it seem to be but as the sediment of the World, as the rubbish of the Creation; yet is this better than man in respect of his lastingnesse, for *one generation passeth away, and another commeth; but the Earth,* that abideth for ever, *ver.* 4.

2 From the Sunne; who, though he seeme frequently to goe downe, yet hee constantly seemes to rise againe; and shines with the same glory, *ver.* 5. *But man dyeth and wasteth away; yea, man giveth up the ghost, and where is he? he lyeth down, and riseth not till the Heavens be no more.* *Job*, 14. 10. 12.

3 From the wind, the common emblem of uncertaintie; yet it is more constant than man, for that *knowes it's circuits, and whirleth about continually, v.* 6. *whereas our life passeth away as doth the wind, but returneth not againe.* *Psal.* 78. 39.

4 From the Sea; though it bee as uncertaine as the Moone, by whom 'tis governed, yet is it more durable than man

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man and his happineſſe. For though the Rivers runne into it, and from it, yet is it ſtill of the ſame quantitie that it was at the beginning, *v.* 7. But man grows worſer as he growes older, and ſtill neerer to a decay. So that in this reſpect, hee is much inferior to many other of his fellow creatures.

From whence it is manifeſt; that this conſtancie or ſtanding of the Earth, is not oppoſed to it's locall motion, but to the changing or paſſing away of divers men in their ſeverall generations. And therefore, thence to conclude the earth's Immobilitie, were as weake and ridiculous, as if one ſhould argue thus: One Miller goes, and another comes, but the Mill remaines ſtill; *ergo*, the Mill hath no motion.

M. Carpenters *Geog. lib. 1. cap. 4.*

Or thus; one Pilate goes, and another comes, but the Ship remaines ſtill; *ergo*, the Ship doth not ſtirre.

* *Perplex. li. 2, cap. 29.*

**R. Moſes* tells us, how that many of the Iewes did from this place conclude, that *Solomon* thought the Earth to be Eternall, becauſe he ſaith it abideth לעולם for ever; & queſtionles, if we examine it

im-

impartially, we shal find that the phrase seemes more to favour this absurditie, than that which our adversaries would collect from hence; that it is without motion.

But M. *Fuller* urging this text against *Copernicus*; tells us, if any should interprete these phrases, concerning the Earth's standing still, *ver.* 4. and the Suns motion, *ver.* 5. in reference onely to appearance and common opinion; he must necessarily also understand those two other verses, which mention the motion of the wind and rivers in the same sence. As if he should say; because some things appeare otherwise than they are, therefore every thing is otherwise than it appeares: or, because Scripture speakes of some naturall things, as they are esteemed according to mans false conceit; therefore 'tis necessarie, that every naturall thing mentioned in Scripture, must be interpreted in the like sence: or, because in one place, wee read of the ends of a Staffe, 1 *Kings*, 8. 8. and in many other places of the ends of the Earth, and the ends of Heaven: Therefore the Earth

earth & heavens have as properly ends as a Staffe. 'Tis the very same consequence of that in the objection. Because in this place of *Ecclesiastes*, wee read of the rest of the Earth, and the motion of the Sun; therefore, these phrases must needs bee understood in the same proper construction as those afterwards, where motion was attributed to the Wind and Rivers. Which inference you see is so weake, that the Objector need not triumph so much in it's strength as he doth.

Another proofe like unto this, is taken from S. *Peter*, *epist.* 2. *cap.* 3. *ver.* 5. where hee speakes of the Earth standing out of the water, and in the water, γῆ συνεστῶσα; and therefore, the Earth is immooveable.

I answer: 'tis evident that the word here is equivolent with *fuit* : and the scope of the Apostle is, to shew that God made all the Earth : both that which was above the water, and that which was under it. So that from this expression, to collect the rest and immobilitie of the Earth, would be such an argument as this other. Such a man made that

that part of a Mill-wheele, or a Ship, which ſtands below the water, and that part which ſtands above the water: therfore thoſe things are immoovable.

To ſuch vain and idle conſequences do's the heate of oppoſition drive our adverſaries.

A third Argument ſtronger than either of the former, they conceive may may be collected from thoſe*ſcriptures: where 'tis ſaid, *The World is eſtabliſhed, that it cannot be mooved.*

* 1. *Chron.* 16.30. *Pſal.* 93.1. *Item* 96.10.

To which, I anſwer: Theſe places ſpeake of the World in generall, and not particularly of our Earth; and therefore may as well proove the immobility of the Heavens, they being the greateſt pert of the World; in compariſon to which, our Earth is but as an inſenſible point.

If you reply, that the word in theſe places is to be underſtood by a *Synechdoche*, as being meant only of this habitable World, the Earth.

I anſwer: Flrſt, this is onely ſaid, not prooved: ſecondly, *David* but a little before ſeems to make a difference between the

the World and the Earth, *Psal.90.2.* where he sayes, *Before thou hadst formed the Earth and the World.* But thirdly, in another place, there is the same original word applyed expresly to the Heavens; and which is yet more, the same place do's likewise mention this supposed setledness of the Earth, *Prov.3.19. The Lord by wisdome hath founded the Earth: and by understanding hath he established the Heavens.* So that these places can no more proove an immobilitie in the Earth than in the Heavens.

If you yet reply, That by the Heavens there is meant the seat of the Blessed, which do's not moove with the rest.

I answer: though by such an evasion a man might possibly avoid the force of this place: yet, first, 'tis but a groundlesse shift, because then, that verse will not containe a full enumeration of the parts in the World, as may seeme more agreeable to the intention of it: but onely shew, that God created this Earth where we live, and the Heaven of Heavens. So that the Heaven of the Starres and Planets, shall be shifted out from the number

ber of the other creature: ſecondly, there is another place which cannot bee ſo avoided, *Pſal.* 89. 37. where the Pſalmiſt uſes this expreſſion יכון *It ſhall bee eſtabliſhed as the Moone.* So *Pſal.* 8. 3 *The Moone and the Starres,* אשר כוננתה *which thou haſt eſtabliſhed.* Thus likewiſe, *Prov.* 8. 27. *when he eſtabliſhed the Heavens*: and in the next verſe, our Engliſh tranſlation reads it, *when he eſtabliſhed the clouds.* And yet our adverſaries will affirme the Moone, and Starres, and Clouds, to bee ſubject unto naturall motions: why then ſhould the very ſame expreſſions be counted as ſufficient Arguments to take it away from the Earth.

If it be replyed, That by eſtabliſhing the Heavens, is meant only the holding of them up, that they doe not fall downe to us (as *Lorinus* explaines that in the eighth *Pſalme*: and quotes *Euthymius* for the ſame interpretation.) *fundandi verbum ſignificat decidere non poſſe, aut dimoteri a loco ubi collecti ſunt:* I anſwer, why may not we as well interpret the words thus of the Earth: ſo that by eſtabliſhing of it, is meant only the keeping of

Lorinus Comment. in Pſal. 8.

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it up in the vaſt places of the open aire, without falling to any other place.

From hence it is plaine, That theſe Scriptures are to be underſtood of ſuch an immobilitie in the Earth, as may likewiſe agree with the Heavens: the ſame originall word being ſo promiſcuouſly applyed to both.

I but (you wil ſay) there are ſome other places which do more peculiarly apply this ſetledneſſe and eſtabliſhment to the Earth. So *Pſal.* 119. 9. *Thy faithfulnes is unto all generations: thou haſt eſtabliſhed the Earth, and it abideth.* Thus likewiſe, *Pſal.* 104. 5. *Who laid the foundations of the Earth, that it ſhould not bee removed for ever.* The later of which, being well weighed in it's original (ſaith M. *Fuller*) do's in three emphaticall words ſtrongly conclude the Earth's immobility.

Miſcel. lib. 1. cap. 15.

As firſt, when he ſayes יסדה *fundavit*, he hath founded it: wherein it is implyed, that it do's not change his place. To which may bee added all thoſe Texts, which ſo frequently ſpeake of *the foundations of the Earth*; as alſo that expreſſion of the *Pſalmiſt*, where hee mentions

mentions *the Pillars of the Earth*, *Psal.* 75. 3.

The second word is מבוסדה translated *Basis*; and by the *Septuagint*, ἐπὶ τῷ ἀσφάλειαν αὐτῆς; that is, he hath founded it upon it's owne firmenesse: and therefore it is altogether without motion.

The third expression is בל-תמוט from the root, מוט which signifies, *declinare*; implying, that it could not wagge with the least kind of declination.

To these I answer severally:

First, for the word, יסד *fundavit*, It cannot be understood properly, as if the naturall Frame of the Earth, like other artificiall buildings, did need any bottome to uphold it; for *he hangeth the Earth upon nothing*, *Iob.* 26. 7. But it is a *Metaphor*, and signifies Gods placing or scituating this Globe of Land and Water. As *David* tells us of *the Pillars of the Earth*: so *Iob* mentions *Pillars of the Heavens*, *Iob*, 26. 11. And yet that will not proove them to be immoveable.

True indeed, wee reade often concerning the foundations of the Earth: but so we do likewise of the ends, sides, and

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corners of the Earth; and yet these Scriptures will not proove it to bee of a long or square forme. Besides, we reade also of the Foundations of Heaven, חשמים מוסדות, 2. *Sam.* 22.8. And yet wee must not hence inferre, that they are without all motion; As also of the *planting of the Heavens*, *Isai.* 51.6. which may as well proove them to be immoovable, as that which followes in the same verse concerning the foundations of the Earth.

Which phrase (as I have observed right) in severall places of Scripture, is to be understood according to these three interpretations.

1 It is taken somtimes for the lower parts of the Earth, as appeares by that place, 2. *Sam.* 22.16. *The channels of the Sea appeared, the foundations of the World were discovered.* So *Psal.* 18.15.

2 Somtimes for the beginning and first creation of it, *Isa.* 40.2. *Hath it not been told you from the beginning, have ye not understood from the foundations of the Earth.* And in many other places, *Before the Foundations of the World* *Iohn* 17.24. *Ephes.* 1.4.

was

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was laid; that is, before the first creation.

Sometimes it signifies the Magistrates and chiefe Governours of the Earth. So many interpret that place in *Micah*, 6.2. where 'tis said, *Heare O yee mountaines the Lords controversie, and yee strong foundations of the Earth.* So *Psal.* 82.5. *The foundations of the Earth are out of course*; and in *Sam.* 2.8. *they are called pillars. For the Pillars of the Earth are the Lords, and he hath set the World upon them.* Hence it is, that the Hebrewes derive their word for Master, or Lord: from a root which signifies a *Basis* or bottome, אדון, *ab* רון. And the Greeke word for King, do's in it's Primitives import as much as the Foundation of the people, βάσιλις, *quasi* βάσις τῦ λαῦ. But now, none of all the severall interpretation of this phrase, will in the least manner conduce to the confirmation of the present Argument. *Etimol. mag*

As for the second word, מכונתו *Basis ejus*: I answer, the proper signification of it, is *locus dispositus*, *sedes*, or *statio*, an appointed seat or station; and accor-

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ding to this sence, is it most frequently used in Scripture. And therefore, the Heavens are sometimes called מכון, the seat of Gods habitation. And for this reason likewise, doe *Aquila* and *Symmachus* translate it by the word ἕδος, a seat or appointed scituation, which may as well be attributed to the Heavens.

The third expression is בל תמוט that it should not be moved from the Primitive מוט which do's not signifie barely to move; but *declinare*, or *vacillare*, to decline or slip aside from it's usual course. Thus is it used by *David*, *Ps.* 17.5 where he prayes, *Hold up my goings in thy paths*, במעגלותיך בלי נמטו פעמי *That my footsteps slide not*: He do's not meane that his feet should not move. So *Psal.* 121.3. *He will not suffer thy foot to bee mooved.* Thus likewise, *Psal.* 16.8. *Because the Lord is at my right hand, I shall not be moved*: which last place is translated in the new Testament by the Greeke word σαλεύω, which signifies *fluctuare*, or *vacillare*, to be shaken by such an uncertaine motion as the waves of the Sea. Now as *Davids* feet may have their usuall motion, and yet in this sence

Acts 2.25.

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sence be said not to move, that is, not to decline or slip aside: so neither can the same phrase applyed to the Earth, prove it to be immovable.

Nor doe I see any reason, why that of *Didacus Astunica* may not be truly affirmed, That wee may prove the naturall motion of the Earth, from that place in *Iob*, 9. 6. *Qui commovet terram è loco suo*, as well as it's rest and immobilitie from these. *Comment. in Iob.*

From all which, it is very evident, that each of these expressions, concerning the founding or establishing both of Heaven or Earth, were not intended to shew the unmovableness of either, but rather, to manifest the power and wisedome of Providence, who had so setled these parts of the World in their proper scituations, that no naturall cause could displace them, or make them decline from their appointed course. As for such who doe utterly dislike all new interpretation of Scripture, even in such matters as do meerely concern opinion, and are not fundamentall: I would only propose unto them a

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ſpeech of S. *Hierome*, concerning ſome that were of the ſame mind in his time. *Cur novas ſemper expetant voluptates, & vulgæ eorum vicina Maria non ſufficiant, cur in ſolo ſtudio Scripturarum, veteri ſapore contenti ſunt.*

Thus have I in ſome meaſure cleered the chiefe Arguments from Scripture, againſt this opinion. For which notwithſtanding, I have not thence cited any: becauſe I conceive the Holy Writ, being chiefly intended to informe us of ſuch things as concerne our faith and obedience: wee cannot thence take any proper proofe for the confirmation of Naturall Secrets.

PROP.

Prop. VI.

That there is not any Argument from the words of Scripture, principles of Nature, or obſervations in Aſtronomy, which can ſufficiently evidence the Earth to bee in the centre of the Vniverſe.

OVr adverſaries doe much inſult in the ſtrength of thoſe Arguments which they conceive; do unanſwerably conclude, the Earth to bee in the centre of the World. Whereas, if they were but impartially conſidered, they would be found altogether inſufficient for any ſuch concluſion, as ſhall be cleerly manifeſted in this following Chapter.

The Arguments which they urge in the prooſe of this, are of three ſorts; Either ſuch as are taken,

1 From expreſſions of Scripture.

2 From

Lib. 2. Cap. 6.

2 From principles of naturall Philosophy.

3 From common appearances in Astronomy.

Those of the first kinde are chiefly two: The first is grounded on that common Scripture phrase, which speakes of the Sunne, as being above us. So *Solomon* often mentioning humane affaires, calls them, *the works which are done under the Sunne*. From whence it appeares that the Earth is below it; and therefore, neerer to the centre of the *Vniverse*, than the Sunne.

Eccles. 1. 14, &c.

I answer: Though the Sun in comparison to the absolute frame of the World, be in the midst; yet this do's not hinder, but that in respect to our Earth, he may be truly said to bee above it, because wee usually measure the height or lowness of every thing, by it's being further off, or neerer unto this centre of our Earth. From which, since the Sunne is so remote, it may properly bee affirmed, that wee are under it; though notwithstanding that bee in the centre of the World.

LIB. 2. *Cap.* 6. *Antar. c.* 12. *item Vesta. tract.* 5. *c.* 2.

A second Argument of the same kinde, is urged by *Fromundus*.

'Tis requisite, that Hell (which is in the centre of the Earth) should be most remotely scituated from the seat of the Blessed. But now this Heaven which is the seat of the Blessed, is concentricall to the starry Sphære. And therefore it will follow, that our Earth must bee in the midst of this Sphære; and so consequently, in the centre of the World.

I answer: This Argument is grounded upon these uncertainties;

1 That Hell must needs bee scituated in the centre of our Earth.

2 That the heaven of the Blessed, must needs bee concentricall to that of the Starres.

3 That places must bee as farre distant in scituation as in use:

Which because they are taken for granted, without any proofe, and are in themselves but weake and doubtfull: therefore the conclusion (which alwaies followes the worser part) cannot bee strong, and so will not need any other answer.

The

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The second sort of Arguments taken from naturall Philosophy, are principally these three:

Arg. 1. 1 First, from the vileness of our Earth, because it consists of a more sordid and base matter than any other part of the World; and therefore, must bee scituated in the centre, which is the worst place, and at the greatest distance from those purer incortuptible bodies, the Heavens.

I answer: This Argument do's suppose such propositions for grounds, which are not yet prooved; and therfore not to be granted. As,

1 That bodies must bee as farre distant in place, as in Nobilitie.

2 That the Earth is a more ignoble substance than any of the other Planets, consisting of a more base and vile matter.

3 That the centre is the worst place.

All which, are (if not evidently false) yet very uncettaine.

Arg. 2. 2 From the nature of the centre; which is the place of rest, and such as in all circular motions, is it's selfe immoovable;

veable. And therefore will be the fitteſt ſcituation for the Earth; which by reaſon of it's heavineſſe, is naturally unfit for motion. LIB. 2. *Cap.* 6.

I anſwer: This Argument likewiſe is grounded upon theſe two fooliſh foundations; As,

1 That the whole Frame of Nature do's moove round, excepting onely the Earth.

2 That the whole Earth, conſidered in it's whole, and in it's proper place, is heavy, or more unfit for a naturall motion, than any of the other Planets.

Which are ſo farre from being ſuch generall grounds, from which controverſies ſhould be diſcuſſed, That they are the very thing in queſtion betwixt us and our adverſaries.

3 From the nature of all heavy bodies, which is to fall towards the loweſt place. From whence they conclude, that our Earth muſt be in the centre. *Arg.* 3.

I anſwer: This may proove it to be a centre of gravitie, but not of diſtance; or that it is in the midſt of the World. Yea (but ſay our adverſaries) *Ariſtotle* for

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for this urges a demonstration, which must needs be infallible. Thus, the motion of light bodies, do's apparantly tend upward towards the circumference of the World: but now the motion of heavy bodies, is directly contrary to the ascent of the other; wherefore it will necessarily follow, that these doe all of them tend unto the centre of the World.

I answer: Though *Aristotle* were a Master in the art of *Syllogismes*, and he from whom we received the rules of disputation; yet in this particular, 'tis very plain that hee was deceived with a fallacie, whilst his Argument do's suppose that which it do's pretend to proove.

That light bodies doe ascend unto some circumference which is higher and above the Earth, is plaine and undeniable. But that this circumference is the same with that of the World, or concentricall unto it, cannot be reasonably affirmed, unlesse he suppose the earth to bee in the centre of the *Vniverse*, which is the thing to be prooved.

I would fain know from what grounds

our

Lib. 2. *Cap.* 6.

our adversaries can proove, that the descent of heavy bodies is to the centre; or the ascent of light bodies, to the circumference of the World. The utmost experience we can have in this kinde, do's but extend to those things that are upon our Earth, or in the aire above it. And alas, what is this unto the vaste frame of the whole *Vniverse?* but *punctulum*, such an insensible point, which do's not beare so great a proportion to the whole, as a small sand do's unto the Earth. Wherefore it were a senceless thing, from our experience of so little a part, to pronounce any thing infallibly concerning the scituation of the whole. The Arguments from *Astronomy*, are chiefly these foure; each of which, are boasted of to be unanswerable.

