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Biographia Philoſophica.

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BEING

An ACCOUNT

OF THE

LIVES, WRITINGS,

AND

INVENTIONS,

Of the moſt eminent

PHILOSOPHERS

AND

MATHEMATICIANS

Who have flouriſhed from the earlieſt Ages of the World to the preſent Time.

By BENJAMIN MARTIN.

LONDON:

Printed and ſold by W. OWEN, near *Temple-Bar*, and by the AUTHOR, at his Houſe in *Fleet-ſtreet*.

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TO THE

KING,

This Account of the

LIVES, WRITINGS, and INVENTIONS

Of the moſt eminent

PHILOSOPHERS and MATHEMATICIANS,

Publiſhed,

By his ROYAL PERMISSION,

Under His Moſt Gracious and Auſpicious

PATRONAGE,

Is now, with all Humility,

Inſcribed,

By his MAJESTY's

Moſt Loyal,

Dutiful, and Obedient

Subject and Servant,

BENJ. MARTIN.

TO THE

K I N G.

BIOGRAPHIA PHILOSOPHICA;

Or, a ſuccinct ACCOUNT of

The LIVES of the moſt eminent PHILOSOPHERS and MATHEMATICIANS, from the higheſt Antiquity to the preſent Time.

IN WHICH

The Places of their Birth; their peculiar Genius, and Manner of Study; their Travels for Improvement; the particular Branches of mathematical or philoſophical Science in which they excelled; the Inventions, and Diſcoveries they made, and the Books they publiſhed on the various Subjects of Natural Hiſtory, Philoſophy, and the Mathematics, will be methodically related, and digeſted according to the Order of Time in which they lived.

The LIFE of THALES *the* MILESIAN.

THALES was born, as the beſt Writers agree, in ſome Part of the 35th Olympiad, flouriſhed in the 50th, and died about the 58th; the Interval between his Birth and public Appearance in *Greece*, was paſſed in Study, and Travels in various Parts of *Aſia*, and into *Ægypt*; in the former he acquired his firſt Inſight into *Aſtronomy*, and, in the latter, his firſt Acquaintance with *Geometry*, *Myſtical Divinity*, and *Natural Knowledge*. Having finiſhed his Studies abroad, he returned to his Native City, *Miletus*, and tranſported the Stock of Learning he had acquired into his own Country.

There are not any particular Circumſtances mentioned in his Hiſtory reſpecting ſignificant Occurrencies in his Travels, other than the Favour he met with from *Amaſis* King of *Ægypt*, which Favour he loſt by being too free in his Opinions concerning Kings; was, by ſuch Freedom, obliged to leave the Country; which was the probable Cauſe of his returning, at that Time, to *Miletus*.

In *Miletus* he lived for ſome Time as private as poſſible, devoted to Study and Contemplation, and in inſtructing ſome few in the Learning he had acquired. Theſe were *Anaximander* and *Anaximines*, both Natives of *Miletus*; and afterwards *Pythagoras*, of what Country unknown, but uſually called of *Samos*, ſo famed, as the Conſtitutor of the *Italic Sect*, and who aſſiduouſly purſued his Maſter's Steps, both in his Studies, and in his Travels.

Thales, in this his Retirement, was courted by many, but cautiouſly avoided either attending, or receiving any Favours from them. He was often viſited by *Solon*, and is ſaid to have taken great Pleaſure in the Converſation of *Thraſybulus*, whoſe excellent Wit cauſed our Philoſopher to forget that he was Tyrant of *Miletus*.

There flouriſhed, at the ſame Time with him, ſix others, diſtinguiſhed for their ſingular Wiſdom by their Morals, Rules, and Practice; but the Epithet of *Wiſe* was given to *Thales* for his ſpeculative Learning.

Laertius, and with him various other Writers, agree, that he was the Father of the *Greek* Philoſophy, the firſt that made any Reſearches into natural Knowledge, or Enquiry into Mathematics.

His Doctrine was, that Water, Moiſture, or Humidity is the firſt Principle of natural Bodies, whereof they conſiſt, and whereinto they reſolve; and that *God* is the Mind, which formed all Things of Water.

Of the World, he taught, there was but one, and that made by God; that it is diſpoſed in due and regular Order, and that God animates the whole.