Arg. 1. 1 The *Horizon* do's everie where divide all the great circles of a Sphære into two equall parts: So there is always halfe the Equinoctiall above it, and half below. Thus likewise, there will constantly be six signs of the *Zodiacke* above the *Horizon*, and other six below it. And besides, the circles of the Heaven and

Earth

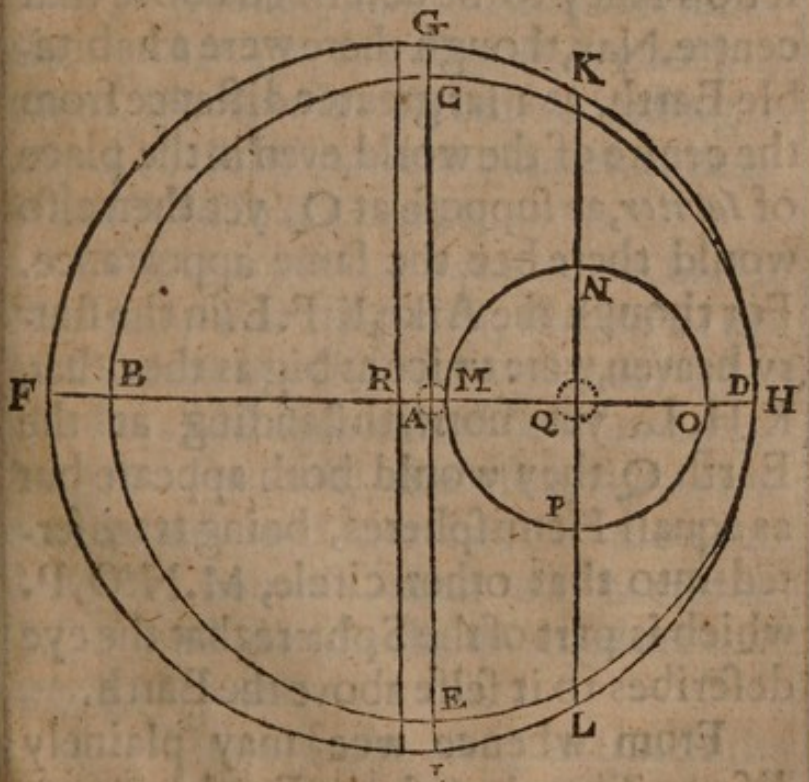
Earth, are each way proportionable to one another: as fifteen Germane miles on the Earth, are every where agreeable to one degree in the Heavens; and one houre in the Earth, is correſpondent to fifteen degrees in the *Equator*. From whence it may bee inferred, that the Earth muſt neceſſarily bee ſcituated in the midſt of theſe circles; and ſo conſequently, in the centre of the World.

I anſwer: This Argument do's rightly proove the Earth to be in the midſt of theſe circles: but we cannot hence conclude, that it is in the centre of the World: from which, though it were never ſo much diſtant, yet would it ſtill remaine in the midſt of thoſe circles, becauſe it is the eye that imagines them to be deſcribed about it. Wherefore it were a weake and prepoſterous collection, to argue thus, That the Earth is in the centre of the World; becauſe in the midſt of thoſe circles; or becauſe the parts and degrees of the Earth, are anſwerable in proportion, to the parts and degrees in Heaven. Whereas, it follows rather on the contrary, That theſe circles

are

are equally distant and proportionall in their parts ; in respect of the Earth, because it is our eye that describes them about the centre of it.

So that though a farre greater part of the world did appeare at one time than at another ; yet in respect of those circles which our eye describes about the Earth, all that wee could see at once, would seem to be but a perfect Hæmisphere : As may bee manifested by this following Figure.



Where

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Where if wee ſuppoſe A. to bee our Earth, B.C.D.E. one of the great circles which we fancy about it, F.G.H.I. the orbe of fixed Starres, R. the centre of them. Now though the Arke, G.F.I. bee bigger than the other, G.H.I. yet yet notwithſtanding, to the eye on the Earth, A. one will appeare a ſemicircle, as well as the other; becauſe the imagination do's transferre all thoſe Starres into the leſſer circle, B.C.D.E. which it do's fancy to be deſcribed above that centre. Nay, though there were a habitable Earth, at a far greater diſtance from the centre of the world, even in the place of *Iupiter*, as ſuppoſe at Q. yet then alſo would there bee the ſame appearance. For though the Arke, K.F.L. in the ſtarry heaven, were twice as big as the other, K.H.L. yet notwithſtanding at the Earth, Q. they would both appeare but as equall Hemiſpheres, being transferred into that other circle, M.N.O.P. which is part of the Sphære that the eye deſcribes to it ſelfe above the Earth.

From whence wee may plainely diſcern, That though the Earth be never ſo

so farre distant from the centre of the World; yet the parts and degrees of that imaginarie Sphære about it, will always be proportionall to the parts and degrees of the Earth.

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2 Another demonstration like unto this former, frequently urged to the same purpose, is this: If the Earth be out of the centre of the World, then must it be scituated in these three positions: either in the *Equator*, but out of the *Axis*; or secondly, in the *Axis*, but out of the *Equator*; or thirdly, besides both of them. But it is not placed according to any of these scituations; therefore must it needs be in the centre.

Arg. 2.

Vid. Carp. Geog. la. c. 5.

1 'Tis not in the *Equator*, and beside the *Axis*. For then, first, there will bee no *Equinox* at all in some places, when the days and nights shall be of an equall length: secondly, the afternoones and forenoones will not bee of the same length; because, then our Meridian Line must divide the *Hemisphære* into unequall parts.

2 'Tis not in the *Axis*, but out of the *Equator*; for then, first, the *Equinox*

would not happen when the Sunne was in the middle line betwixt the two *Solſtices*, but in ſome other paralell, which might bee neerer to one of them, according as the earth did approach to one *Tropicke* more than another. Secondly, there would not bee ſuch a proportion between the increaſe & decreaſe of days and nights, as now there is.

3 'Tis not beſides both of them: For then, all theſe inconveniences, and ſundry others muſt with the ſame neceſſity of conſequence be inferred. From whence it will follow, That the Earth muſt be ſcituated there, where the *Axis* and *Equator* meet, which is in the centre of the World.

To this we grant, that the Earth muſt needs be placed both in the *Axis* and *Equator*; and ſo conſequently, in the centre of that ſphære which we imagine about it: But yet this will not prove, that it is in the midſt of the *Vniverſe*. For let our adverſaries ſuppoſe it to bee as far diſtant from that, as they conceive the Sun to be; yet may it ſtill be ſcituated in the very concourſe of theſe two Lines:

Lines: becauſe the *Axis* of the World is nothing elſe but that imaginary Line which paſſes through the Poles of our Earth, to the Poles of the World. And ſo likewiſe the *Equator*, is nothing elſe but a great circle in the midſt of the Earth, betwixt both the Poles, which by imagination is continued even to the fixed Starres. Thus alſo, we may affirme the Earth to be in the plane of the *Zodiacke*, if by it's annuall motion it did deſcribe that imaginarie circle: and in the plane of the *Equator*, if by it's diurnall motion about it's own *Axis*, it did make ſeverall paralels, the midſt of which ſhould be the *Equator*. From whence it appeares, that theſe two former Arguments proceed from one and the ſame miſtake, whileſt our adverſaries ſuppoſe the circumference and centre of the Sphære, to be the ſame with that of the World.

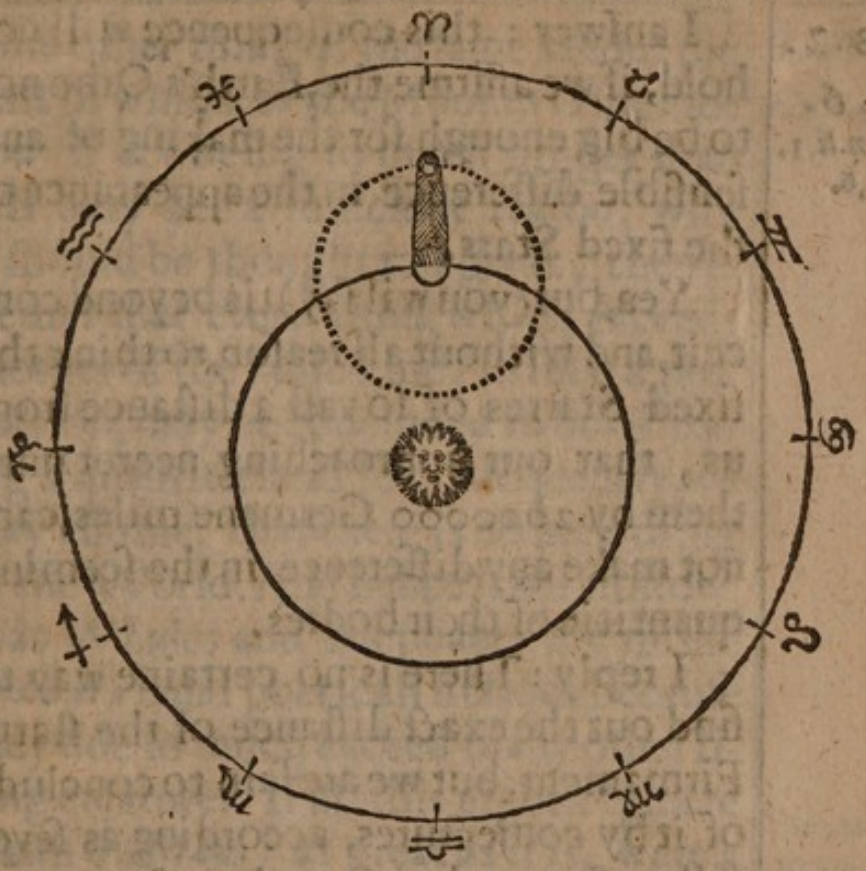
Arg. 3. Another demonſtration of the ſame kinde, is taken from the Eclipſes of the Sunne and Moone; which would not alwaies happen when theſe two Luminaries are diametrically oppoſed, but ſom-

Lib. 2. Cap. 6.

times when they are leſſe diſtant than a ſemicircle, if it were ſo, that the Earth were not in the centre.

I anſwer: This Argument, if well conſidered, will be found moſt directly to inferre this concluſion, That in all Eclipſes, the Earth is in ſuch a ſtrait Line (betwixt the two Luminaries,) whoſe extremities doe point unto oppoſite parts of the *Zodiacke*. Now though our adverſaries ſhould ſuppoſe (as *Copernicus* do's) the Earth to be ſituated in that which they would have to bee the Sunnes Orbe; yet would there not bee any Eclipſe, but when the Sunne and Moone were diametrically oppoſite, and our Earth betwixt them: As may cleerely bee manifeſted by this Figure, where you ſee the two Luminaries in oppoſite Signes: and according as any part of our Earth is ſituated by it's diurnall revolution, ſo will every Eclipſe be either viſible, or not viſible unto it.

The



The last and chiefe Argument, is taken from the appearance af the Starres; which in every Horizon, at each houre of the night, and at all times of the yere, seeme of an equall bigneſſe. Now this could not bee, if our Earth were sometimes neerer unto them by 2000000 Germane miles, which is granted to bee the diameter of that Orbe, wherein the Earth is suppoſed to move.

LIB. 2. *Cap.* 6. *Arg.* 4. *Ariſt. de cœlo. li.* 2. *c.* 14.

LIB. 2. *Cap.* 6. *Copern. li.* 1. *cap.* 5, 6.

I answer: this consequence will not hold, if we affirme the Earth's Orbe not to be big enough for the making of any sensible difference in the appearance of the fixed Stars.

Yea, but (you wil say) tis beyond conceit, and without all reason, to think the fixed Starres of so vast a distance from us, that our approaching neerer unto them by 2000000 Germane miles, cannot make any difference in the seeming quantitie of their bodies.

I reply: There is no certaine way to find out the exact distance of the starry Firmament: but we are fain to conclude of it by conjectures, according as severall reasons and observations seem most likely unto the fancies of divers men. Now that this opinion of *Copernicus* do's not make it too big, may be discerned from these following considerations.

The Worlds *great* & *little*, are relative tearmes, and do import a comparison to somthing else: So that where the Firmament (as it is according to *Copernicus*) is said to be too big; 'tis likely, that this word is to be understood in reference to some

LIB. 2. *Cap.* 6.

ſome other thing of the ſame kinde, the leaſt of which, is the Moones Orbe: but now if it's being ſo much bigger than this may bee a ſufficient reaſon, why it ſhould be thought too great, then it ſeemes that every thing which exceeds another of the ſame kind, in ſuch a proportion, may be concluded to be of too big a quantitie: and ſo conſequently, we may affirme, that there is no ſuch thing in the World. And hence it will follow, that Whales and Elephants are meere *Chimæra's*, and poeticall fictions, becauſe they doe ſo much exceed many other living creatures. If all this eighth ſphære (ſaith *Gallilæus*) as great as it is, were a light body, and placed ſo farre from us that it appeared but as one of the leſſer Starres, wee ſhould then eſteeme it but little; and therefore, we have no reaſon now to thruſt it out from being amongſt the works of nature, by reaſon of it's too great immenſitie. 'Tis a frequent ſpeech of our adverſaries, *Tycho*, *Fromundus*, and others, in excuſe of that incredible ſwiftneſſe which they imagine in their *primum mobile*, That 'twas requiſite

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requisite the motion of the Heavens should have a kind of infinitie in it, the better to manifest the infiniteneſſe of the Creator. And why may not wee as well affirme this concerning the bignes of the Heavens? *Difficilius est accidens præter modulum subjecti intendere, quàm subjectum sine accidente augere* (saith *Keplar.*) His meaning is, that 'tis lesse absurd to imagine the eighth Sphære of so vast a bigneſſe, as long as it is without motion, or at least, ha's but a very slow one: than to attribute unto it such an incredible celeritie, as is altogether disproportionable to it's bigneſſe.

Comment. in Spher. cap. 1.

2 'Tis the acknowledgement of *Clavius*, and might easily be demonstrated, That if the centre were fastened upon the Pole of the World, the Orbe wherein he supposes the Sunne to move, would not be able to reach so farre in the eighth Sphære (being considered according to *Ptolomies Hypotheſis*) as to touch the Pole-starre: which notwithstanding (saith he) is so neere the Pole it selfe, that wee can scarse discerne it to move: Nay, that circle which the Pole-

starre

ſtarre makes about the Pole, is aboue foure times bigger than the Orbe of the Sunne. So that according to the opinion of our adverſaries, though our Earth were at that diſtance from the centre, as they ſuppoſe the Sunne to be, yet would not this *eccentricitie* make it neerer to any one part of the Firmament, than the Pole-ſtarre is to the Pole, which according to his confeſſion, is ſcarſe ſenſible. And therefore according to their opinion, it would cauſe very little difference in the appearance of thoſe Stars, the biggeſt of which do's not ſeeme to bee of above five cubites in it's diameter.

3 'Tis conſiderable, That the ſphæres of *Saturne*, *Iupiter*, *Mars*, are according to the generall opinion, of very great extenſion; and yet each of them is appointed onely to carry about it's particular Planet, which are but very little in compariſon of the fixed Starres. Now if for the ſcituation of theſe fixed Starres, there ſhould be allotted a proportionable part of the World, 'tis certaine, that their Orbe muſt be farre bigger than it is

Lib. 2. Cap. 6.

is commonly ſuppoſed, and very neer to this opinion of *Copernicus*.

4 Wee uſually judge the bigneſſe of the higher Orbs, by their different motions. As becauſe *Saturne* finiſhes his courſe in thirty yeares, and *Iupiter* in twelve, therfore we attribute unto thoſe Orbes ſuch a different proportion in their bigneſſe. Now if by this rule wee would finde out the quantitie of the eighth Sphære, wee ſhall diſcerne it to be farre neerer unto that bigneſſe, which *Copernicus* ſuppoſeth it to have, than that which *Ptolomy*, *Tycho*, and others, ordinarily aſcribe unto it. For the ſtarry Heaven (ſay they) do's not finiſh his courſe under 26000 yeares; whereas *Saturne*, which is next unto it, do's compaſſe his Orbe in thirty yeares. From whence it will probably follow, that there is a very great diſtance betwixt theſe in place, becauſe they have ſuch different termes of their revolutions.

But againſt this anſwer: unto the laſt Argument, our adverſaries thus reply:

Fromond. Veſta. tract. 5. cap. 1.

1 If the fixed Starres be ſo far diſtant from us, that our approaching neerer

rer unto them by 2000000 Germane miles, doe not make any ſenſible difference in their appearance, then *Galilæus* his perſpective could not make them ſeeme of a bigger Forme, than they doe to the bare eye, which yet is contrary to common experience. LIB. 2. *Cap.* 6.

2 From hence it may bee inferred, That the leaſt fixed Star is bigger than all this Orbe wherein wee ſuppoſe the Earth to move; becauſe there is none of them but are of a ſenſible bigneſſe in reſpect of the Firmament, whereas, this it ſeemes is not. *Ibid.*

3 Since God did at firſt create the Starres *for the uſe of all nations that are under the wholeheavens*, *Deut.* 4. 19. it might have argued ſome improvidence in him, if he had made them of ſuch vaſt magnitudes: whereas they might as well beſtow their light and influences, and ſo conſequently be as ſerviceable to that end for which they were appointed, if they had been made with leſſe bodies, and placed neerer unto us. And 'tis a common *maxime*, that nature in all her operations, do's avoid ſuperfluities, *Ibid.*

Lib. 2. Cap. 6.

ties, and use the most compendious way.

I answer:

1 To the first, whether the perspective do make the fixed Starres appeare bigger than they do to the bare eye, cannot certainly be concluded, unlesse wee had such an exact glasse, by which wee might trie the experiment. But if in this kinde we will trust the authoritie of others, * *Keplar* tells us from the experience of skilfull men, that the better the perspective is, by so much the lesse will the fixed Starres appeare through it, being but as meer points from which the beames of light doe disperse themselves like haires. And 'tis commonly affirmed by others, that the Dog-starre, which seemes to bee the biggest Starre amongst those of the first magnitude, do's yet appeare through this glasse but as a little point no bigger than the fiftieth part of *Iupiter*. Hence it is, that though the common opinion hold the Starres of the first magnitude to be two minutes in their diameter, and *Tycho* three, yet † *Gallilæus*, who hath bin most

* *Astron. Copern. lib. 4. par. 1.*

† *System. mundi, Coll. 3.*

versed

verſed in the experiments of his owne perſpective, concludes them to bee but five ſeconds. LIB. 2. *Cap.* 6.

2 To the ſecond: Firſt wee affirme, the fixed Starres to be of a vaſte magnitude. But however, this Argument do's not induce any neceſſitie that we ſhould conceive them ſo big as the earth's Orb. For it might eaſily bee prooved, that though a Starre of the ſixth magnitude were but equall in diameter unto the Sunne (which is farre enough from the greatneſſe of the Earth's Orbe) yet the ſtarry heav'n would be at ſuch a diſtance from us, that the Earth's annuall motion could not cauſe any difference in it's appearance.

Suppoſe the *diameter* of the Sunne to be about half a degree, as our adverſaries grant; whereas a Starre of the ſixth magnitude is fifty thirds, which is comprehended in that of the Sun 2160 times. Now if the Sunne were removed ſo far from us, that it's *diameter* would ſeeme but as one of that number whereof it now containes 2160, then muſt his diſtance from us, bee 2160 times greater than *Vide Galil. ibid.*

LIB. 2. *Cap.* 6.

than now it is: which is all one, as if wee should say, that a Starre of the sixth magnitude is severed from us by so many *semidiameters* of the Earth's Orb. But now according to common consent, the distance of the Earth from the Sun, do's containe 128 *semidiameters* of the Earth, and (as was said before) this supposed distance of the fixed Starres, do's comprehend 2160 *semidiameters* of the Earth's Orbe. From whence it is manifest, that the *semidiameter* of the Earth, in comparison to it's distance from the Sunne, will bee almost doubly bigger than the *semidiameter* of the Earth's Orbe, in comparison to this distance of the Starres. But now the *semidiameter* of the Earth, do's make very little difference in the appearance of the Sunne, because we see common observations upon the surface of it, are as exactly true to the sence, as if they were made from the centre of it. Wherefore, that difference which would bee made in these fixed Stars, by the annuall course of the earth, must needs be much more unobservable, or rather altogether insensible.

2 The consequence of this Argument is grounded upon this false supposition, That every body must necessarily be of an equall extension, to that distance from whence there do' not appeare any sensible difference in it's quantitie. So that when I see a Bird flying such a height in the aire, that my being neerer unto it, or farther from it, by tenne or twenty foot, do's not make it seem unto my eyes either bigger or lesse; then I may conclude, that the bird must needs be either ten or twenty foot thicke: or when I see the body of a Tree that may be halfe a mile from me, and perceive that my approaching neerer to it by thirty or forty paces, do's not sensibly make any different appearance, I may then inferre, that the Tree is forty paces thicke; with many the like absurd consequences, that would follow from that foundation upon which this Argument is bottomed.