In *Geometry* he is ſaid to have been an Inventor, as well as an Improver; a Science that had its Birth by Neceſſity in *Ægypt*, where

where *Thales* acquired his primary Inſtruction, as Commerce firſt gave Being, by the like Neceſſity, to *Numbers*.

He gave the firſt Light into the Knowledge of ſcalenous, and other Triangles, many of which *Euclid** has digeſted into his *Elements*; but that for which he is more particularly celebrated, as being, according to *Laertius*, his Invention, is what now appears as the 47th Propoſition of *Euclid*, *That the Sums of the Squares of the two leſſer Sides of a right angled Triangle is equal to the Square of the greater Side*; which is, however, diſputed as the Invention of his Diſciple *Pythagoras*. But all the Writers agree, that he was the firſt, even in *Ægypt*, who took the Height of the Pyramids by the Shadow, in the Manner the ſame is now uſually effected, and therefore needs not any Illuſtration.

As an *Aſtronomer*, he divided the celeſtial Spheres into five Circles, or Zones, the *Artic*, the *Summer Tropic*, the *Equator*, the *Winter Tropic*, and the *Antartic Circle*, placing the *Zodiac* under the three middle Circles, touching them all as it paſſes, and each of them cut in right Angles by the Meridian, that extendeth from Pole to Pole: Which have unjuſtly been aſcribed to more modern Diſcoveries.

He firſt obſerved the apparent Diameter of the Sun, which he concluded to be the 720th Part of the Circle or Zodiac, which he appears annually to deſcribe about the Earth, which is divided into 360 Degrees; and firſt diſcovered the Conſtellation of the leſſer Bear.

He likewiſe firſt obſerved the Nature and Courſe of *Eclipſes*, and calculated them to an Exactneſs; one in particular, about the 50th Olympiad, memorably recorded by *Herodotus*, as it happened on a Day of Battle between the *Medes*, and *Lydians*, which, *Laertes* ſays, he had foretold to the *Ionians*. And the ſame Author informs us he divided the Year into 365 Days; but this Diviſion he ſeems to have had from the *Ægyptians*. *Plutarch de placit. Philos*, not only confirms his general Knowledge of Eclipſes, but that his Doctrine was, that an Eclipſe of the Sun is occaſioned by the Intervention of the Moon, as may be ſeen in a Baſon of Water, or Looking-glaſs; and that an Eclipſe of the Moon is cauſed by the Intervention of the Earth.

* Lib. 1. Def. 17. — Prop. 5. — Prop. 15. Id. 26.

The Writers of his Life agree, that he was addicted to judicial Aſtrology; and *Tully* thinks there is ſomething in that Science, and of his Acquaintance there-with, which he aims to confirm by the following Story:

That *Thales* being upbraided for his Poverty, reſulting from the Study of Science, and foreſeeing by his Skill in Aſtrology, there would be a Plenty of Olives that Year, he purchaſed all the Gardens about *Miletus* and *Chios*, and thus having acquired a Monopoly, diſpoſed of them again at high Prices, and then told his Neighbours, that it was very eaſy for Men of Learning to be rich if they choſe it, but that Wealth was not their Aim.

Laertius, and ſome others, agree with *Tully* in the Notion of this being an Aſtrological Prediction, which is far from being a clear Point: It is ſufficient, that he was capable of making a good Judgment of the approaching Seaſon, and that it would be ſuch a Seaſon, as wherein Olives are uſually moſt plentiful. This, however, ſufficiently evinces, that he had more worldly Wit than his Neighbours conceived, when he thought proper to employ it; as is the Caſe of moſt ſtudious Men, when they turn their Attention that Way, and affect the Object, as by Study they acquire a Sagacity and Penetration not common to the In-attentive: But, as Self-intereſt is the ruling Paſſion of our Natures, Men turned only to the Attainment of Wealth, will, with ſome Reaſon, ſmile at thoſe who reduce themſelves to Poverty, in order to make others learned.

It is a ſufficient Illuſtration of the Wiſdom of *Thales*, that he was the Inventor, or Improver, in many Branches of uſeful Knowledge; and whether right or wrong in his Contempt of Wealth, his Sagacity in other Reſpects ſuperior to moſt Men.

His *Morals* were as juſt, as his *Mathematics* well grounded, and his Judgement in civil Affairs equal to either; ſo that his Knowledge was as general, as the Good of Mankind his Care; and as we have given a brief Account of his Skill in Science, it may not be amiſs to give here a conciſe Taſte of his Morals, ſummed up in a few Lines.

Fear e'er thou ſin, thyſelf, tho' none be nigh,
Life fades, a glorious Death can never die;

Let

Let not thy Tongue diſcover thy Intent,
'Tis Miſery to dread, and not prevent.
He helps his Foes that juſtly reprehends;
He that unjuſtly praiſeth, harms his Friends;
That's not enough, that to Exceſs extends.

He was very averſe to Tyranny, and eſteemed Monarchy little better in any Shape; he was uſed to ſay, That a Tyrant, who chuſeth rather to command Slaves than Freemen, is like an Huſbandman who preferreth the gathering of Locuſts and catching of Fowls, to the reaping of Corn.

Concerning his Writings, it remains doubtful whether he left any behind him. *Auguſtine* mentions ſome Books of *Natural Philoſophy*; *Simplicius*, ſome written on *Nautic Aſtrology*; *Laertius*, two Treatiſes on the *Tropics* and *Equinoxes*; and *Suidas*, a Treatiſe on *Meteors*, written in Verſe.

His Death happened in Point of Time as is ſaid above; the Occaſion appears to have been his attending the *Olympic* Games, where, oppreſt with Heat, Thirſt, and the Weakneſs of his Years, he, in public View, ſunk into the Arms of his Friends.

He was buried, according to his own Appointment, in an obſcure Part of the *Mileſian* Fields, where he predicted in future Times their *Forum* ſhould be.

NOTES.

Page 1. *Line* 2. An *Olympiad* was a Meaſure of Time uſed by the antient *Grecians*, conſiſting of 4 Years; it was firſt inſtituted by *Iphitus*, in the Year of the World 3174, on Account of the *Olympic Games*, which were celebrated every 5th Year in the Planes of *Elis*, near the City of *Olympia*, in Honour of *Jupiter Olympius*.

Page 2, *Line* 22. The Seven *Wiſe Men*, were *Thales*, *Solon*, *Pittacus*, *Periander*, *Cleobulus*, *Chilo*, and *Bias*, greatly renowned through all Antiquity.

Page 2, *Line* 30. That this Doctrine (tho' very antient) is not wide of the Truth, appears by many modern Experiments on the Nature of Vegetation of Plants and the Animal Oeconomy, the Generation of Metals and Foſſils, *&c.* as we ſhall ſhew in its proper Place.

ANAXIMANDER.

ANAXIMANDER, a *Mileſian*, Countryman, Companion, Kinſman, Diſciple, Succeſſor, and Propagator of the Doctrine of *Thales*, was born in the 42d *Olympiad*. He demonſtrated the Compendium of Geometry, and firſt publiſhed a Geographic Table. As early as the 50th *Olympiad* he publickly explained the Obliquity of the *Zodiac*, and invented the *Gnomon*. He was Maſter of every Branch of *Aſtronomy*, imputed to *Thales*; and if *Tully* and *Pliny* may be depended upon, he was deeply ſkilled in *Natural Philoſophy*, predicting the famous Earthquake that overturned the City of *Sparta*, and tore away Part of the Mountain *Taygetus*; he wrote, as *Suidas* informs us, a Treatiſe *De Naturâ:* as alſo one on the *Sphere*, and divers others.

He is ſaid to have differed from *Thales*, holding *Infinity* to be the Principle of all Things; but this, perhaps, is not different, as it is not explained what is meant by *Infinity*, unleſs this myſtical Expreſſion elucidates his Intention: That, *it is one infinite in Magnitude, the Parts thereof changing, the Whole immutable, out of which all Things proceed, and into which all Things reſolve.* Hence, that there are infinite Worlds generated, which corrupt and degenerate into that from whence they proceeded.

The various Writers of his Life, conſidering him as an Aſtronomer, ſeem in many Inſtances either to have miſunderſtood him, or given us their own Abſurdities, for his Opinions; they are therefore, replete with Contradictions, I ſhall for that Reaſon only recite ſuch as are conſiſtent with themſelves. He held the Doctrine of *innumerable Worlds*; That *the Orb of the Sun is 28 times bigger than the Earth*; *and that the Moon hath a thin Light of her own, beſides that which ſhe borroweth from the Sun.*

His Opinions concerning *Meteors* are the ſame as thoſe eſpouſed by the beſt Philoſophers of later Ages; and his Notion of the Origin of *Beings* was, that the firſt Creatures were generated in Humidity, which is the ſame as *Thales* taught, of Water being the Principle of all Things; whence it may be concluded, that *Anaximander* diſtinguiſhed between Principle and Element.