To the third I answer: 'Tis too much presumption, to conclude that to bee superfluous, the usefulnesse of which we doe not understand. There be many se-

Lib. 2. Cap. 6.

cret ends in these great works of Providence, which humane wisedome cannot reach unto, and as *Solomon* speakes of those things that are under the Sunne, so may we also of those things that are above it, *That no man can find out the works of God, for though a man labour to seek it out.* Eccles. 8. 17. Yea further: *Though a wise man thinke to know it, yet shall he not be able to finde it.* He that hath most insight into the works of nature, is not able to give a satisfying reason, why the Planets or Stars should be placed just at this particular distance from the Earth, and no neerer or farther. And besides, this Argument might as well be urged against the *Hypothesis* of *Ptolomy* or *Tycho*, since the Starres, for ought we know, might have been as serviceable to us, if they had been placed farre neerer, than either of those Authors suppose them. Againe, were there any force in such a consequence, it would as well conclude a great improvidence of nature, in making such a multitude of those lesser Stars, which have lately discovered by the perspective. For to what purpose should so many

Lights

Lights be created for the use of man, since his eyes were not able to discerne them? So that our disabilitie to comprehend all those ends which might be aimed at in the works of nature, can bee no sufficient Argument to proove their superfluitie. Though Scripture doe tell us that these things were made for our use, yet it do's not tell us, that this is their only end. 'Tis not impossible, but that there may be elsewhere some other inhabitants, by whom these lesser Stars may be more plainly discerned. And (as was said before) why may not we affirm that of the bigneſſe, which our adversaries doe concerning the motion of the Heavens? That God, to shew his owne immensitie, did put a kinde of infinitie in the creature.

There is yet another Argument to this purpose, urged by * *Al. Rosſ.* which was not referred to any of the former kinde, because I could scarsely beleeve I did rightly understand it: since he puts it in the front of his other Arguments, as being of strength and subtilty enough to be a leader unto all the rest; and yet

* *Lib.* 1. *sect.* 2. *cap.* 1.

LIB. 2. *Cap. 6.*

in the moſt likely ſence of it, 'tis ſo extremely ſimple to be preſſed in a controverſie that every freſh man would laugh at it. The words of it are theſe: *Quod minimum eſt in circulo debet eſſe centrum illius, at terra longè minor eſt Sole, & Æquinoctialis terreſtris eſt omnium in Cœlo circulus minimus, ergo,* &c.

By the ſame reaſon, it would rather follow, that the *Moon* or *Mercury* were in the centre, ſince both theſe are leſſe than the Earth. And then, whereas he ſayes that the Æquinoctiall of the Earth is the leaſt circle in the Heavens, 'tis neither true nor pertinent, and would make one ſuſpect, that hee who ſhould urge ſuch an Argument, did ſcarſe underſtand any thing in Aſtronomy.

There are many other objections like unto this, not worth the citing: The chiefe of all have bin already anſwered; by which you may diſcerne, that there is not any ſuch great neceſſitie, as our adverſaries pretend, why the Earth ſhould bee ſcituated in the midſt of the *Vniverſe.*

PROP.

LIB. 2. *Cap.* 7.

PROP. VII.

'Tis probable that the Sunne is in the centre of the World.

THe chiefe reasons for the confirmation of this truth, are implyed in the inconveniences of this *Hypothesis* above any other; whereby wee may resolve the motions and appearances of the Heavens into more easie and naturall causes.

Hence will the frame of nature bee freed from that deformitie, which it ha's according to the *Systeme* of *Tycho*: who though he make the Sunne to be in the midst of the Planets, yet without any good reason, denies it to be in the midst of the fixed Starres; as if the Planets, which are such eminent parts of the World, should bee appointed to move about a distinct centre of their owne, which was beside that of the *Universe*.

LIB. 2. Cap. 7.

Hence likewiſe are wee freed from many of thoſe inconveniences in the *Hypotheſis* of *Ptolomy*, who ſuppoſed in the Heavens, *Eppicides* and *Eccentrickes*, and other Orbes, which he calls the differents of the *Apoge* and the *Perige*. As if nature in framing this great engine of the World, had been put unto ſuch hard ſhifts, that ſhee was faine to make uſe of wheeles and ſcrewes, and other the like artificiall inſtruments of motion.

There bee ſundry other particulars, whereby this opinion concerning the Sunnes being in the centre, may bee ſtrongly evidenced: which becauſe they relate unto ſeverall motions alſo, cannot therefore properly be inſiſted on in this place. You may eaſily enough diſcerne them, by conſidering the whole frame of the Heavens, as they are according to the *Syſteme* of *Copernicus*; wherein, all thoſe probable reſolutions that are given for divers appearances amongſt the Planets, doe mainly depend upon this ſuppoſition, that the Sunne is in the centre. Which Arguments (were there

no

no other) might be abundantly enough for the confirmation of it. But for the greater plenty, there are likewise these probabilities considerable.

1 It may seem agreeable to reason, that the light which is diffused in severall Starres through the circumference of the World, should be more eminently contained, and (as it were) contracted in the centre of it, which can only be by placing the Sunne there.

2 'Tis an Argument of * *Clavius*, and frequently urged by our adversaries, That the most naturall scituation of the Sunnes body was in the midst, betwixt the other Planets; and that for this reason, because from thence he might more conveniently distribute amongst them both his light and heate. The force of which, may more properly bee applyed to proove him in the centre.

* *In prim. cap. Sphær.*

3 'Tis probable that the planetarie Orbes (which are speciall parts of the *Vniverse*) doe moove about the centre of the World, rather than about any other centre which is remote from it. But now 'tis evident, that the Planet *Saturne*, *Iu-*

Lib. 2. Cap. 7.

piter, *Mars*, *Venus*, *Mercury*, doe by their motion encompasse the body of the Sunne. 'Tis likely therefore, that this is scituated in the midst of the World.

As for the three upper Planets, 'tis found by observation, that they are alwaies neerest to the Earth, when in opposition to the Sunne; and farthest from us, when in conjunction with it: which difference is so eminent, that *Mars* in his *Perige* do's appeare sixty times bigger than when hee is in the *Apoge*, and at the greatest distance.

Now, that the revolution of *Venus* and *Mercury* also is about the Sun, may from hence be evidenced: first, because they are never at any great distance from him: secondly, because they are seen sometimes above, and sometimes below him: thirdly, because *Venus*, according to her different scituations, do's change her appearance, as the Moone.

4 There is yet another Argument, which † *Aristotle* himselfe do's repeat from *Pythagoras*. The most excellent body should have the best place; but the Sunne is the most excellent body,

† De Cœlo. lib. 2. ca. 13.

and

and the centre is the beſt place; therfore 'tis likely the Sunne is in the centre. In the frame of nature (which is ſuppoſed to be of an orbicular forme) there are but two places of any eminency, the circumference and the centre. The circumference being of ſo wide a capacity, cannot ſo fitly be the peculiar ſeat of a body, that is ſo little in reſpect of it: and beſides, that which is the moſt excellent part of the World, ſhould bee equally preſerved in it ſelfe, and ſhared in it's vertues by all the other parts, which can only be done by it's being placed in the midſt of them. This is intimated unto us in that frequent ſpeech of *Plato*, that the Soule of the World do's reſide in the innermoſt place of it: and that in * *Macrobius*, who often compares the ſun in the World, to the Heart in a living creature.

* *Saturnal. lib. 1. cap. 17, &c.*

Vnto this *Ariſtotle* anſwers by a diſtinction: There is *medium magnitudinis*, ſo the centre is the middle of a Sphære: and there is *medium naturæ*, or *informationis*, which is not alwayes the ſame with the other; for in this ſence

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ſence the Heart is the middle of a man; becauſe from thence (ſaith hee) as from the centre, the vitall ſpirits are conveied to all the members: and yet we know that it is not the centre of Magnitude, or at an equall diſtance from all the other parts.

And beſides, the middle is the worſt place, becauſe moſt circumſcribed, ſince that is more excellent which do's limit any thing, than that which is bounded by it. For this reaſon is it, that *Matter* is amongſt thoſe things which are terminated, and *Forme*, that which do's circumſcribe.

But againſt this anſwer of *Ariſtotle*, it is againe replyed:

Keplar. Aſtr. Copern. lib. 4. par. 2.

1 Though it be true, that in living creatures the beſt and chiefeſt part is not placed alwaies juſt in the midſt, yet this may be, becauſe they are not of an orbicular forme, as the World is.

2 Though that which bounds another thing be more excellent than that which is terminated by it, yet this do's not proove the centre to bee the worſt place, becauſe that is one of the tearmes

or

LIB. 2. *Cap.7.*

or limits of a round body, as well as the circumference.

There are likewise other Arguments to this purpose, much insisted on by eminent Astronomers, taken from that harmonicall proportion which there may be betwixt the several distance and bigness of the Orbs, if we suppose the Sun to be in the centre.

Maslin. præ. ad Narrat. Rhetici. Kepler. mysterium Cosmographicum.

For according to this (say they) wee may conceive an excellent Harmonie both in the number and the distance of the Planets: (and if God made all other things *numero & mensurâ*, much more then those greater Works, the Heavens) for then the five Mathematicall bodies, so much spoken of by **Euclid*, will beare in them a proportion answerable to the severall distances of the Planets from one another.

** Lib. 13. prop. 14, 15, &c.*

Thus a *Cube* will measure the distance betwixt *Saturne* and *Iupiter*; a *Pyramis* or *Tetraëdron*, the distance betwixt *Iupiter* and *Mars*; a *Dodecaëdron*, the distance betwixt *Mars* and the Earth; an *Icosaëdron*, the distance betwixt the *Earth* and *Venus*; and an *Octoëdron*, the distance be-

Lib. 2. Cap. 7.

betwixt *Venus* and *Mercury*; that is, if we conceive a circumference described immediately without the *Cube*, and another within it, the distance betweene these two will shew what proportionall distance there is betwixt the Orbe of *Saturne*, and that of *Iupiter*. Thus also, if you conceive a circumference described on the outside of a *Pyramis* or *Tetraëdron*, and another within it, this will shew such a proportionall distance, as there is betwixt the Orbe of *Mars*, from that of *Iupiter*. And so of the rest.

Now if any aske why there are but six Planetary Orbs? *Keplar* answers: *Quia non oportet plures quàm quinque proportiones esse, totidem nempè quot regularia sunt in Matheſi corpora. Sex autèm termini consummant hunc proportionum numerum*: Because there are but five proportions, so many as there are regular bodies in Mathematickes, each of whose sides and angles are equall to one another. But now there are six tearmes required to consummate this number of proportions; and so consequently, there can bee but six primary Planets.

Thus

LIB. 2. *Cap.* 6.

Thus likewiſe by placing the Sunne in the centre, wee may conceive ſuch a proportion betwixt the Bodies of the Planets, as will be anſwerable unto their ſeverall Sphæres: Then *Mercury*, which ha's the leaſt Orbe, will have the leaſt Body; *Venus* bigger than that, but leſſe than any of the other; our *Earth* bigger than *Venus*, but leſſe than the reſt; *Mars* bigger than the *Earth*, but leſſe than *Iupiter*; *Iupiter* bigger than *Mars*, and leſſe than *Saturne*; *Saturne* being the higheſt, ſhould alſo be the biggeſt. All which Harmony would bee diſturbed by putting in the Sunne amongſt them; and therfore, it may be more convenient for him to ſit ſtill in the centre.

There are ſundry other Arguments in this kinde to be found out, by a conſideration of this whole *Hypotheſis*: Hee that do's rightly underſtand it, may therein eaſily diſcerne many ſtrong probabilities, why the Sun ſhould be in the midſt of the World, rather than in any other poſition.

PROP.

LIB. 2. Cap. 8.

PROP. VIII.

That there is not any ſufficient reaſon to prove the Earth incapable of thoſe motions which Copernicus *aſcribes unto it.*

THe two chiefe motions in the World, which are more eſpecially remarkable above the reſt, are the *Diurnall*, and *Annuall*.

The *Diurnall*, which makes the difference betwixt night and day, is cauſed by the revolution of our Earth vpon it's owne *Axis*, in the ſpace of foure and twenty houres.

The *Annuall*, which makes the difference betwixt Winter and Summer, is likewiſe cauſed by the Earth, when being carried through the *Eclipticke* in it's owne Orbe, it finiſhes it's courſe in a yeare.

The firſt is uſually ſtiled, *Motus revolutionis*;

lutionis: The ſecond *Motus circumlationis:* There is likewiſe a third, which *Copernicus* calls *Motus inclinationis:* but this being throughly conſidered, cannot properly be ſtiled a motion, but rather an immutabilitie, it being that whereby the *Axis* of the Earth do's alwaies keep paralell to it ſelfe, from which ſcituation, it is not his annuall courſe that do's make it in the leaſt manner to decline.

As for the difficulties which concern the ſecond of theſe, they have been alreadie handled in the ſixth Propoſition, where the Earth's *eccentricitie* was maintained.

So that the chiefe buſineſſe of this Chapter, is to defend the Earth's diurnall motion, againſt the objections of our adverſaries. Sundry of which objections, to ſpeak (as the truth is) do beare in them a great ſhew of probabilitie, and ſuch too (as it ſeemes) was very efficacious, ſince *Ariſtotle* and *Ptolomy*, &c. men of excellent parts and deep judgements, did ground upon them, as being of infallible and neceſſarie conſequence.

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I shall reckon them up severally, and set downe such answers unto each, as may yeeld some satisfaction to every indifferent seeker of truth.

1 First then, 'tis objected from our sences; If the Earth did move, we should perceive it. The Westerne mountaines would then appeare to ascend towards the Starres, rather than the Stars to descend below them.

I answer: The sight judges of motion according as any thing do's desert the plane whereon it selfe is seated: which plane every where keeping the same situation and distance, in respect of the eye, do's therefore seem immovable unto it, and the motion will appeare in those Starres and parts of the Heaven; through which the verticall Line do's passe.

The reason of such deceit may be this: Motion being not a proper object of the sight, nor belonging to any other peculiar sence, must therefore be judged of by the *sensus communis*, which is liable to mistake in this respect; because it apprehends the eye it self to rest immovable,

vable, whileſt it do's not feel any effects of this motion in the body: As it is when a man is carried in a Ship; ſo that ſence it but an ill judge of naturall ſecrets. 'Tis a good rule of *Plato*, Εἰς τὸν τῶν ἀφορῶν δεῖ φιλόσοφον καὶ μὴ εἰς τὸ ὄφιν: A Philoſopher muſt not bee carried away by the bare appearance of things to ſight, but muſt examine them by reaſon. If this were a good conſequence, The Earth do's not move, becauſe it do's not appeare ſo to us, we might then as well argue, that it do's move when we goe upon the water, according to the verſe:

Provehimur portu, terræque, urbesque recedunt.

Or if ſuch Arguments would hold, it were an eaſie matter to prove the Sunne and Moone not ſo big as a Hat, or the fixed ſtars as a Candle.

Yea, but if the motions of the Heavens bee onely apparant, and not reall, then the motion of the clouds will be ſo too, ſince the eye may bee as well deceived in the one as the other. *Al. Roſſ. l. 1. ſect. 1 cap. 1.*

I anſwer: 'Tis all one, as if he ſhould

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inferre, that the ſence was miſtaken in every thing, becauſe it was ſo in one thing: and this would be an excellent Argument to prove that opinion of *Anaxagoras*, that the Snow was blacke.

The reaſon why that motion which is cauſed by the Earth, do's appeare as if it were in the Heavens, is, becauſe the *ſenſus communis* in judging of it, do's conceive the eye to be it ſelfe immovable (as was ſaid before) there being no ſence that do's diſcerne the effects of any motion in the body; and therefore, it do's conclude every thing to move, which it do's perceive to change it's diſtance from it: So that the clouds do not ſeem to move ſometimes, when as notwithſtanding they are every where carried about with our Earth, by ſuch a ſwift revolution; yet this can be no hinderance at all, why wee may not judge aright of their other particular motions, for which there is not the ſame reaſon. Though to a man in a Ship, the Trees and Bankes may ſeeme to move; yet it would be but a weak Argument, to conclude from hence, that therefore ſuch a one

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one could not tell whether his friend do's really ſtirre, whom he ſees to walke up and downe in the Ship : or that hee might as well bee deceived in judging the Oares to move, when they doe not.

Ibid.

'Tis againe replyed by the ſame Objector, That it is not credible, the eye ſhould bee miſtaken in judging of the Starres and Heavens ; becauſe thoſe being light bodies, are the primarie and proper Objects of that ſence.

I anſwer : The deceit here is not concerning the light or colour of thoſe bodies, but concerning their motion ; which is neither the primarie nor proper Object of the Eye, but reckoned amongſt the *Objecta Communia.*

2 Another common Argument againſt this motion, is taken from the danger that would thence ariſe, unto all high buildings, which by this would quickely bee ruinated, and ſcattered abroad.

Coper. l. 1. c. 8

I anſwer: This motion is ſuppoſed to be naturall : and thoſe things which are according to nature, have contrary effects to other matters, which are by

Lib. 2. Cap. 8.

force and violence. Now it belongs unto things of this later kind, to be inconstant and hurtfull; whereas those of the first kinde must be regular, and tending to conservation. The motion of the Earth is alwaies equall and like it selfe: not by starts and fits. If a glasse of Beere may stand firmely enough in a Shippe, when it moves swiftly upon a smooth streame, much lesse then will the motion of the Earth, which is more naturall; and so consequently more equall, cause any danger unto those buildings that are erected upon it. And therefore to suspect any such event, would bee like the feare of *Lactantius*, who would not acknowledge the being of any *Antipodes*, lest then he might bee forced to grant that they should fall downe unto the Heavens. We have equall reason to be afraid of high buildings, if the whole World above us were whirled about with such a mad celeritie as our adversaries suppose; for then there would be but small hopes, that this little point of Earth should escape from the rest.

Gibert de Magn. lib. 6. cap. 5.

Lib. 1. sect. 1. cap. 3.

But supposing (saith **Rosse*) that this motion

motion were naturall to the Earth, yet it is not naturall to Townes and Buildings, for these are artificiall.

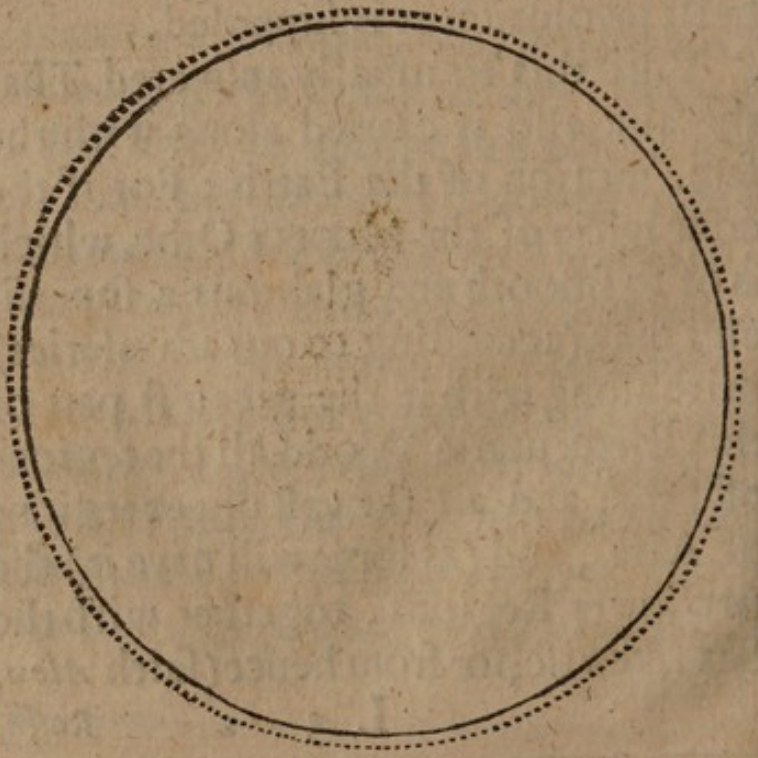
To which I answer: Ha, ha, he.

3 Another Argument to this purpose is taken from the rest and quietnes of the aire about us; which could not be, if there were any such swift motion of the Earth. If a man riding upon a fleet horse, doe perceive the aire to beat against his face, as if there were a winde, what a vehement tempest should wee continually feele from the East, if the Earth were turned about with such a swift revolution as is supposed.

Vnto this 'tis usually answered, That the aire also is carried along with the same motion of the Earth: For if the concavitie of the Moones Orbe, which is of so smooth and glabrous a superficies, may (according to our adversaries) drive along with it the greatest part of this Elementarie World, all the regions of Fire, and all the vast upper regions of Aire, and (as some will have it) the two lower Regions, together with the Sea likewise; for from hence (saith *Alex.*

LB. 2 Cap. 8.

Rosse, lib. 1. sect. 1. cap. 3.) is it, that betwixt the *Tropicks* there is a constant Easterne wind, and a continuall flowing of the Sea Westward: I say, if the motion of the Heavens which are smooth bodies, may bee able to carry with it so great a part of the elementarie World: or if the rugged parts of the Moons Body be able to carry with it so great a part of the aire, as *Fromondus* (*Ant. c. 16.*) affirms: much more then may our earth, which is a rugged mountainous Body, be able to turne about so little a part of the world, as that vaporous aire next unto it.



Suppoſe the inward circle to repreſent the Earth; and the outward, the thicker aire which encompaſſes it. Nowit is eaſily conceivable, that the revolution of ſo great a Body as this Globe of Earth, may turne about by it's meere motion (if there were nothing els) ſo little a part of the adjoyning aire, as is here repreſented: And yet,

1 The diſproportion betwixt the thickneſſe of the Earth, and this Orb of Aire, is farre greater than could bee expreſt in the Figure, being but as twenty miles; which is at moſt the thickneſſe of this Aire, unto 3456 miles, which is the ſemidiameter of our Earth, and ſo is but as an inſenſible number in reſpect of this other.

2 Beſides the meere motion of the Earth, which in probabilities (being ſuch a rugged body) might bee enough to carry ſo little a part of the aire along with it; there is alſo (as wee ſuppoſe) a magneticall vigor which proceeds from it, whereby 'tis more able to make all things that are neere unto it, to obſerve the ſame revolution.

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* Li. 1 sect. 1. cap. 5.

But if it be so (saith * *Alex. Ross.*) that not only the man, but the *medium* also, and the Object bee moved: this must needs be such a great hinderance to the sight, that the eye cannot judge exactly of any thing. For suppose the man alone to be in a motion, hee could not see so well as when hee is still; but now if not only he, but his spectacles, and booke were all mooved, he would not bee able to discerne any thing distinctly.

I answer: the consequence were pertinent, if all these were severall motions: but if the Subject, and *Medium*, and Object were all carried with one and the same equall motion (as it is here supposed) this could be no impediment to the act of seeing, but it would bee all one with the rest; because by this means, they are not severed from one another; and therefore the *species* are not disturbed.' Tis an excellent saying of * *Galilæus*, and may serve for the resolution of many such doubts as these: *Motus eatenus tanquàm motus operatur, quatenus relationem habet ad eas res quæ ipso distituuntur, in ijs verò rebus, quæ totæ æqualiter de*

* Syst. mundi, Collop. 2.

eo

LIB. 2. *Cap.* 8.

eo participant, nihil operatur, & ita se habet ac si nullus esset. If a man be within some roome of a Ship, he may read altogether as easily when the Ship moves, as when it stands still.

4 Another Argument against this circular motion of the earth, is grounded upon that common Principle amongst the *Aristotelians: Vnius corporis simplicis unum tantum est motus*: One kind of body ha's but one kind of motion. But now the Earth and Water ha's a motion of descent: the Aire, a motion of ascent; and therefore none of them can have any circular motion naturall unto them.

I answer: First, these right motions of elementarie bodies belong onely to the parts of them, and that too when they are out of their proper places; so that the whole to which they belong, may notwithstanding this, have another motion of it's owne. But secondly, this saying which *Aristotle* cals a Principle, will not consist with other evident experiments of nature. Thus, though a Loadstone in respect of it's matter and condensitie, naturally tends downward; yet this do's not

not hinder, but that in respect of some other qualities, as it's desire of union and coition to another loadstone, it may also naturally move upwards. From whence it will follow, that the same elementarie bodie may have divers natural motions.

5 The gravitie and magnitude of this Earthy Globe, do make it altogether unfit for so swift a motion.

I answer: First, Heavinesse can onely be applyed unto those bodies which are out of their proper places, or unto such parts as are severed from the whole to which they belong. And therefore the Globe of Earth, considered as whole, and in it's right place, cannot truly bee called heavy. I deny not, but that there is in it, and so likewise in the other Planets, an ineptitude to motion, by reason of the matter and condensitie of their bodies: And so likewise there is, as truly (though not according to the same degrees) in the least particle of a materiall condensed substance: so that this cannot reasonably be pretended as a just impediment, why the earth should be incapable of such a motion. Secondly, and though

though this Globe be of so vast a magnitude, yet as nature bestowes upon other creatures (for instance an Eagle and a Flye) spirits, and motive powers, proportionable to their severall bodies: so likewise may she indowe the Earth with a motive facultie answerable to it's greatnesse. Or if this may make the Earth incapable of so swift a motion, as is supposed, much more then will the Heavens bee disabled for that greater swiftnesse which is imagined in them. I might adde, the Globe of the Sun and *Iupiter* are observed to move about their owne centres; and therefore the Earth, which is farre lesse than either of them, is not by reason of it's too great magnitude made unfit for such a revolution. Thirdly, as for the swiftnesse of the Earth's course, it do's not exceed (all circumstances well considered) the celeritie of some other motions, with which we are acquainted; as that of the clouds, when driven by a tempestuous wind; that of a Bullet shot from a Cannon, which in the space, a minute do's fly 4 miles. Or as another hath observed in the second

Mæslin præfat. ad Narrat. Rhet. Fromond. Vesta. tract. 1. cap. 3.

cond scruple of an hour it may passe the fifteenth part of a Germane mile: Than which, there is not any point in the Earth's Equinoctiall that moves faster; and though a Bullet bee much slower in moving a greater distance, yet for so little a space, while the force of the pouder is most fresh and powerfull, it do's equal the swiftnesse of the Earth. And yet,

1 A bullet or cloud is carried in it's whole body, being fain to break it's way through the aire round about it: but now the earth (in respect of this first motion) do's remaine still in the same scituation, and move onely about it's owne centre.

2 The motion of a Bullet is violent, and against it's nature, which do's strongly incline it to move downwards. Whereas the Earth being considered as whole, and in it's proper place, is not heavy, nor do's it containe any repugnancie to a circular motion.

6 The chiefe Argument, on which our adversaries do most insist, is this: If there were such a motion of the Earth as is supposed, then those bodies which are severed from it in the Aire, would be

Aristot. de Cœlo, lib. 2. cap. 13.

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be forsaken by it. The clouds would seeme to rise and set as the Starres. The Birds would be carried away from their nests. No heavy body could fall perpendicular. An Arrow or Bullet being shot from East to West by the same violence, will not bee carried an equall distance from us, but we should by the revolution of our Earth, overtake that which was shot to the East, before it could fall. If a man leaping up should abide in the Aire but one second scruple of an houre, or the sixtieth part of a minute, the Earth in that space, would withdraw it selfe from him almost a quarter of a mile. All these and many other such strange inferences, which are directly contrary to sence and experience, would follow from this motion of the Earth.

There are three severall wayes most frequently used for the resolving of these kind of doubts.

1 From those magneticall qualities, which all elementarie bodies do partake of.

2 From the like motions of other things

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things within the roome of a sailing Ship.

3 From the like participation of motion in the open parts of a Ship.

1 For those *magneticall* properties, with which all these bodies are endowed. For the better understanding of this, you must know, That besides those common elementarie qualities of heat, coldnesse, drinesse, moisture, &c. which arise from the predominancie of severall Elements; there are likewise other qualities (not so well known to the Antients) which wee call *magneticall*, of which every Particle in the Terrestriall Globe do's necessarily participate: and whether it be joyned to this Globe by continuitie or contiguitie; or whether it be severed from it, as the Clouds in the second Region, a Bird, or Bullet in the Aire; yet do's it still retaine it's magneticall qualities, together with all those operations that proceed from them.

Now from these properties doe wee suppose the circular motion of the Earth to arise.

If you aske, what probabilities there are,

are, to prove that the Earth is indowed with any such affections. I answer: 'Tis likely, that the lower parts of this Globe do not consist of such a soft fructifying Earth, as there is in the surface (because there can be no such use for it, as here, and nature do's nothing in vain;) but rather, of some hard rocky substance, since we may well conceive, that these lower parts are pressed close together by the weight of all those heavy bodies above them. Now 'tis probable, that this rocky substance is a Load-stone, rather than a *Iaspis*, *Adamant*, *Marble*, or any other; because experience teacheth us, that the Earth and Loadstone do agree together in so many properties. Suppose a man were to judge the matter of divers bodies; each of which should bee wrapt up in some covering from his eye, so that he might not only examine them by some other outward signes: If in this examination he should find any particular body which had all the properties that are peculiar to a Load-stone, hee would in reason conclude it to be of that nature, rather than any other. Now there

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is altogether as much reaſon why wee ſhould inferre, that the inward parts of the Earth doe conſiſt of a magneticall ſubſtance. The agreement of theſe two you may ſee largely ſet forth in the treatiſe of D. *Gilbert*. I will inſtance only in one Example; which of it ſelf may ſufficiently evidence, that the Globe of Earth do's partake of the like affections with the load-ſtone. In the mariners needle you may obſerve the magneticall notions of *direction*, *variation*, *declination*; the two laſt of which are found to be different, according to the varietie of places. Now this difference cannot proceed from the needle it ſelfe, becauſe that is the ſame every where. Nor can we well conceive how it ſhould bee cauſed by the Heavens; for then the variation would not be alwaies alike in the ſame place, but diverſe, according to thoſe ſeverall parts of the heaven, which at ſeverall times ſhould happen to bee over it: And therefore, it muſt neceſſarily proceed from the Earth, which being it ſelfe endowed with magneticall affections, do's diverſly diſpoſe the motions of

of the needle, according to the difference of that disponent vertue which is in it's severall Ports.

Now to apply this unto the particular instances of the Objection: We say, though some parts of this great Magnet the Earth, may according to their matter be severed from the whole; yet are they alwayes joyned to it by a communion of the same magneticall qualities; and doe no lesse observe these kinde of motions, when they are separated from the whole, than if they were united to it. Nor need this seeme incredible, that a heavy Bullet, in such a swift violent course, should bee able to observe this magneticall revolution of the whole Earth; when as we see that those great bodies of *Saturne*, *Iupiter*, &c. hanging in the vaste spaces of the ætheriall Aire, do so constantly and regularly move on, in their appointed courses: Though we could not shew any similitude of this motion in these inferior bodies, with which we are acquainted; yet wee must know, there may be many things which agree to the whole frame, that are not dis-

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cernable in the divers parts of it. 'Tis naturall unto the Sea to ebbe and flow, but yet there is not this motion in every drop or bucket of Water. So if we consider every part of our bodies severally, the humours, bones, flesh, &c. they are all of them apt to tend downewards, as being of a condensed matter; but yet consider them according to the whole Frame, and then the bloud or humours may naturally ascend upwards to the Head, as well as descend to any of the lower parts. Thus the whole Earth may move round, though the severall parts of it have not any such particular revolution of their owne. Thus likewise, though each condensed body being considered by it selfe, may seem to have only a motion of descent; yet in reference to that whole Frame of which it is a part, it may also partake of another motion that may be naturall unto it.

But some may here object: Though the Earth were endowed with such magneticall affections, yet what probabilitie is there that it should have such a revolution? I answer: 'Tis observed of those

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thoſe other magneticall bodies of *Saturne*, *Iupiter*, and the Sun, that they are carried about their owne centers; and therefore 'tis not improbable, but that it may be ſo with the Earth alſo; which if any deny, he muſt ſhew a reaſon why in this reſpect they ſhould be unlike.

Yea, but though the Earth did move round, what ground is there to affirme that thoſe bodies which are ſevered from it, as a Bullet, or the clouds, ſhould follow it in the ſame courſe?

I anſwer: Thoſe ſpots which are diſcovered about the Sun, and are thought to bee clouds or evaporations from his body, are obſerved to bee carried about according to his revolution. Thus the Moone is turned round by our Earth: the foure leſſer Planets by the body of *Iupiter*. Nay, thus all the Planets in their ſeverall Orbes, are moved about by the revolution of the Sunne, upon it's owne *Axis* (ſaith *Keplar*) and therefore much more may an Arrow or Bullet be carried round by the magneticall motion of our Earth.

The ſecond way, whereby ſome an-

swer unto the instances of this Argument, is, by shewing the like motions of other things within some roome of a sailing Ship. Thus experience teaches (say they) that a candle, as also the fumes that come from it, will alwayes keep the same scituation in the swifteſt motion of a Ship, as if it did reſt immovably, and the flame will not more especially bend one way, or have any troubled fluctuation, but burne as strait and quietly, as if it did stand still. Againe, it ha's been found (say those that have been versed in these kinde of experiments) that the same force will cast a body but at an equall distance, whether or no the body do move with, or against the motion of the Ship. As also that any weight being let fall, will descend in as true a perpendicular, as if the Ship did stand still. If a man leaping up, doe tarry in the Aire one second minute of an houre, yet the Ship will not in it's greateſt swiftneſſe (as it should according to the calculation of our adversaries) be carried from him at leaſt fifteen foot. If wee suppose a man to jumpe in such

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ſuch a Ship, he will not be able to paſſe farther, when he jumps againſt the motion of it, than when hee jumps with it. All which particulars may argue, that theſe things are carried along together, by the common motion of the Ship. Now if bodies may be thus jointly moved by ſuch a præternaturall motion; much more then will they accompanie the Earth in it's diurnall revolution, which we ſuppoſe to bee naturall unto them, and as a Law impoſed by God in their firſt Creation.

If the flame of a candle, or the ſmoke that comes from it (things that are ſo eaſily movable) are notwithſtanding carried ſo equally, and without any diſturbance, by the motion of a Ship: then alſo the Cloudes in the Aire, and all other light Bodies, may well enough be turned about by the revolution of our Earth.

If an equall force wil caſt an heavy body but at an equall diſtance, whether or no it move with, or againſt the motion of the Ship; then may wee eaſily conceive, that an Arrow or Bullet being

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ſhot with the ſame violence, will paſſe but the ſame ſpace on the Earth, whether or no it be ſhot towards the Eaſt or Weſt.

If a heavy Body, while the Ship do's move, will fall downe in a ſtrait Line, then it is not the revolution of our Earth that can hinder a perpendicular deſcent.

If a man leaping up in a Ship, may abide in the Aire on the ſecond ſcruple of an houre, and yet this Ship in it's greateſt ſwiftneſſe not withdraw it ſelfe fifteene foot; then will not the Earth in that ſpace go from him almoſt a quarter of a mile.

Fromondus Veſta. tract. 3. cap. 2.

But againſt this 'tis objected, That the Earth ha's the ſimilitude of an open Ship, and not of any room that is cloſe. And though it bee true, that when the Roofe and the Walls doe all move together, the Aire which is included betwixt them, muſt bee carried along by the ſame motion; yet it is not ſo with the Earth, becauſe that hath not any ſuch Walls or Roofe, wherein it may containe and carry along with it the *medium.*

dium. And therefore experience will rather argue against this supposed revolution. Thus 'tis observed, that a stone being let fall from the Mast of a Ship that moves swiftly, will not descend to the same point, as if the Ship did stand still. From whence it will follow, that if our Earth had such a circular motion, then any heavy body being let fall from some high Tower, or other steep place, would not descend unto that point of Earth which was directly under it at the beginning.

To this wee answer; That the Aire which moves along with our Earth, is as well limited in certaine bounds, as that which is included in a roome. If you aske where these bounds are terminated: I answer neither by the utmost parts of the World, nor yet by the concavitie of the Moons Orb (as *Fromondus* would have us affirme) but by the Sphære of vaparous Aire that encompasses our Earth; or which is all one, by the Orbe of magneticall vigor, which proceeds from it. And besides, tis considerable that all Earthly Bodies are not onely

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contained within these limits, as things are in a close roome, but also as parts in that whole to which they belong.

2 Though the carrying along of the *medium* may solve the motion of light Bodies in a Ship, as the flame of a candle, smoake, or the like; yet this cannot concurre to that which hath bin said of heavy Bodies, as a man leaping up, a Bullet descending, &c. since it is not the motion of the meere Aire that is able to make these partake of the same motion with the Ship. Vnto that Argument which he urges from the experiment of a Stone falling in an open Ship, Wee answer:

1 Though the instance of a Ship, may serve as a proofe for this opinion, it being an Argument *a minori ad majus*, from an accidentall motion to a naturall; yet it will not serve against it. For though it were not thus in accidentall motions; yet this would not hinder but that it might be so in those that are supposed to be proper and naturall.

2 As for that experiment it selfe, 'tis but a groundlesse imagination, and

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was never yet confirmed by any particular experience, becauſe 'tis certaine the event would be clean otherwiſe, as ſhall be prooved in the third way of anſwering.

3 The third and laſt way of cleering the doubts in the ſixth Argument, is by ſhewing the like participation of motion, in thoſe things that are in the open parts of a Ship. To which purpoſe *Gallilæus* urges this experiment: If any one ſhould let fall a Stone from an high Maſt, he would find *lapidem in eundem ſemper Navis locum decidere, ſeu conſiſtat illa, ſeu quantacunque velocitate moveatur:* that the Stone would alwayes deſcend unto the very ſame place, whether or no the Ship did move or ſtand ſtill. The reaſon of which is, becauſe the motion of the Ship is likewiſe impreſſed in the Stone: which impreſſion is not equally prevalent in a light body, as a Feather, or Wooll, becauſe the Aire which ha's power over them, is not carried along by the ſame motion of the Ship. Thus likewiſe will it be in this other experiment: If a man upon a running

Syſte. Mundi. Colleq. 2.

ning Horſe ſhould in his ſwifteſt courſe let fall a Bullet or Stone, theſe heavy Bodies, beſides their owne deſcent, would alſo participate that tranſverſe motion of the Horſe. For as thoſe things that are throwne from us, do continue their motion when they are out of the hand in the open Aire: ſo likewiſe muſt it bee when the force is conferred by that motion which the arm ha's from the Horſe. While a man is riding, his arme is alſo carried by the ſame ſwiftnes of the Horſe; therefore, if hee ſhould onely open his hand and let fall any thing, it would not deſcend in a ſtrait Line, but muſt neceſſarily be driven forward, by reaſon of that force impreſſed in it by the ſwiftneſſe of the Horſe, which is alſo communicated to the arme: it being all one in effect, whether or no the arme be moved by a particular motion of it's owne, as it is in caſting of things from us; or by the common motion of the Body, as it is in dropping of any thing from us, either when wee are on the toppe of ſome ſayling Shippe, as in the *Former*; or on ſome

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ſome running Horſe, as in this *Later* inſtance.