The Time of his Death is no where aſcertained, ſo as to agree with his Birth, Age, and his being the Succeſſor of *Thales:*

For

For which Reaſon I ſhall leave that Particular unnoticed, as a long Criticiſm on that Head is not material to the preſent Purpoſe.

ANAXIMENES.

ANAXIMENES was firſt the Diſciple of *Thales*, and afterwards an Auditor of *Anaximander*; he was of the ſame Country with both, and the Succeſſor of the latter. He held *Air* to be the Principle of the Univerſe, of which all Things are engendered, and into which all reſolve. That *Spirit* and *Air* are only two Words ſignifying the ſame Thing. His general Opinion of the *Heavens* and *Meteors*, was the ſame as his Maſters; and of the Cauſe of the *Rainbow*, the ſame as in modern Philoſophy: That *Earthquakes* proceed from the Rarity and Dryneſs of the Earth, from Exceſs of Heat, or Cold; the latter he called *Contraction*, or *Condenſation*, the former *Laxation* or *Rarity*: Thus illuſtrated, a Man's Breath compreſſed by his Lips and condenſed, is cold, (as when we blow on any Thing to cool it,) but iſſuing from an open Mouth, is hot, by reaſon of its Rarity. And more than this we do not find concerning him.

ANAXAGORAS.

ANAXAGORAS was a Native of *Glazomena*, and born in the 67th *Olympiad*. He was eminent for his noble Birth and wealthy Poſſeſſions, but more for his Contempt of them, which he quitted for the Delights of Philoſophy, turning his Thoughts from Civil Affairs to the Acquiſition of Natural Knowledge; but for his Improvidence herein *Plato* highly blames him, becauſe a Competency might rather aſſiſt, than be an Impediment to him in the Attainment of human Wiſdom. Being aſked, Why he had no Regard to his Country? he, pointing to the Heavens, anſwered, *My greateſt Regard is to my Country*. And again, To

what End he was born? he anſwered, *To contemplate the Sun, Moon, and Heavens.*

In the 20th Year of his Age he went to *Athens* to ſtudy Philoſophy, and continued there 30 Years. He is reputed the firſt who added *Mind* to *Matter*, and on that Account he was honoured by the *Athenians*. Some of his Cotemporaries, however, diſputed his Right to this Honour; alledging, That this Sentiment was taught much earlier, as no Doubt it was, tho' not in that Country.

His Opinion of a ſupreme Being was much clearer, more rational, and intelligent, than any of his Predeceſſors in *Greece*; he held that GOD is an infinite ſelf-moving Mind, and the efficient Cauſe of all Things; that the ſame divine Mind, out of infinite Matter conſiſting of ſimilar Parts, made every Thing according to its Species, reducing into Order what was before confuſedly mingled together. His Conceptions of Nature were, That the upper Regions were replete with Fire, and the operative Power there he called *Æther*. His Notion of the *Sun*, that it was a burning Plate, the common Opinion of that Time; but that the *Moon* was a dark Body enlightened by the *Sun*, habitable, having Hills, Plains, and Waters; that the Inequality in her Face proceeded from a Mixture cold and Earthy, and that the *Milky Way* is the Light of ſome Stars.

The *Winds* he conceived to proceed from an Extenuation of the Air by the Sun: And that *Earthquakes* are cauſed by the Air, apt to aſcend, but finding Difficulty in getting out, cauſeth that Perturbation, effected principally by the exterior, at certain Times breaking in upon the interior Air, and there producing the ſame Force as we perceive, when, upon the Colliſion of the Clouds, and Motion of the agitated Air, they produce Thunder and Lightning.

His Thoughts concerning the Animal World, That Creatures were firſt generated by Humidity, Calidity, and earthy Matter.

That the Voice is produced by the ſtriking of the Wind againſt firm reſiſting Air, returning the Counter-blow to the Ear; which is the Manner whereby alſo the Repercuſſion of the Air is formed called *Echo*; and that the *Gall* is the Cauſe of *acute Diſeaſes*, which, over-flowing, is diſperſed into the *Lungs*, *Veins*, &c.