What hath been ſaid concerning the motion of *deſcent*, is likewiſe applyable, both to that which is *upward*, and that which is *tranſverſall*. So that when 'tis objected, if the Earth did move, then a Bullet that were ſhot up perpendicularly would bee forſaken by it, and not deſcend to the place from whence it aroſe: Wee anſwer, that the Cannon which is upon the Earth, together with the Bullet in it, doe partake of the ſame circular motion, with the Earth, and this perhaps our adverſaries will grant, whileſt wee ſuppoſe the Bullet to remaine ſtill in the Cannon, all the difficultie will bee to ſhew how it muſt neceſſarily obſerve the ſame motion, when it is ſhot out into the open Aire. For the better explication of this, you may note this following Figure.

Galil. Syſt. Colleq. 2.

Where

That the Earth

Where wee ſuppoſe A. C. to bee a Cannon perpendicularly, erected with a Bullet in it at B. which if it were immovable, wee grant that the Bullet being diſcharged, muſt aſcend in a juſt perpendicular. But now conceive this Cannon to move along with the Earth, then in that ſpace of time while the Bullet by the force of the pouder is aſcending to the top of the Bore, the Cannon will be transferred to the ſcituation D. E. ſo that the Bullet muſt bee moved according to the Line F. G. which is not directly upright, but ſomewhat declining. Now the motion of the Bullet in the Aire, muſt neceſſarily be con-

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conformed unto that direction that is impreſſed in it by the Cannon from whence it is ſhot, and ſo conſequently it muſt bee continued according to the Line F.G. and therefore will alwayes keep perpendicularly over the point from which it did aſcend.

If you reply, that the motion of the Bullet in the Cannon muſt needs bee ſo ſo ſwift, that the Earth cannot carry the Cannon from C. to E. in the ſame ſpace of time, wherein the Bullet do's move from B. to A. I anſwer: 'tis not materiall whether the Earth bee of a greater or leſſer ſwiftneſſe than the Bullet, becauſe the declination muſt alwayes bee proportionable to the motion of the Earth, and if wee ſuppoſe this to bee ſlower than the Bullet, then the declination of the Line F.G. will bee ſo much the leſſe.

This truth may yet farther bee illuſtrated by the practiſe of thoſe Fowlers, who uſe to kill Birds as they are flying: Concerning which Art, tis commonly thought that theſe men direct their aimes to ſome certaine ſpace in the Aire,

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Aire, just before the Birds, where they conceive the Bullet wil meet with them in their flight; whereas the truth is, they proceed in this case, the very same way, as if the Birds did stand still, by a direct aiming at their bodies, and following of their flight by the motion of the piece, till at length, having got a perfect aime, they discharge, and do hit altogether as surely, as if the Birds were sitting upon a Tree. From whence wee may observe, that the motion of the piece, as in our aiming, it is made to follow the Birds in their flight (though it be but slow,) yet is communicated to the Bullet in the Aire.

But here it may seeme very difficult to give any reason according to those grounds concerning the flight of birds; which being animated, have a liberty to fly here or there, to tarry for a good space of time in the open Aire, and so 'tis not easie to conceive what meanes there is, by which they should participate of the Earth's diurnall revolution.

To this *Gallilæus* answers, that the motion

motion of the Aire, as it do's turne about the Clouds, so doth it also carry with it the Birds, together with such other like things that are in it. For if some violent winde bee able to drive with such swiftnesse a full laden Ship, to throw downe Towers, to turne up Trees, and the like; much more then may the diurnall motion of the Aire, (which do's so farre exceed in swiftnesse the most tempestuous winde) be able to carry with it the bodies of Birds.

Ob. But if all things bee turned about by this revolution, then it should seeme there is no such thing as a right motion, whether of ascent, or descent in a strait Line.

Sol. I answer: The moving of heavy or light bodies, may bee considered in a double relation.

1 According to the space wherein they move, and then we grant their motions not to bee simple, but mixed of a direct and circular.

2 According to the body or *medium* wherein they move, and then they may properly be said to have right motions,

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tions, becauſe they paſſe through the *medium* in a ſtrait Line; and therefore it is, that unto us they ſeeme directly to aſcend or deſcend. *Ariſtotle* himſelfe would not deny, but that Fire may aſcend in a ſtrait Line unto it's Sphære, and yet participate alſo of that circular motion which hee ſuppoſes to bee communicated from the Heavens, unto the upper part of the Aire, and it's owne Region. So likewiſe muſt it bee for the deſcent of any thing. Suppoſe a Ship in it's ſwifteſt motion, and a man in it, having ſome veſſell filled with water, ſhould let fall into it a little Ball of Waxe, or ſome other matter which may be ſlow in it's ſinking, ſo that in one minute it ſhould ſcarſe deſcend the ſpace of a cubit, though the Ship (it may be) in the ſame time may paſſe at leaſt a hundred cubits; yet would this ſtill ſeeme unto the eye to deſcend in a ſtrait Line; and the other motion which is communicated unto it by the Shippe, would not at all bee diſcernable in it. And though in this caſe, the motion were in it ſelfe compoſed of a circular

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and direct; yet in respect of us it would appeare, and so might be stiled exactly strait.

Now if it be thus in those which are generally granted to be præternaturall motions; wee need not doubt then the possibilitie of the like effect in that motion which wee conceive to be proper and naturall, both to the Earth, and the things that belong unto it.

There is yet another Objection to this purpose urged by * *Malapertius*, a late Iesuite, who though hee doe with much eagernesse presse this Argument concerning a Bullet or Stone, against the opinion of *Copernicus*; yet he grants that it might easily be resolved, if the defenders of it would affirme that the Aire did move round with the earth. But this (saith he) they dare not avouch; for then the Comets would always seem to stand stil, being carried about with the revolution of this aire, and then they could not rise or set, as experience shews they doe.

* *Austriaca Syder. par. 2. prop. 25.*

To this it may be answered, that most Comets are above that Sphære of Aire which is turned round with our Earth,

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as is manifeſt by their height. The motion that appeares in them, is cauſed by the revolution of our Earth, whereby we are turned from them.

As for thoſe which are within the Orbe of our Aire, theſe do ſeem to ſtand ſtill. Such a one was that mentioned by † *Ioſephus*, which did conſtantly hang over Ieruſalem; and that likewiſe which appeared about the time of *Agrippa's* death, and for many dayes together did hang over the City of Rome. Wherefore * *Seneca* do's well diſtinguiſh out of *Epigenes*, betwixt two ſorts of Comets, the one being low, and ſuch as ſeeme immovable, the other higher, and ſuch as did conſtantly obſerve their riſings and ſettings, as the Starres.

† *De bello Iudaico, lib. 7. cap. 12. Dion. lib. 54.*

* *Nat. Qu. lib. 7. cap. 6.*

I have done with all the Arguments of any note or difficultie, that are urged againſt this diurnall motion of the Earth. Many other cavils there are not worth the naming, which diſcover themſelves to be rather the Objections of a captious, than a doubtfull minde. Amongſt which, I might juſtly paſſe over thoſe that are ſet down by * *Alex. Roſſe.*

* *Lib. 1. ſect. 2. cap. 6.*

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Rosse. But becauſe this Author do's proceed in his whole diſcourſe with ſo much ſcorne and triumph, it will not be amiſſe therefore to examine what infallible evidence there is in thoſe Arguments upon which hee grounds his boaſtings.

We have in one chapter no leſſe than theſe nine.

Arg. 1. 1 If the Earth did move, then would it bee hotter than the Water, becauſe motion do's produce heate; and for this reaſon likewiſe, the Water would be ſo hot and rarified, that it could not bee congealed; ſince that alſo do's partake of the ſame motion with the Earth.

Arg. 2. 2 The Aire which is next the Earth, would be purer, as being rarified with motion.

Arg. 3. 3 If the Earth did move the Aire, it would cauſe ſome ſound, but this is no more audible than *Pythagoras* his Harmony of the Heavens.

Arg. 4. 4 'Twould have been in vaine for Nature to have endowed the Heavens with all conditions requiſite for motion, if they had been to ſtand ſtill: As

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first, they have a round Figure. Secondly, they have neither gravitie nor levity. Thirdly, they are incorruptible. Fourthly, they have no contrary.

Arg. 5. 5 All similarie parts are of the same nature with the whole: But each part of the Earth do's rest in it's place; therfore also doth the whole.

Arg. 6. 6 The Sun in the World is as the Heart in a mans Body: But the motion of the Heart ceasing, none of the members do stir; therefore also if the Sunne should stand still, the other parts of the World would be without motion.

Arg. 7. 7 The Sun and Heavens do worke upon these inferior Bodies by their light and motion. So the Moone do's operate upon the Sea.

Arg. 8. 8 The Earth is the Foundation of Buildings; and therefore must be firme and stable.

Arg. 9. 9 'Tis the constant opinion of Divines, that the Heavens shall rest after the day of Iudgement; which they prove from *Isa.* 60. 20. *Thy Sun shall no more goe downe, neither shall thy Moone withdraw it selfe.* So likewise *Rev.* 10. 6. The Angell sweares

sweares *that there shall be time no longer*; and therefore the Heavens must rest; since by their motion it is that time is measured. And S. *Paul* sayes, *Rom.* 8. 20. *That all the Creatures are made subject to vanity*. Now this can be no other in the Heavens, than the Vanitie of Motion, which the Wise man speaks of, *Eccles.* 1. 4. *The Sunne riseth, and the Sunne goeth downe*, &c. LIB. 2. *Cap.* 8.

To these it may be answered:

In the first you may note a manifest contradiction, when hee will have the Earth to bee hotter than the Water, by reason of this motion; when as notwithstanding he acknowledges the Water to move along with it; and therefore too in the next Line he infers that the Water, because of that heate and rare faction which it receives from this motion with the earth, must be incapable of so much cold as to be congealed into Ice. *Ad.* 1. & 2.

But unto that which may be conceived to bee his meaning in this and the next Argument: I answer, if he had fully understood this opinion which hee opposes, he would easily have apprehended

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that it could not be prejudiced by either of theſe conſequences. For we ſuppoſe that not only this Globe of Earth and Water, but alſo all the vaporous Aire which invirons it, are carried along by the ſame motion. And therfore, though what hee ſayes concerning the heate, which would bee produced by ſuch a motion, were true; yet it would not bee pertinent, ſince our Earth and Water, and the Aire next unto them, are not by this meanes ſevered from one another, and ſo doe not come within the compaſſe of this Argument.

If any reply, That this will notwithſtanding hold true concerning the upper part of the Aire, where there is ſuch a ſeparation of one body from another; and ſo conſequently, an anſwerable heate: I anſwer,

1 'Tis not generally granted, That motion in all kind of bodies do's produce heate; ſome reſtraine it onely to ſollid bodies: affirming, That in thoſe which are fluid, it is rather the cauſe of coldneſſe. This is the reaſon (ſay they) why running Waters are ever to our ſence

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sence the cooleſt: and why amongſt thoſe Winds which proceed from the ſame coaſts of Heaven, about the ſame time of the yeare, the ſtrongeſt alwaies is the coldeſt? If you object, that running Waters are not ſo ſoone frozen as others: They anſwer, this is not becauſe they are thereby heated; but becauſe unto congellation, it is requiſite that a Body ſhould ſettle and reſt, as well as be cold.

2 If wee ſhould grant a moderate heate in thoſe parts of the Aire, we have not any experiment to the contrary, nor would it prejudice the preſent opinion, or common Principles.

Ad. 3. As the ſound of this motion is not more heard than the Harmony of the Heavens: ſo neither is there any reaſon why this motion ſhould cauſe a ſound, more than the ſuppoſed motion of the Heavens, which is likewiſe thought to be continued unto the Aire hard by us.

Ad. 4. This will prove the Earth to move as well as the Heavens; For that ha's, firſt, a round Figure, as is generally granted. Secondly, being conſidered as whole,

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and in it's ptoper place, it is not heavy, as was proved before: and as for the two other conditions, neither are they true of the Heavens; nor if they were, would they at all conduce to their motion.

Ad.5. 1 This Argument would prove that the Sea did not ebbe and flow, becauſe there is not the ſame kind of motion in euery drop of Water: or that the whole Earth is not ſphæricall, becauſe every little piece of it is not of the ſame Forme.

Ad.6. This is rather an illuſtration than a proofe; or if it do prove any thing, it may ſerve as well for that purpoſe unto which it is afterward applyed, where the motion of every Planet is ſuppoſed to depend upon the revolution of the Sunne.

Ad.7. That the Sunne and Planets do work upon the Earth by their own reall daily motion, is the thing in queſtion; and therefore muſt not be taken for a common ground.

Ad.8. Wee grant that the Earth is firme and ſtable from all ſuch motions whereby it is jogged or uncertainly ſhaken.

1 For

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1 For the authoritie of those Divines, which hee urges for the interpretation of these Scriptures; this will be but a weake Argument against that opinion which is already granted to bee a Paradox.

2 The Scriptures themselves, in their right meaning, will not at all conduce to the present purpose.

As for that in *Isaiah*, if wee consult the cohærence, wee shall finde that the scope of the Prophet is to set forth the Glory of the Church triumphant. Wherein (hee sayes) there shall not bee any need of the Sunne or Moone, but Gods presence shall supply them both: *For the Lord shall be unto thee an everlasting Light, and thy God thy glory, ver.* the nineteenth, and as for this Sunne and Moone, it shall not goe downe, or withdraw it selfe: but hee shall bee an *everlasting Light* without intermission. So that 'tis evident hee speakes of that Light which shall hereafter bee, in stead of the Sunne and Moone.

Vid. Revel. 21.23. *item* c. 22. *ver.* 5.

As

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As for that in the *Revelations*, wee yeeld, that *time ſhall ceaſe*; but to ſay that this depends upon the ceſſation of the Heavens, is to beg the queſtion, and to ſuppoſe that which is to be proved, *viz.* that time is meaſured by the motion of the Heavens, & not of the Earth. **Perrerius* (from whom this laſt argument was borrowed without acknowledgement) might have told him in the very ſame place, that time do's not abſolutely, and univerſally depend upon the motion of the Heavens, *ſed in motu & ſucceſſione, cujuſlibet durationis*, but in any ſuch ſucceſſion, by which duration may be meaſured.

Gen. c. 1. l. 2. quæſt. 6.

As for that in the *Romans*, wee ſay, that there are other vanities to which the Heavenly Bodies are ſubject: As firſt, unto many changes and alterations, witneſſe thoſe Comets, which at ſeverall times have been diſcerned amongſt them; and then likewiſe to that generall corruption, in which all the creatures ſhall be involved at the laſt day. *When they ſhall paſſe away with a great noiſe, and the Elements ſhall melt with fervent heate.*

2. Pet. 3. 10, 12.

Thus

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Thus you see, there is not any such invincible strength in these arguments, as might cause the Author of them to triumph before hand with any great noise of victory.

Another Objection like unto these is taken from the Etymologie of severall words. Thus the Heavens are called *Æthera, ab ἀεὶ θεῖν* because they are alwaies in motion, and the Earth *Vesta, quia vi stat*, because of it's immobilitie.

To which I answer: 'Twere no difficult matter to finde such proofes for this opinion, as well as against it.

Thus wee may see that the Hebrew word ארץ is derived from רוץ *quia currit*; and *Terra, non quod terratur, sed quod perenni cursu omnia terat*, saith *Calcagnius*. However, though wee suppose the Etymology to be never so true and genuine; yet it can at the best but shew what the more common opinion was of those times when such names were first imposed.

Ob.

But suppose all this were so, That the Earth had such a diurnalll revolution;

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Sol.

tion ; yet how is it conceivable that it ſhould at the ſame time have two diſtinct motions.

I anſwer : This may eaſily bee apprehended, if you conſider how both theſe motions doe tend the ſame way from Weſt to Eaſt. Thus a Bowle being turned out of the hand, ha's two motions in the Aire ; one, whereby it is carried round ; the other, whereby it is caſt forward.

From what hath been delivered in this Chapter, the indifferent Reader may gather ſome ſatisfaction for thoſe Arguments which are uſually urged againſt this diurnall motion of the Earth.

Prop.

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PROP. IX.

That it is more probable the Earth do's move, than the Sun or Heavens.

AMongst those many Arguments that may bee urged for the confirmation of this truth, I shall set down only these five.

1 If we suppose the Earth to be the cause of this motion, then will those vast and glorious Bodies of the Heavens be freed from that inconceivable, unnaturall swiftnes, which must otherwise bee attributed unto them.

For if the diurnall revolution be in the Heavens, then it will follow according to the common *Hypothesis*, that each Starre in the *Equator* must in every houre move at the least 4529538 Germane miles. So that according to

Vid. Mæst. Epit. Astr. lib. 1. in fine.

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to the obſervation of * *Cardan*, who tels us, that the pulſe of a well tempered man do's beat 4000 times in an houre; one of theſe Starres in that ſpace, whilſt the pulſe beats once, muſt paſſe 1132 Germane miles (ſaith *Alphraganus:*) Or according to *Tycho* 732 Germane miles. But theſe numbers ſeem to be ſomwhat of the leaſt; and therefore many others doe much inlarge them, affirming that every Starre in the *Equator*, in one beating of the pulſe, moſt move 2528 of theſe miles.

* *De Prop. l. 5. prop. 58.*

'Tis the aſſertion of † *Clavius*, that though the diſtance of the Orbs, and ſo conſequently their ſwiftneſſe, ſeeme to be altogether incredible; yet it is rather farre greater in it ſelf, than Aſtronomers uſually ſuppoſe it; & yet (ſaith he) according to the common grounds, every ſtar in the *Equator*, muſt move 42398437 ½ miles in an houre. And though a man ſhould conſtantly travel 40 miles a day; yet he would not be able to goe ſo far as a Star do's in one houre, under 2904 yeares: Or if wee will ſuppoſe an Arrow to bee of the ſame ſwiftneſſe, then muſt

† *Comment. in prim cap. Sphæræ.*

it

it compaſſe this great Globe of Earth and Water 1884 times in an hour. And a Bird that could but fly as faſt, might go round the World ſeven times in that ſpace, whileſt one could ſay, *Ave Maria, gratia plena, Dominus tecum.*

Which though it be a pretty round pace; yet you muſt conceive that all this is ſpoken onely of the eighth Sphære, and ſo being compared to the ſwiftneſſe of the *primum mobile*, is but a ſlow and heavy motion.

For (ſaith the ſame author) the thickneſſe of each Orbe is equall to the diſtance of it's concave ſuperficies from the centre of the Earth. Thus the Orbe of the Moone do's containe as much ſpace in it's thickneſſe, as there is betwixt the neereſt parts of that and the centre. Thus alſo the eighth Sphære is as thicke as that whole ſpace betwixt the centre of the Earth, and it's owne concave ſuperficies. So likewiſe muſt it be in thoſe three other Orbes, which he ſuppoſes to bee above the Starry Heaven. Now if we proportion their ſwiftneſſe according to this difference in their

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their bigneſſe, you may then conceive (if you can) what a kinde of celeritie that muſt be, by which the *primum mobile* wil be whirled about.

Tycho makes the diſtance of the Stars to bee much leſſe, and their motion ſlower; and yet hee is faine to confeſſe, that it is *omni cogitatione celerior*.

Clavius likewiſe ſpeaking concerning the ſwiftneſſe of the Starry Orbe, do's acknowledge, *Quod velocitas ejus captum humani ingenij excedit*. What then could he thinke of the *primum mobile*?

De magnete, lib. 6. cap. 3.

Dr *Gilbert* being (it ſeems) aſtoniſhed at the conſideration of this ſtrange ſwiftneſſe, ſayes of it, that it is *motus ſupra omnes cogitationes, ſomnia, fabulas & licentias poeticas inſuperabilis, ineffabilis, incomprehenſibilis*. A man may more eaſily conceive the poſſibilitie of any Fable or Fiction how Beaſts and Trees might talke together, than how any materiall Body ſhould bee moved with ſuch a ſwiftneſſe.

Not but that 'tis poſſible for God to turne them about with a farre greater velocitie. Nay 'tis poſſible for Art to con-

contrive a motion, which shall be equally slow in that proportion as this is swift. But however, the question here, is not what can bee done, but what is most likely to be don according to the usuall course of Nature. 'Tis the part of a Philosopher, in the resolution of naturall events, not to fly unto the absolute Power of God, and tell us what he can doe; but what according to the usuall way of Providence, is most likely to be done, to find out such causes of things, as may seem most easy & probable to our reason.

If you ask what repugnancy there is in the Heavens, unto so great a swiftnes: we answer, Their being such vast, materiall condensed substances, with which this inconceivable motion cannot agree.

Since Motion and Magnitude are two such Geometricall things, as beare a mutuall proportion to one another; therefore it may seeme convenient, that slowneſſe should be more agreeable to a great Body, and swiftnes to a lesser: and so it would bee more consonant to the Principles of Nature, that the Earth, which is of a lesser quantitie, should be

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appointed to such a motion as is somewhat proportionable to it's bignes, than that the Heavens that are of such a vast magnitude, should bee whirled about with such an incredible swiftnes, which do's as farre exceed the proportion of their bigneſſe, as their bigneſſe do's exceed this Earth, that is but as a point or centre to them. 'Tis not likely that nature in theſe constant and great workes, should so much deviate from that usual harmony and proportion which she observes in lesser matters. If this Globe of Earth onely were appointed to move every day round the Orbe of the fixed Starres, though it be but a little Body, and so more capable of a swift motion; yet that swiftneſſe would be so exttemely disproportionable unto it, that wee could not with reason conceive it possible, according to the usuall course of nature. But now that the Heavens themselves, of such strange bigneſſe, with so many Starres, which do so farre exceed the magnitude of our Earth, should bee able to turne about with the same celeritie: Oh 'tis altogerher be-

beyond the fancy of a Poet or a mad man.

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For answer unto this Argument, our adversaries tell us, that there is not in the Heavens any repugnancie to so swift a motion; and that whether wee consider the nature of those Bodies, or secondly, the swiftnesse of this motion.

1 For the nature of those Bodies, either their { *Qualities.* / *Quantity.*

1 There is not in them the Qualities of lightnesse or heavinesse, or any the least contrarietie that may make them reluctant to one another.

2 Their magnitude will helpe them in their swiftnesse: For the greater any body is, the quicker will it be in it's motion, and that not onely when it is moved by an inward Principle, as a milstone will descend faster than a little pibble; but also when it's motion do's proceed from some externall Agent, as the Winde will drive a great Cloud, or a heavy Ship, when it is not able to stir a little Stone. *Rossi. lib.* 1. *sect.* 1. *ca.* 1.

2 As for the swiftnesse of this motion, the possibilitie of it may be illu-

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ſtrated by other particulars in Nature: As,

1 The ſound of a Cannon, in a little time is carried for twenty miles diſtance.

2 Though a Starre bee ſcituated ſo remotely from us; yet the Eye diſcerns it in a moment, which is not without ſome motion, either of the Species of the Starre, or the Rayes of the Eye. Thus alſo the Light do's in an inſtant paſſe from one ſide of the Heaven to another.

Idem lib. 2. ſect. 1. ca. 5.

Idem lib. 1. ſect. 1. cap. 2.

3 If the force of Pouder be able to carry a Bullet with ſo great a ſwiftneſſe, we need not doubt then, but that the Heavens are capable of ſuch a celeritie, as is uſually attributed unto them.

Vnto theſe it may be anſwered:

1 Where they ſay that the heavenly Bodies are without all gravitie, wee grant it, in the ſame ſence as our Earth alſo, being conſidered as whole, and in it's proper place, may bee denied to bee heavy: ſince this qualitie in the exacteſt ſence, can onely bee aſcribed unto ſuch parts as are ſevered from the whole to

which

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which they belong. But however, since the Heavens or Stars are of a materiall substance, 'tis impossible but there should bee in them some ineptitude to motion; because matter is of it selfe a dull and sluggish thing; and by so much the more, as it is kept close and condensed together. And though the followers of *Ptolomey* doe with much confidence deny the Heavens to be capable of any reluctancie to motion; yet it were easie to prove the contrary out of their owne Principles. 'Tis not conceivable, how the upper Sphære should move the nether, unlesse their Superficies were full of rugged parts (which they deny:) or else one of the Orbes must leane upon the other with it's weight, and so make it partake of it's owne motion. And besides, they tell us, that the farther any Sphære is distant from the *primum mobile*, the lesse is it hindered by that in it's proper course, and the sooner do's it finish it's owne revolution. From whence it will easily follow, that these Bodies have resistency from one another.

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I have often wondred, why amongst the inchanted Buildings of the Poets, they have not fained any Castle to bee made of the same materials with the sollid Orbs, since in such a fabrick there would have been these eminent conveniences.

1 It must needs be very pleasant, by reason of it's perspicuitie, because it is more diaphanous than the Aire it selfe, and so the Walls of it could not hinder the prospect any way.

2 Being so solid and impenitrable, it must needs be excellent against al violence of weathers, as also against the assaults of the enemy, who should not be able to breake it with the most furious batteries of the Ram, or pierce it with any Cannon shot.

3 Being void of all heavinesse, a man may carry it up and downe with him, as a Snaile do's his House: and so whether hee follow the enemy, or fly from him, hee ha's still this advantage, that he may take his castle and defence along with him.

But then againe, there are on the other

other ſide as many inconveniences. For,

1 It's perſpicuitie would make it ſo open, that a man ſhould not bee able to retire himſelfe into any private part of it. And then,

2 Being ſo extremely ſollid, as wel as inviſible, a man ſhould be ſtil in danger of knocking his head againſt every Wall and Pillar; unleſſe it were alſo intangible, as ſome of the *Peripatetickes* affirme.

3 It's being without all gravitie, would bring this inconvenience, that every little puffe of wind would blow it up and downe; ſince ſome of the ſame ſect are not aſhamed to ſay, that the Heavens are ſo utterly devoid of heavineſſe, that if but a little Fly ſhould juſtle againſt the vaſt frame of the Cœleſtiall Sphæres, hee would move them out of their places.

A ſtrong fancy, that could bee at leiſure, might might make excellent ſport with this Aſtronomicall fiction.

So that this firſt evaſion of our Adverſaries, will not ſhelter them from the

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force of that Argument, which is taken from the incredible swiftnes of the Heavens.

2 Whereas they tell us in the second place, that a bigger Body, as a Milstone, will naturally descend swifter than a lesse, as a Pibble. I answer: This is not because such a great Body is in it selfe more easily movable; but because the bigger any thing is which is out of it's owne place, the stronger will bee it's naturall desire of returning thither, and so consequently, the quicker it's motion. But now those Bodies that move circularly, are alwayes in their proper scituations, and so the same reason is not applyable unto them. And then, whereas 'tis said that Magnitude do's alwayes adde to the swiftnesse of a violent motion (as Winde will move a great Shippe sooner than a little Stone:) Wee answer, This is not because a Shippe is more easily movable in it selfe than a little Stone: For I suppose the Objector will not thinke hee can throw the one as farre as the other; but because these little Bodies

Bodies are not so liable to that kinde of violence from whence their motion do's proceed. LIB. 2. *Cap. 9.*

As for those instances which are cited to illustrate the possibilitie of this swiftnesse in the Heavens, wee answer: The passage of a sound is but very slow in comparison to the motion of the Heavens. And then besides, the swiftnesse of the Species of sound or sight, which are accidents, are not fit to infer the like celeritie in a materiall substance: and so likewise for the Light which * *Aristotle* himselfe, and with him the generalitie of Philosophers, doe for this very reason prove not to bee a Body, because it moves with such swiftnesse, of which (it seemes) they thought a Body to bee incapable. Nay, the † Objector himselfe in another place, speaking of Light in reference to a substance, do's say: *Lumen est accidens, sic species rei visæ, & alia est ratio substantiarum, alia accidentium.*

* *De Animâ. lib. 2. cap. 7.*

† *Ross. lib. 2. sect. 1. ca. 4.*

To that of a Bullet, wee answer: Hee might as well have illustrated the swift-

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swiftnes of a bullet, which wil passe 4 or 5 miles in 2 minutes, by the motion of a hand in a Watch, which passes 2 or 3 inches in 12 houres; there being a greater disproportion betwixt the motion of the heavens, and the swiftnes of a Bullet, than there is 'twixt the swiftnes of a bullet, and the motion of a hand in a watch.

Arg. 2. Another Argument to this purpose may be taken from the chiefe end of the Diurnall and Annuall motions, which is to distinguish betwixt Night and Day, Winter and Summer; and so consequently, to serve for the commodities and seasons of the habitable World. Wherfore it may seeme more agreeable to the Wisedome of Providence, for to make the Earth as well the efficient, as the finall cause of this motion: Especially since nature in her other operations do's never use any tedious difficult means to performe that which may as well bee accomplished by shorter and easier wayes. But now, the appearances would be the same, in respect of us, if only this little point of Earth were made the subject of these motions, as if the

the vaſt Frame of the World, with all thoſe Stars of ſuch number and bignes were moved about it. 'Tis a common Maxime, Μήδεν εἰκῇ τὴν φύσιν ἐργάζεσθαι. Nature do's nothing in vaine, but in all her courſes do's take the moſt compendious way. 'Tis not therefore (I ſay) likely, that the whole Fabricke of the Heavens, which do ſo much exceed our Earth in magnitude and perfection, ſhould bee put to undergoe ſo great and conſtant a Worke in the ſervice of our Earth, which might more eaſily ſave all that labour by the circumvolution of it's owne Body; eſpecially, ſince the Heavens doe not by this motion attaine any farther perfection for themſelves, but are made thus ſerviceable to this little Ball of Earth. So that in this caſe it may ſeeme to argue as much improvidence in nature to imploy them in this motion, as it would in a * Mother, who in warming her Childe, would rather turne the fire about that, than that about the fire: Or in a † Cook, who would not roſt his Meat by turning it about to the fire; but rather, by turning the fire about it:

LIB. 2. *Cap.* 9. *Galen.*

* *Lanſberg.*

† *Keplar.*

That the Earth

Cap. 9.
* Galilæus.

it: * Or in a man, who aſcending ſome high Tower, to ſave the labour of ſtirring his head, ſhould rather deſire that all the Regions might ſucceſſively bee turned before his eye, that ſo hee might eaſily take a view of them.

Wee allow every Watch-maker ſo much wiſdome as not to put any motion in his Inſtrument, which is ſuperfluous, or may bee ſupplied an eaſier way: and ſhall wee not thinke that Nature ha's as much providence as every ordinary Mechanicke? Or can wee imagine that She ſhould appoint thoſe numerous and vaſt Bodies, the Stars, to compaſſe us with ſuch a ſwift and reſtleſſe motion, ſo full of confuſion and uncertainties, when as all this might as well be done by the revolution of this little Ball of Earth?

Arg. 3.

Amongſt the ſeverall parts of the World, there are ſix Planets which are generally granted to move. As for the Sun and the Earth, and the fixed Starres, it is yet in queſtion, which of them are naturally indowed with the ſame condition. Now common reaſon will dictate

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ctate unto us, that motion which is moſt agreeable to that which in kind and properties is moſt neer to thoſe Bodies that undoubtedly are moved. But now there is one eminent qualification, wherin the Earth do's agree with the Planets; whereas the Sun, together with the fixed ſtars, do in the ſame reſpect differ from them: and that is Light, which all the Planets and ſo too the Earth, are fain to borrow elſwhere, whileſt the Sun and the Stars have it of their owne. From whence it may bee probably concluded, that the Earth is rather the ſubject of this motion than the other. To this it may be added, that the Sun and Stars ſeem to be of a more excellent Nature than the other parts of the World; and therfore ſhould in reaſon be indowed with the beſt qualifications. But now motion is not ſo noble a condition as reſt. That is but a kind of weariſome and ſervile thing; wheras, this is uſually aſcribed to God himſelf: Of whom 'tis ſaid:

* *Immotus ſtabiliſq; manens dans cuncta moveri.*

† *Ariſtotle* tells us, 'tis very agreeable to reaſon that the time appointed for

* *Boet. de Conſol. Phil. lib. 3. Arg. 4.*

† *De Cœlo, li. 2. cap. 10.*

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for the revolution of each Orbe, should be proportionable to it's bigneſſe. But now this can onely be by making the Earth a Planet, and the subiect of the annuall and diurnall motions. Wherefore 'tis probable, that this do's rather move than the Heavens.

According to the common *Hypothesis*, the *primum mobile* will move round in a day. *Saturne* in thirty yeares. *Iupiter* in twelve. *Mars* in two. The *Sunne*, *Venus*, and *Mercury*, which have severall Orbes, yet will agree in their revolutions, being each of them about a yeare in finishing their courses: Whereas by making the Earth a Planet, there will be a just proportion betwixt the bigneſſe of the Orbes, and the time of their motions: For then, next to the Sunne or Centre, there will be the Sphære of *Mercury*; which as it is but narrow in it's diameter, so likewise is it quick in it's motion, running it's course in eighty eight days. *Venus*, that is next unto it, in 224 dayes. The Earth in 365 daies, or a yeare. *Mars*, in 687 dayes. *Iupiter* in 4332 dayes. *Saturne*, in 10759 dayes. Thus likewise is

it

it with those *Medicean* Starres that encompasse *Iupiter*. That which is lowest amongst them, finishes his course in two and twenty houres; the next in three dayes and a half; the third, in seven dayes; and the farthest in seventeen days. Now as it is (according to *Aristotles* confession) more likely that Nature should observe such a due proportion betwixt the Heavenly Orbes: so is it more probable, that the Earth should move, rather than the Heavens.

Arg. 5. This may likewise be confirmed from the appearance of Comets: Concerning which, there are three things commonly granted, or if they were not, might be easily proved: namely,

1 That there are divers Comets in the Aire, betwixt the Moone and our Earth.

2 That many of these Comets do seeme to rise and set as the Stars.

3 That this appearing motion is not properly their owne, but communicated unto them from somewhat else.

But now, this motion of theirs cannot be caused by the Heavens; and therefore it

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it must necessarily proceed from the revolution of our Earth.

That the Moones Orbe cannot carry along with it the greater part of the aire wherein these Comets are placed, might easily be proved from the common grounds. For the concave Superficies of that Sphære is usually supposed to bee exactly terse and smooth; so that the meer touch of it cannot turne about the whole Element of Fire, with a motion that is not naturall unto it. Nor could this Elementarie Fire which they imagine to be of a more rarified and subtle Nature, communicate the same motion to the thicker Aire, and that to the waters (as some affirme:) For by what meanes could that smooth Orbe take hold of the adjoyning Aire. To this *Sarsius* answers, that there are great gibbosities, and mountainous inequalities, in the concavitie of the lowest Sphære, and by these is it inabled to carry along with it the Fire and Aire. But * *Fromondus* tels him, *Fictitia ista & ad fugam reperta sunt*. And yet his owne Conjecture is scarse so good, when hee affirmes,

* *Antarist. cap. 6.*

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affirmes, that this motion of the æthe-riall Aire, as alſo of that elementary Aire hard by us, is cauſed by that ruggedneſſe which there is in the Bodies of the Planets; of which opinion wee may with as good reaſon ſay as hee ſayes to *Sarſius: Fictitia iſta, & ad fugam reperta*; Theſe things are meere fictions invented for ſhifts, and without any probable ground.

But now this appearance of the Comets may eaſily be reſolved, if wee ſuppoſe the earth to move. For then, though they did ſtill remaine in their wonted places; yet this, by it's diurnall revolution ſucceſſively with drawing it ſelf from them, they wil appear to riſe & ſet. And therefore, according to this common naturall experiment, it is more probable that the Earth ſhould move, than the Heavens.

Another Argument urged by ſome, to prove that this Globe of Earth is eaſily movable, is taken from the opinion of thoſe who affirme that the acceſſe of any weight unto a new place: as ſuppoſe an army do's make the Earth poiſe

Vid. Vaſq. lib. 1. diſt. 2. cap. 816.

it selfe afresh, and change the centre of gravitie that it had before: but this is not generally granted; and therefore not to bee insisted on as a common ground.

To this purpose likewise is that inference of *Lansbergius*, who from *Archimedes* his saying, that hee could move the Earth, if he knew where to stand and fasten his instrument; concludes, that the Earth is easily movable; whereas 'twas the intent of *Archimedes* in that speech, to shew the infinit power of Engines: there being no weight so great, but that an instrument might be invented to move it.

Before we finish this Chapter, tis requisite that we enquire what kind of faculties that is from which these motions that *Copernicus* ascribes unto the Earth, do's proceed. Whether or no it be some Animall Power, that do's assist (as *Aristotle*) or informe (as *Keplar* thinks) or else some other naturall motive qualitie which is intrinsicall unto it.

Wee may observe, That when the proper genuine cause of any motion is not

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not obvious, men are very prone to attribute unto that which they discerne to be the most frequent Originall of it in other things, Life. Thus the *Stoicks* affirme, the Soule of the Water to bee the cause of the ebbing and flowing of the Sea. Thus others thinke the Winde to proceed from the Life of the Aire, whereby it is able to move it selfe severall waies, as other living creatures. And upon the same grounds doe the *Platonicks*, *Stoicks*, and some of the *Peripateticks*, affirme the Heavens to bee animated. From hence likewise it is, that so many do maintaine *Aristotle* his opinion concerning *Intelligences*: which some of his followers, the Schoole-men, doe confirme out of Scripture. From that place in *Mat.* 24. 29. where 'tis said, *The Powers of the Heaven shall bee shaken.* In which words, by *Powers* (say they) are meant the Angels, by whose power it is, that the Heavens are moved. And so likewise in that, *Iob*, 9. 13. Where the vulgar ha's it, *Sub quo curvantur, qui portant orbem*; that is, the Intelligences. Which Text, might serve altogether as

Senec: Nat. Qu. lib. 5. cap. 5, 6.

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well to prove the Fable of *Atlas* and *Hercules*. Thus *Cajetan* concludes from that place in the *Psalme*, 136.5. Where 'tis said, *God by wisdome made the heavens:* or according to the vulgar, *Qui fecit Cœlos intellectu*, That the Heavens are moved by an intelligent Soule.

If wee consider the originall of this opinion, we shall find it to proceed from that mistake of *Aristotle*, who thought the Heavens to be Eternall; and therefore to require such a moving cause, as being of an immateriall Substance, might be exempted from all that wearinesse and inconstancie, which other things are liable unto.

But now this ground of his is evidently false, since 'tis certain, That the Heavens had a beginning, and shall have an end. However, the imploying of Angels in these motions of the World, is both superfluous, and very improbable.

1 Because a naturall Power, intrinsicall to those Bodies, will serve the turne as well. And as for other operations, which are to bee constant and regular, Nature do's commonly make

make use of some inwarde Principle.

2 The Intelligences being immateriall, cannot immediatly worke upon a Body. Nor do's any one tell us what Instruments they should make use of in this businesse. They have not any hands to take hold of the Heavens, or turne them about. And that opinion of *Aquinas, Durand, Soncinas,* with other Schoolmen, seemes to bee without all reason; who make the faculty, whereby the Angels move the Orbs, to be the very same with their Vnderstandings and Will: So that if an Angell doe but meerely suspend the Act of willing their Motion, they must necessarily stand still; and on the contrary, his only willing them to move, shall bee enough to carry them about in their severall courses. Since it were then a needlesse thing for Providence to have appointed Angels unto this businesse, which might have been done as well by the only Will of God. And besides, how are the Orbes capable of perceiving this Will in the Intelligences? Or if they were, yet what mo-

tive Facultie have they of themſelves, which can inable them to obey it?

Now as it would bee with the Heavens: ſo likewiſe is it with the Earth, which may bee turned about in it's diurnall revolution, without the helpe of Intelligences, by ſome motive Power of it's owne, that may be intrinſicall unto it.