Laertius

Laertius assures us, that this *Anaxagoras* studied Natural Philosophy in *Athens* for 30 Years successively, and that *Pericles* the Son of *Xantippus*, *Archelaus*, the Son of *Apollodorus*, *Euripides*, the celebrated *Grecian* Poet, and *Socrates*, the Son of *Sophroniscus* (with a great Number of other Auditors too tedious here to enumerate) were his favourite Pupils, and gave constant Attendance to his Lectures.

Laertius likewise mentions *Metrodorus* of *Lampsacum* as an intimate Friend, and One, who paid him all the Marks of the highest Esteem and Veneration on Account of his profound Learning.

Though there are some Historians, indeed, who affirm, that *Democritus*, notwithstanding he was 40 Years younger than *Anaxagoras*, was one of his Disciples; yet *Laertius* endeavours to confute that Notion; for he peremptorily insists, that *Anaxagoras* was so far from giving him any friendly Instructions, that he conceived an implacable Aversion to the Man, and industriously shunned all Familiarity and Converse with him. And *Phavorinus* assures us (as a Confirmation of this natural Disgust) that *Democritus*, perceiving such a singular Coldness in *Anaxagoras*, and his too visible Neglect of his profered Friendship, professed himself an open Antagonist, and absolutely denied, that the Doctrines which he advanced in regard to the Sun and Moon were just; and asserted, in order to depreciate them, that he had only imbibed some favourite Tenets of the Antients, and, like a Thief, had palmed them on the Public for his own Conceptions; in a Word, that his Description of the World and his Sentiments concerning the Mind were very erroneous, imperfect, and altogether unworthy the Attention of the Curious.

This *Anaxagoras* endeavoured (as much as in him lay) not only to instruct his Disciples in the Grounds of Natural Philosophy; but to free their Minds from all superstitious Terrors, arising from their Want of Knowledge and Penetration into physical Causes; and the following Instance, (amongst many others which might be produced) will be sufficient to convince the Reader of his profound Knowledge in that particular Science. The Incident was this; the Head of a Ram was one Day produced before his Pupil *Pericles*, with but one Horn; which, by the *Magi* or *Soothsayers* at that Time, was looked upon as a Prodigy;

the Pupil brought it to his Maſter, who immediately, to convince him of the Folly of ſuch ſuperſtitious and enthuſiaſtic Notions, diſſected it before his Face, and demonſtrated, that the Ram's Brains lay out of their natural Situation, and had by Degrees, been contracted into an oval Form towards that Part where the Horn grew.

Some Years after this, finding himſelf infirm, decrepid, and greatly neglected by his Pupils, to what he had been, he grew melancholy, and ſo weary of the World, that, in a Fit of Reſentment, he raſhly reſolved to ſtarve himſelf, and be no longer the too viſible Object of Contempt.

Laertius, however, gives him quite another Character, and much more to his Reputation and Advantage. There are various Conjectures, ſays he, in regard to the many Misfortunes which he laboured under during his old Age.

Sotion inſiſts, that he was charged by one *Cleon* with Impiety towards the Gods; and with maintaining that impious Notion of the Sun's being a burning Plate; but that his Cauſe was ſo ſtrenuouſly eſpouſed by his Pupil *Pericles*, that when his Caſe came impartially to be heard, inſtead of having Sentence of Death paſt upon him (as his Enemies not only wiſhed, but fully expected) he was only fined five * Talents, and baniſhed for a ſhort Time.

Satyrus, however, peremptorily inſiſts, that he was ſummoned before the Court, by *Thucydides*, who was of the contrary Party to *Pericles*, and accuſed, not only of maintaining impious and falſe Doctrines, but of Diſloyalty, and holding ſecret Correſpondence with the *Perſians*; and that, though he was abſent, Sentence of Death was inſtantly paſt upon him; that when the News was brought him, not only that his two Sons were actually dead, but that he himſelf was to be executed as a Traytor to the Government, he was ſo far from being dejected and caſt down (as was before hinted in regard to his Intention of *Suicide*) that he heard the melancholy Relation, with ſuch an amazing Æquanimity, and Preſence of Mind, that he only made the following Anſwer (without the leaſt viſible Emotion or Concern) "You tell "me Nothing new or unexpected. Nature has long ſince con"demned both my Sons and me to Death. As to them, I know "very

* An *Attic* Talent was equal to 139*l.* 15*s.* Sterling.