If it be yet enquired, what cauſe there is of it's annuall motion: I anſwer, 'Tis eaſily conceivable, how the ſame Principle may ſerve for both theſe, ſince they tend the ſame way from Weſt to Eaſt.

However, that opinion of *Keplar* is not very improbable, That all the Primary Planets are moved round by the Sunne, which once in twenty five, or twenty ſix dayes, do's obſerve a revolution about it's owne Axis, and ſo carry along the Planets that encompaſſe it; which Planets are therefore ſlower or ſwifter, according to their diſtances from him. If you aske by what means the Sunne can produce ſuch a motion?

He anſwers: By ſending forth a kind of

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of Magneticke Vertue in ſtrait Lines, from each part of it's Body; of which there is alwaies a conſtant ſucceſſion: ſo that as ſoone as one beame of this vigor ha's paſſed a Planet, there is another preſently takes hold of it, like the teeth of a Wheele.

But how can any vertue hold out to ſuch a diſtance?

He anſwers: Firſt, as light and heate, together with thoſe other ſecret influences, which work upon Minerals in the Bowels of the Earth: ſo likewiſe may the Sunne ſend forth a magneticke, motive vertue, whoſe power may bee continued to the fartheſt Planets. Secondly, if the Moone, according to common Philoſophy may move the Sea, why then may not the Sun move this Globe of Earth?

In ſuch *Quære's* as theſe, wee can conclude only from conjectures that ſpeech of the wiſe man, *Eccl.* 3. 11. being more eſpecially verified of *Aſtronomicall* queſtions, concerning the Frame of the whole *Vniverſe, That no man can finde out the Works of God, from the beginning to the*

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end. Though wee may discerne diverse things in the World, which may argue the infinite Wisedome and Power of the Author; yet there will bee alwaies some particulars left for our dispute and enquiry, and we shall never bee able with all our industry, to attaine a perfect comprehension of the creatures, or to find them wholly out, *from the beginning to the end.*

Valles. Sacr. Philos. c. 64.

The Providence of God having thus contrived it, that so man might look for another Life after this, when all his longing and thirst shall be fully satisfied. For since no naturall appetite is in vain, it must necessarily follow, that there is a possibilitie of attaining so much knowledge as shall bee commensurate unto these desires, which because it is not to be had in this World, it will behove us then to expect and provide for another.

Prop.

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PROP. X.

That this Hypothesis is exactly agreeable to common appearances.

IT hath been already proved, that the Earth is capable of such a scituation and motion, as this opinion supposes it to have. It remaines, that in the last place we shew how agreeable this would bee unto those ordinary seasons of Dayes, Moneths, Yeres, and all other appearances in the Heavens.

1 As for the difference betwixt days and nights: 'tis evident, That this may be caused as well by the revolution of the Earth, as the motion of the Sunne; since the Heavenly Bodies must needs seeme after the same manner to rise and set, whether or no they themselves by their owne motion do passe by our *Horizon* and *Verticall* point; or whether our *Horizon* and *Verticall* point, by the revolution

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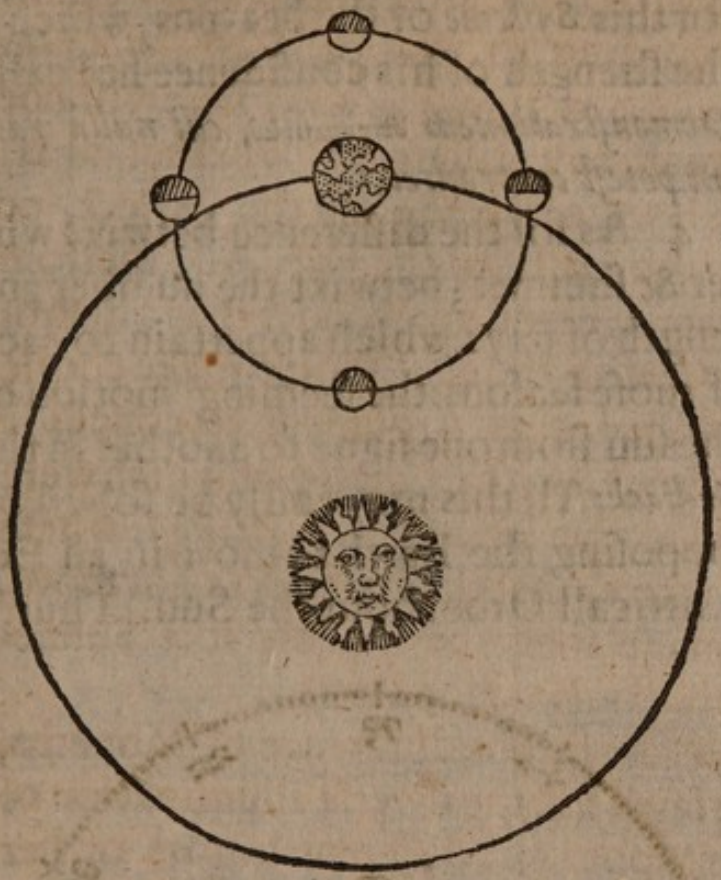
* De Cœlo, lib. 2. cap. 8.

lution of our Earth, doe passe by them. According to that of * *Aristotle*, οὐδὲν διαφέρει κινεῖν τὴν ὄψιν ἢ τὸ ὁρώμενον. There will not appeare any difference, whether or no the Eye be moved from the Object, or the Object from the Eye. And therfore I cannot chuse but wonder that a man of any reason or sence should make choise of no better an Argument to conclude his booke withall, than that which were read at the later end of *Al. Ross.* where he infers, that the Earth do's not move, because then the shadow in a Sunne-diall would not be altered.

2 As for the difference of Moneths, we say, That the diverse illumination of the Moone, the different bignes of her Body, her remaining for a longer or shorter time in the earth's shadow, when she is eclipsed, &c. may well enough be solved by supposing her to move above our Earth, in an Eccentricall Epicycle. Thus,

In



In which kinde of *Hypotheſis* there will bee a double difference of motion. The one cauſed by the different ſcituation of the Moones Body in it's owne Eccentricke. The other by the different ſcituation of the Moons Orbe in the Earth's Eccentricke: which is ſo exactly anſwerable to the motions and appearances of this Planet, that from hence *Lansbergius* drawes an Argument for

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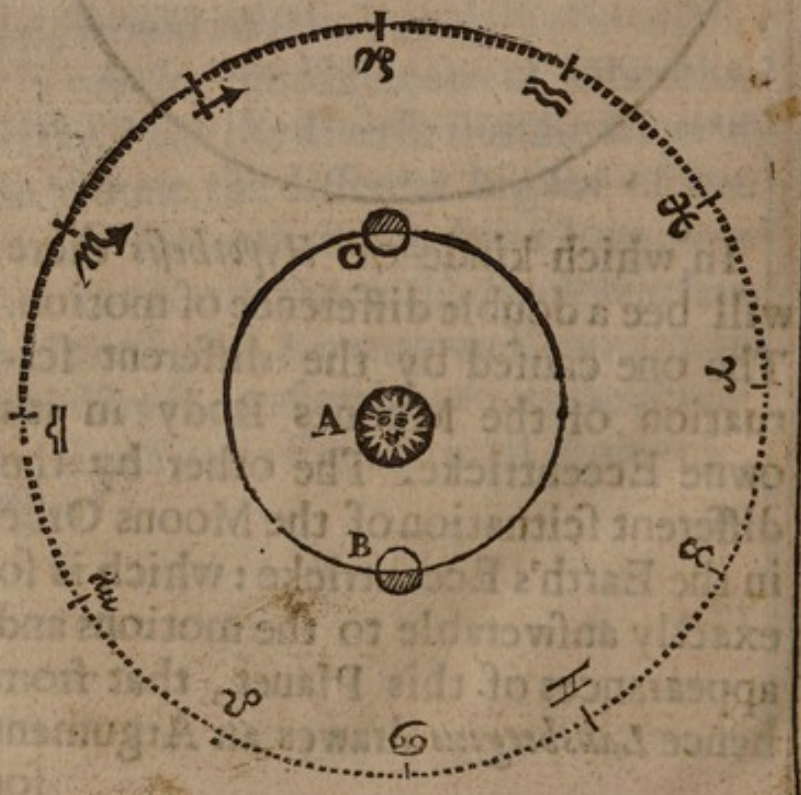
for this *Syſteme* of the heavens, which in the ſtrength of his confidence hee calls, *Demonſtrationem* ἀπαραμυθητον, *cui nullâ ratione poteſt contradici.*

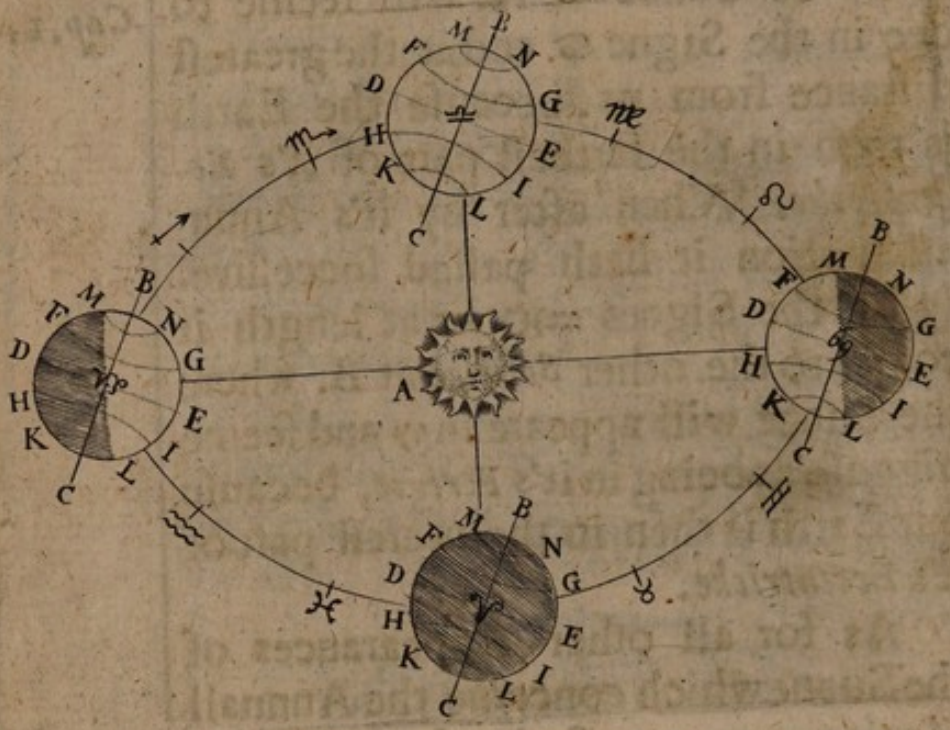
4 As for the difference betwixt winter & ſummer; betwixt the number and length of days, which appertain to each of thoſe ſeaſons: the ſeeming motion of the ſun from one ſigne to another in the *Zodiack:* All this may eaſily be ſolved, by ſuppoſing the Earth to move in an Eccentricall Orbe about the Sun. Thus;



Suppoſe the Earth to bee at C. then the Sunne at A. will ſeeme to bee in the Signe ♋ and at the greateſt diſtance from us, becauſe the Earth is then in the fartheſt part of it's *Eccentricke*. When after by it's Annuall motion it hath paſſed ſucceſſively by the Signes ♌♍♎ at length it comes to the other *Solſtice* at B. where the Sunne will appeare in ♑ and ſeeme biggeſt, as being in it's *Perigie*, becauſe our Earth is then in the neereſt part of it's *Eccentricke*.

As for all other Appearances of the Sunne which concerne the Annuall Motion, you may ſee by the following Figure, that they are exactly agreeable to this *Hypotheſis*.

Where



Where you have the Earth described about the Sunne at A. in the foure chief points of the *Zodiacke*; namely, the two *Equinoctials* at ♈ and ♎ and the *Solstices* at ♑ and ♋. Through all which points the Earth do's passe in his Annuall Motion from West to East.

The *Axis* upon which our Earth do's move, is represented by the Line B.C. which *Axis* do's alwaies decline from that of the *Eclipticke*, about 23 degrees, thirty

thirty minutes. The Points B.C. are imagined to be the Poles, B. the North Pole, and C. the South.

Now if we suppose this Earth to turn about its owne *Axis*, by a diurnall motion, then every Point of it will describe a paralell Circle, which will be either bigger or lesser, according to it's distance from the Poles. The chiefe of them are the *Equinoctiall* D.E. The two *Tropicks*, F.G. and H.I. The two *Polar* Circles M.N. the *Arcticke*, and K.L. the *Antarcticke*: of which, the *Equinoctiall* only is a great Circle, and therefore will alwaies be equally divided by the Line of Illumination M.L. wheras the other paralels are thereby distributed into unequal parts. Amongst which parts, the diurnall Arches of those that are towards B. the North Pole, are bigger than the Nocturnall, when our Earth is in ♈ and the Sunne appeares in ♋ Insomuch, that the whole *Arcticke* Circle is enlightened, and there is day for halfe a yeare together under that Pole.

Now when the Earth proceeds to the

the other *Solstice* at ♋ and the Sunne appeares in ♑ then that *Hemisphere* must be involved in darkneſſe, which did before partake of Light. And thoſe paralels towards the North & South Poles will ſtill bee divided by the ſame inequalitie. But thoſe bigger parts which were before enlightened, will now bee darkened, *& vice verſa*. As when the Earth was in N. the *Arcticke* Circle M.N. was wholly enlightned, and the *Antarcticke*, K.L. altogether in the dark. So now, when it is in A. the *Antarcticke*, K.L. will be wholly in the Light, and the other M. N. altogether obſcured. Whereas the Sun before was verticall to the inhabitants at the *Tropick* F.G. So now is he in the ſame ſcituation to thoſe that live under the other *Tropicke*, H.I. And whereas before the Pole did incline twenty three degrees thirty minutes towards the Sunne, ſo now do's it recline as much from him. The whole difference will amount to 47 degrees, which is the diſtance of one *Tropicke* from the other.

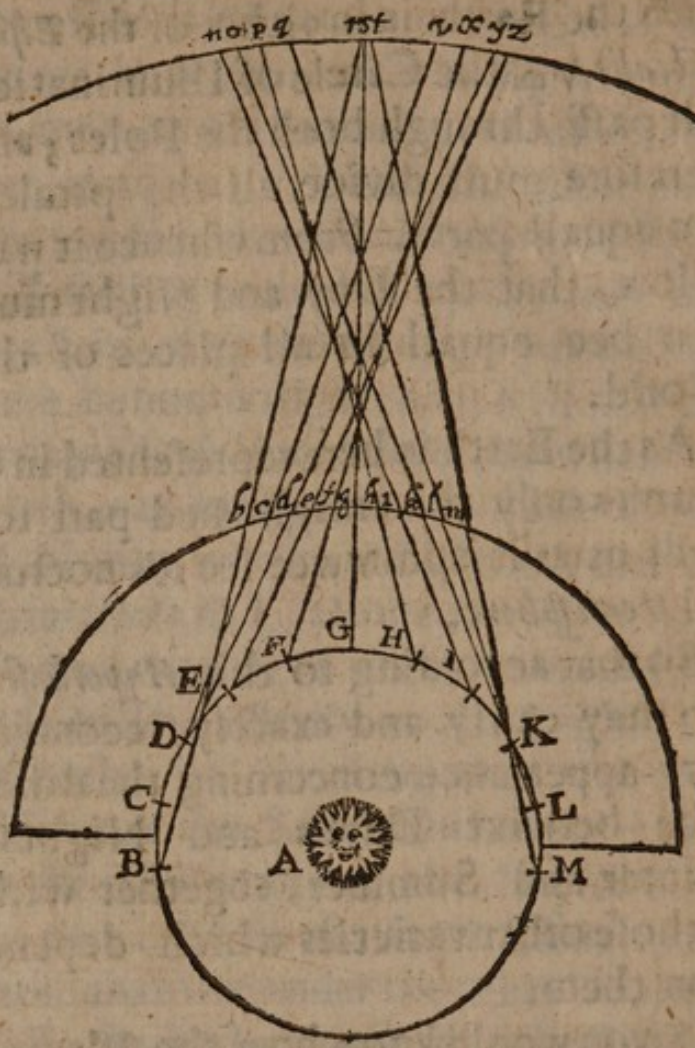
But now in the two other Figures, when

when the Earth is in either of the *Equinoctialls* ♈ ♎ the Circle of Illumination will passe through both the Poles; and therefore must divide all the paralels into equall parts. From whence it will follow, that the Day and Night must then bee equall in all places of the World.

As the Earth is here represented in ♎ it turnes only the enlightened part towards us: as it is in ♈ wee see it's nocturnall *Hemisphere*.

So that according to this *Hypothesis*, wee may easily and exactly reconcile every appearance concerning the difference betwixt Dayes and Nights, Winter and Summer, together with all those other varieties which depend upon them.

If you would know how the Planets (according to the *Systeme* of the Heavens) will appeare *Direct*, *Stationarie*, *Retrograde*; and yet still move regularly about their owne Centers, you may plainely discerne it by this following *Diagram*.



Where suppose the Sun to be at A. the Circle (B.G.M.) to be the Orbe of the Earth's motion, and that above it noted with the same Letters, to bee the Sphære of *Iupiter*; and the uppermost of all, to bee a part of the *Zodiacke* in the Starry Heaven.

Now

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Now if you conceive the Letters, B C D E F G H I K L M, and b c d e f g h i k l m, to divide the Earth's Orb, and that of *Iupiter*, into ſeverall parts, proportionable to the ſlowneſſe or ſwiftnes of their different motions (*Iupiter* finiſhing his courſe in twelve yeres, and the Earth in one) then ſuppoſing the Earth to be at the point (B.) and *Iupiter* likewiſe in his Orbe to bee ſcituated at (b) hee will appeare unto us to be in the *Zodiacke* at the point (r.) But afterwards, both of them moving forward to the Letter (C c.) *Iupiter* will ſeeme to be in the *Zodiacke* at (v) as having paſſed directly forward according to the order of the Signes. And ſo likewiſe each of them being transferred to the places (D d.) (E e.) *Iupiter* will ſtill appeare *Direct*, and to have moved in the *Zodiack* unto the Points (y z.) But now when the Earth comes to be more immediatly interpoſed betwixt this Planet and the Sunne; as when both of them are at the Letter (F f.) then will *Iupiter* be diſcerned in the *Zodiacke* at (x.) So that all the while the Earth was paſſing the

Arch (E F) *Iupiter* did ſtill remaine betwixt the Points (z) and (x) and therefore muſt ſeeme unto us as if hee were *Stationary*; but afterwards, both of them being carried to (G g.) then *Iupiter* will appeare at (s) as if by a haſty motion he had returned from his former courſe the ſpace (x s.) Both of them paſſing to (H h) this Planet will ſtill ſeeme to bee ſwiftly *Retrograde*, and appeare in the Point at (p) but when they come to the Points (I i.) *Iupiter* will then ſeem to be ſlower in this motion, and to have onely paſſed the ſpace (p n.) Both of them being transferred to (K k.) *Iupiter* will then appeare in the *Zodiacke* at (o) as being againe *Direct*, going forward according to the order of the Signes, and while the Earth did paſſe the Arch (I K.) *Iupiter* then remain'd between the points (n o.) and ſo conſequently, did againe ſeeme to bee *Stationary*. Both of them comming to (L l.) & thence to (M. N.) *Iupiter* will ſtill appeare *Direct*, and to have gone forward in the *Zodiacke* from (q) to (t.) So that all the ſpace wherein *Iupiter* is *retrograde*, is repreſented by the

(he Arch(n z.) In which ſpace, he himſelfe moves in his owne Orbe, the Arch (e i) and ſo the Earth in it's Orbe, a proportionall ſpace (E I.)

As it hath been ſaid of this Planet, ſo likewiſe is it applyable to the other. *Saturne*, *Mars*, *Venus*, *Mercury*; all which are thus made to appeare *direct*, *Stationarie*, and *retrograde*, by the motion of our Earth, without the helpe of thoſe *Epicycles* and *Eccentricks*, and ſuch unneceſſary wheele worke, wherewith *Ptolomey* hath filled the Heavens. Inſomuch that here * *Fromondus* is faine to confeſſe, *Nullo Argumento in ſpeciem probabiliori, motum terræ annuum a Copernicanis aſtrui, quam illo ſtationis, directionis, regreſſionis Planetarum.* There is not any more probable Argument to prove the annuall motion of the Earth, than it's agreeableneſſe to the *ſtation*, *direction*, and *regreſſion* of the Planets.

* *Antiriſt. cap.* 18. *Veſt. tract.* 4. *cap.* 3.

Laſtly, that *Copernicus* his *Syſteme* of the Heavens, is very anſwerable to the exacteſt obſervations, may bee manifeſt from this following deſcription of it.

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Suppose the Sunne to be scituated at A. Now because *Mercury* is found by experience to be alwaies very neere the Sunne, so that he do's for the most part lye hid under his Raies. As also because this Planet hath a more lively vigorous Light than any of the other; therefore wee may inferre, that his Orbe is

is placed next unto the Sunne, as that at B.

As for *Venus*, 'tis observed, That She do's alwaies keep at a set distance from the Sunne, never going from him above forty degrees or thereabouts; that her Body appeares through the perspective to be forty times bigger at one time than at another; that when She seemes biggest and neerest unto us, wee then discerne her as being perfectly round. Therefore doth this Planet also move in a Circle that incompasses the Sun. Which Circle do's not containe the Earth within it; because then, *Venus* would sometimes be in *opposition* to the Sunne; whereas, 'tis generally granted, that She never yet came so far as to be in a *Sextile*.

Nor is this Circle below the Sun (as *Ptolomey* supposeth) because then this Planet, in † both it's Conjunctions, would appeare horned, which She do's not.

† *Matutina Vespertina.*

Nor is it above the Sunne, because then She would alwaies appeare in the Full, and never Horned.

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From whence it will follow, that this Orbe must necessarily bee betwixt the Earth and the Sunne; as that at C.

As for *Mars*: 'tis observed, That hee do's appeare sixty times bigger when he is neer us, than at his greatest distance; that he is sometimes in *opposition* to the Sunne. From whence we may conclude, that his Orbe do's containe our Earth within it. 'Tis observed also, that he do's constantly appeare in the Full, and never Horned; from whence likewise it is manifest, that the Sunne is comprehended within it's Orbe, as it is in that which is represented by the Circle, E.

And because the like appearances are observed in *Iupiter* and *Saturne* (though in lesse degrees) therefore wee may with good reason conceive them to be in the Heavens, after some such maner as they are here set downe in the Figure, by the Circles, F. G.

As for the Moone: because Shee is sometimes in *opposition* to the Sunne; therefore must her Orbe comprehend in it the Earth: because She appeares dark in her Conjunction, and sometimes eclipses

eclipſes the Sunne; therefore that muſt neceſſarily be without her Orbe, as it is in that *Epicycle* at H. In the Centre of which, the Earth muſt neceſſarily bee ſcituated according to all thoſe appearances mentioned before. So that the Orbe of it's annuall motion, will bee repreſented by the Circle D.

All which appearances, cannot ſo well be reconciled by *Ptolomey*, *Tycho*, *Origanus*, or by any other *Hypotheſis*, as by this of *Copernicus*. But the application of theſe to the ſeverall Planets, together with ſundry other particulars, concerning the *Theoricall* part of *Aſtronomy*, you may ſee more fully ſet downe by thoſe who have purpoſely handled this ſubject, *Copernicus*, *Rheticus*, *Galilæus*; but more eſpecially *Keplar*: nnto whom I doe acknowledge my ſelfe indebted for ſundry particulars in this diſcourſe.

I have done with that which was the chiefe purpoſe of the preſent Treatiſe; namely, the removall of thoſe common prejudices that men uſually entertaine againſt this opinion. It remaines, that by

by way of concluſion, I endeavour to ſtirre up others unto theſe kind of Studies, which by moſt men are ſo much neglected.

'Tis the moſt rationall way, in the proſecution of ſeverall Objects, to proportion our love and endeavour after every thing, according to the excellencie and deſireableneſſe of it. But now, amongſt all Earthly Contentments, there is nothing either better in it ſelfe, or more convenient for us, than this kind of Learning; and that, whether you conſider it according to it's *generall* Nature, as a *Science*; or according to it's more *ſpeciall* Nature, as *ſuch* a *Science*.

1 Conſider it as a *Science*. Certaine it is, that amongſt the varietie of Objects, thoſe are more eligible which conduce unto the welfare of that which is our beſt part, our Soules. 'Tis not ſo much the pleaſing of our ſences, or the increaſing of our Fortunes, that do's deſerve our induſtry, as the information of our Iudgements, the improvement of our Knowledge. What ever the World may thinke; yet it is not a vaſt Eſtate, a Noble

Noble Birth, an eminent place, that can adde any thing to our true reall Worth; but it muſt be the degrees of that which makes us *Men*, that muſt make us *better Men*, the endowments of our Soule, the enlargement of our Reaſon. Were it not for the contemplation of Philoſophy, the heathen * *Seneca* would not ſo much as thanke the gods for his Being. *Niſi ad hæc admitterer non fuit opere pretium naſci. Detrahe hoc ineſtimabile bonum, non eſt vita tanti, ut ſudem, ut æſtuem.* Take but away this benefit, & he would not thinke Life worth the ſweating for. So much happineſſe could hee diſcerne in the Studies of Nature. And therfore as a *Science* in generall, it may very well deſerve our Love and Induſtry.

* *Præf. ad lib. 1. Nat. Quæſt.*

2 Conſider it as ſuch a particular *Science*, *Aſtronomy*: the Word ſignifies the Law of the Stars; and the Hebrewes (who doe not ordinarily admit of compoſition) call it in two words, חקות שמים *Cœlorum ſtatuta*, or the *Ordinances of Heaven*; becauſe they are governed in their courſes by a certain rule, as the *Pſalmiſt* ſpeaks in the hundred forty eighth *Pſalme*,

Iob 38. 33. *Ier.* 33. 25.

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Psa. ve. 6. God ha's given them a Law which shall not be broken.

Now this of all naturall *Sciences* may best of all challenge our Industry; and that, whither you consider it,

1 Absolutely, as it is in it selfe: or,

2 As it stands in reference to us.

1 As it is in it selfe. The excellencie of any *Science* may be judged of (saith the Philosopher) first, by the excellency of the Object. Secondly, by the certaintie of it's demonstrations.

1. For the *Object*. It is no lesse than the whole World (since our Earth also is one of the Planets) more especially those vast and glorious Bodies of the Heavens. So that in this respect, it far exceeds all those barren, empty speculations, about *Materia prima* and *Vniversale*, and such like cob webs of learning; in the study of which, so many doe misplace their younger yeares. And for the same reason likewise is it to be preferr'd before all those other *Sciences*, whose subjects are not either of so wide an extent, or so excellent a Nature.

2 For the *demonstrations* of *Astronomy*, they

they are as infallible as truth it self; and for this reason also do's it excel all other knowledge, which do's more depend upon conjectures & uncertaintie. They are onely those who want skill in the Principles of this *Science*, that mistrust the conclusions of it. Since therefore in these respects, it is one of the most excellent *Sciences* in Nature, it may best deserve the industry of Man, who is one of the best Works of Nature. Other creatures were made with their Heads and Eies turned downwards: would you know why man was not created so too? why it was, that he might be an Astronomer?

Os hominum sublime dedit, Celumq; tueri
Iussit, & erectos ad Sydera tollere vultus.

God gave to man an upright face, that he
Might view the stars, & learn astronomy.

2 Consider it in reference to us, and so it is,

1 Most Vsefull.
2 Most Pleasant.

1 Most usefull, and that in sundry respects. It proves a God and a Providence,

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vidence, and incites our hearts to a greater admiration and feare of his omnipotencie. *We may understand by the Heavens, how much mightier he is that made them; for by the greatnesse and beauty of the creatures, proportionably the Maker of them is seene,* saith the booke *of Wisdome*, 13.4.5. It was hence that *Aristotle* did fetch his chiefe Argument to prove a *primus motor*. 'Twas the consideration of these things that first led Men to the knowledge & worship of God (saith * *Tully*.) *Hæc nos primum ad Deorum cultum, tum ad modestiam, magnitudinemq; animi erudivit.* And therefore when God by the Prophet would convince the people of his Deitie, he bids them *lift up their eyes on high; and behold who hath created those things that bringeth out their Host by number, that calleth them all by their Names*, &c. *Isa.* 40.26. which occasioned that saying of *Lactantius*: *Tanta rerum magnitudo, tanta dispositio, tanta in servandis ordinibus, temporibusq; constantia; non potuit aut olim sine provido artifice oriri, aut constare tot sæculis sine incola potente, aut perpetuum gubernari sine perito & sciente rectore, quod ratio ipsa*

* *Tuscul.* 1. Item Plut. de placit. Phil. l. 1. c. 6.

Instit. lib. 2. cap. 5.

ipsa declarat. Such a great order and constancy amongst those vast Bodies, could not at first be made but by a wise Providence, nor since preserved without a powerfull Inhabitant, nor so perpetually governed without a skilfull guide.

True indeed, an ordinary view and common apprehension of these Cœlestiall Bodies, must needs manifest the Excellencie & Omnipotencie of their Maker; but yet a more accurate and diligent enquiry into their Natures, will raise our Vnderstandings unto a neerer Knowledge, and greater Admiration of the Deitie. As it is in those inferiour things, where the meere outside of a Man, the comelinesse and majesty of his countenance, may bee some Argument from whence to inferre the excellencie of his Creator. But yet the subtle Anatomist, who searches more deeply into this wonderfull structure, may see a cleerer evidence for this in the consideration of the inward Fabricke, the muscles, nerves, membranes, together with all those secret contrivances in the Frame of this little World. Thus also

is

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is it in the great *Vniverſe*, where the common apprehenſion of things is not at all conſiderable, in compariſon to thoſe other diſcoveries, which may bee found out by a more exact enquiry.

As this Knowledge may conduce to the proving of a God, and making Men religious; ſo likewiſe may it ſerve to confirme unto us the Truth of the Holy Scriptures: ſince the ſacred Story, in the order of it's narrations, do's ſo exactly agree with the converſions of Heaven, and *Logiſticall Aſtronomy*.

It may alſo ſtirre us up to behave our ſelves anſwerably unto the noble and divine nature of our Souls. *When I conſider the Heaven, the Workes of thy fingers, the Moone and the Starres which thou haſt ordained, what is Man, that that thou art ſo mindfull of him?* as to create ſuch vaſt glorious Bodies for his ſervice.

Pſal.8.3,6.

Againe, when I conſider with my ſelf the ſtrange immenſitie and bigneſſe of this great *Vniverſe*, in compariſon to which, this Earth of ours is but as an undiſcernable point: When I conſider that I carry a Soule about me, of far greater worth

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worth than all this, and desires that are of a wider extent and more unbounded capacity than this whole Frame of Nature; Then mee thinks it must needs argue a degenerateneſſe and poverty of Spirit, to buſie my Faculties about ſo ignoble, narrow a ſubject as any of theſe earthly things. What a folly is it in Men to have ſuch high conceits of themſelves, for ſome ſmall poſſeſſions which they have in the World above others, to keep ſo great a buſsle about ſo poore a matter. *Hoc eſt punctum quod inter tot gentes ferro & igni dividitur.* 'Tis but a little point which with ſo much adoe is diſtributed unto ſo many nations by fire and ſword. What great matter is it to be Monarch of a ſmall part of a point? Might not the Ants as well divide a little Mole-hill into diverſe Provinces, and keep as great a ſtir in diſpoſing of their government? *Punctum eſt illud in quo navigatis, in quo bellatis, in quo regna diſponitis.* All this place wherin we warre, and travell, and diſpoſe of Kingdomes, is but a point far leſſe than any of thoſe ſmall ſtars, that at this diſtance

Sen. Nat. Quæſt. l. 1. Nonne ô terrena animalia conſideratis, quibus præſidere videamini? Nam ſi inter mures videres unum aliquem, jus ſibi ac poteſtatem præ cæteris vindicantem, quanto moveretur cachinno, &c. Boëtius de Conſol. l. 2.

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are scarse discernable. Which when the Soule do's seriously meditate upon, it will begin to despise the narrownesse of it's present habitation, and thinke of providing for it selfe a mansion in those wider spaces above, such as may bee more agreeable to the nobleneſſe and divinity of it's Nature.

Why should any one dreame of propagating his name, or spreading his report through the World ? when as though he had more glory than ambition can hope for ; yet as long as all this habitable earth is but an inconsiderable point, what great matter can there be in that fame which is included within such strait contracted limits ?

Boetius. Ibid.

Quicunq; solam mente præcipiti petit
Summumq; credit gloriam,
Late patentes ætheris cernat plagas,
Arctumq; terrarum situm.
Brevem replere non valentis ambitum,
Pudebit aucti nominis.

"He that to honour only seeks to mount,
"And that his chiefest end doth count ;
"Let him behold the largenes of the skies,
"And on the strait Earth cast his eyes;
"He will despise the glory of his Name,
"Which cannot fill so small a Frame.

Why

Why ſhould any one be taken up in the admiration of theſe lower outſides, theſe earthly glories ? *Reſpicite Cœli ſpatium, firmitudinem, celeritatem, & aliquando deſinite vilia mirari.* Hee that rightly underſtands the nature of the Heavens, will ſcarſe eſteem any other thing worth his *notice*, much leſſe his *wonder*.

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Idem lib. 3.

Now when wee lay all this together, that he who hath moſt in the World, hath almoſt nothing of it ; That the Earth it ſelfe, in compariſon to the *Vniverſe*, is but an inconſiderable point; and yet that this whole *Vniverſe* do's not beare ſo great a proportion to the Soul of man, as the earth do's unto that: I ſay, when a man in ſome retired thoughts ſhall lay all this together, it muſt needs ſtir up his ſpirits to a contempt of theſe earthly things, and make him place his love & endeavour upon thoſe comforts that may be more anſwerable to the excellency of his nature.

Without this Science, what traffick could wee have with forreine Nations ? What would become of that mutuall Commerce, whereby the

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World is now made but as one Common-wealth?

Vosq; medijs in aquis Stellæ, pelagoq; timendo,
Decretum monstrastis iter, totiq; dedistis,
Legibus inventis hominum, commercia mundo.

'Tis you bright Stars, that in the fearfull Sea
Doe guid the Pilot through his purpos'd way.
'Tis your direction that doth commerce give,
With all those men that through the World doe (live.

2 As this Science is thus profitable in these and many other respects: so likewise is it equally pleasant. The eye (saith the Philosopher) is the sence of pleasure, and there are no delights so pure and immateriall as those which enter through that Organ. Now to the understanding which is the eye of the soul, there cannot be any fairer prospect, than to view the whole Frame of Nature, the fabrick of this great *Vniverse*, to discern that order & comlinesse which there is in the *magnitude*, *situation*, *motion* of the severall parts that belong unto it; to see the true cause of that constant variety and alteration which there is in the different seasons of the yeare. All which must needs enter into a mans thoughts, with a great deale of sweetnes and com-

wis. 7. 18, 19.

placency.

placency. And therfore it was that *Iulius Cæsar* in the broiles and tumult of the camp, made choise of this delight:

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Media inter prælia semper,
Stellarum, Cæliq; plagis, superisq; vacavit. *Lucan. l.* 10

He alwaies leisure found amidst his Wars,
To mark the coasts of heav'n, and learn the stars.

And for this reason likewise did *Seneca* amidst the continuall noise & busle of the Court, betake himselfe to this recreation:

O quam iuvabat, quo nihil maius, parens
Natura genuit, operis immensi artifex,
Cœlum intueri Solis, & currus sacros
Mundiq; motus, Solis alternas vices,
Orbemq; Phœbes, astra quem cingunt vaga
Lateq; fulgens atheris magni decus.

O what a pleasure was it to survay
Natures chief work, the heavens; where we may
View the alternate courses of the Sun,
The sacred Chariots, how the World do's run:
The Moons bright Orb, when shee's attended by
Those scattered stars, whose light adorns the sky.

And certainly those eminent men who have this way bestowed a great part of their imployment, such as were *Ptolomey*, *Iulius Cæsar*, *Alphonsus* King of Spain, the noble *Tycho*, &c. have not only

ly by this means pitched upon that which for the preſent was a more ſolid kind of pleaſure and contentment; but alſo a ſurer way to propagate their memories unto future ages. Thoſe great coſtly Pyramides which were built to perpetuate the memory of their founders, ſhall ſooner periſh and moulder away into their primitive duſt, than the names of ſuch Worthies ſhall bee forgotten. The monuments of learning are more durable than the Monuments of Wealth or Power.

All which encouragements may bee abundantly enough to ſtir up any conſidering man, to beſtow ſome part of his time in the ſtudy and inquiſition of theſe Truths.

Foelices animæ, quibus hæc cognoſcere primum,
Inq; domos ſuperas ſcandere cura fuit.

FINIS.

Faults escaped at the Presse *in the second Booke.*

IN the Epistle *line* 11. *read* præ monish. *Prop.* 4. *read* words *for* grounds. *page* 3. *line* 18. *r.* probable *for* possible. *p.* 4. *l.* 15. *r.* obsolete *for* absolute. *l* 20. *r.* as to take up every thing for Canonical *p.* 8. *l.* 7. *r.* things *for* times. *p.* 16. *l.* 10. *r.* move amongst the rest. *p.* 17. *l.* 4. *Philolaus. p.* 18. *l.* 20. Prutenicall. *p.* 22. *l.* 7. *marg.* 6. Consid. *p.* 26 *l.* 8. *Schonbergius. p.* 34. *l.* 14. pravity *for* variety. *p.* 38. *l.* 8. imply *for* imploy. *p.* 42. *l.* 22. signe *for* figure. *p.* 43. *l.* 14. rather *for* either. *p.* 58. *l.* 7. this for a. *l* 8. product *for* quotient. *p* 59. *l.* 6. is *for* as. *p.* 70. *l.* 20. severall *for* generall. *p.* 72. *l.* 13. Shall fall from. *p.* 83. *l.* 18. tosse *for* crosse. *l.* 27. from *for* with. *p.* 86. *l.* 8. Sea *for* Sun. *l.* 16. in *for* on. *p.* 90. *l.* 7. יצמר. *p.* 94. *l.* 3. with *for* of. *p.* 97. *l.* 4. יכון *l.* 24. *dimoveri a loco, ubi collocata sunt. p.* 100. *l.* 5 מוסרות *l.* 13. if *for* as. *p.* 101. *l.* 16. ארון *ab* ארון *p.* 104. *l* 3. *cum* for *cur. l.* 4. *gulæ* for *vulgæ. p.* 109. *l.* 6. false *for* foolish. *l* 12. as *for* in it's. *p.* 114. *l.* 25. about that *for* above the. *p.* 115. *l.* 10. in one of these three. *p.* 120. *l.* 22. words *for worlds. p.* 123. *l.* 15. seconds *for* cubits. *p.* 130 *l.* 26. lately bin. *p.* 133. *l.* 8. conveniences. *p.* 134. *l.* 4. *Epicycles. l.* 6. Deferents. *p* 153. *l.* 10. *axus. p.* 159. *l.* 21. might only. *p.* 160. *l.* 12. motions *for* notions. *p.* 166. *l.* 11. one second. *p.* 187. *l.* 16. say *for* see. *p.* 190. *l.* 12. must *for* most. *p.* 205. *l.* 1. motion is. *p.* 228. *l.* 23. r. (M m) *for* (M N) *p.* 237. *l.* 17. *r. Os hominis. p.* 236. *l.* 3. *r.* of all other naturall.

Place this against the firth