" very well that I begat them Mortals." And *Demetrius Phalareus* aſſures us, that he interred them Both with his own Hands.

Hermippus, on the other Hand, inſiſts, that he was actually impriſoned in order to ſuffer Death; but that *Pericles* beforementioned appearing before the Judges in his Defence, procured his Diſcharge; but that he laid violent Hands on himſelf, in the Goal, not having Courage ſufficient to ſupport himſelf under that public Diſgrace.

Hieronymus and *Laertius* both inſiſt, that his Friend *Pericles*, when his Trial came on, brought him into Court in ſuch a poor, tattered Condition, and ſo greatly emaciated with Sickneſs, that he appeared to the Judges rather as an Object of their Compaſſion than their Juſtice.

Suidas again tells us another Story; and inſiſts, that the *Athenians* threw him into Priſon for introducing new and heterodox Notions concerning the Supreme Being; and afterwards baniſhed him to *Lampſacum*, where he ſtarved himſelf to Death.

Joſephus ſays, that the general Notion, prevailing over all *Athens*, that the Sun was the Supreme Being, or God, which *Anaxagoras* affirmed to be without all Senſe or Knowledge, he was by the Votes of ſome of his Judges ſentenced to die for his impious and prophane Doctrines.

If, however, we will give Credit to *Plutarch*, who is an Hiſtorian, of equal, if not ſuperior Reputation to any of the others before quoted, he was neither condemned nor cenſured by any Perſons whomſoever, but by *Pericles* himſelf.

His Departure from *Athens*, however, ſome inſiſt, was no leſs than 30 Years after his Arrival at that City, that is to ſay, in the 3d Year of the 82d *Olympiad*, and in the 63d Year of his Age; from whence he went to *Lampſacum* abovementioned; where he reſided for two and twenty Years ſucceſſively, and was ſo regardleſs either of the Intereſt and Advantage of the *Athenians*, or his own Country, that he ſaid they were more obliged to him than ever he was to them; and when he fell ſick, according to *Cicero*, being aſked by his Friends whether he would be conveyed to *Clazomene*, his native Country; he anſwered in the Negative, ſaying, " that it was altogether needleſs, ſince the Road to the Grave " was every where alike." And *Plutarch* aſſures us, that before his Deceaſe, the Magiſtrates of the City aſked him if there were any

Fa-

Favours in their Power to confer upon him? To this his Anſwer was ſomewhat ludicrous, though innocent enough; all I deſire is, that the Youth of the Place may be indulged with an annual *Play-day*, on the Day of my Deceaſe; which Cuſtom (according to *Laertius*) was religiouſly obſerved for many Years afterwards.

He was interred ſome few Days after his Death by the Inhabitants of *Lampſacus*, in a very magnificent and pompous Manner, with an Inſcription on his Monument; intimating, that under that Stone lay the venerable *Anaxagoras*, and the greateſt Philoſopher of his Age.

There were two Altars erected to his immortal Memory, if we will confide in *Ælian*'s Account of him; One inſcribed to the *Mind*; the Other to *Truth*.

Laertius, whom we have quoted ſo often, and who has given us ſome valuable Memoirs of his Life, concludes it with the following Epigram.

Fam'd Anaxagoras *the Sun defin'd*
A burning Plate, for which to die deſign'd;
Sav'd by his Pupil Pericles; *but he*
Abandon'd Life, to ſad Philoſophy.

As to his Writings, we are told by *Laertius*, that he was the firſt that publiſhed any Treatiſe of Natural Philoſophy, which was cenſured by *Plato*, but whether with juſt Grounds or not, we ſhall not take upon us to determine.

He publiſhed likewiſe another Treatiſe, entitled, *The Quadrature of the Circle*, which *Plutarch* aſſures us, that he wrote during the Time of his Impriſonment.

There were three Others (according to *Laertius*) of the ſame Name, *viz.* a celebrated Orator, and Diſciple of *Iſocrates*; the Second, a Statuary taken notice of by *Antigonus*; and the laſt, a *Grammarian*, a Diſciple of *Zenodotus*: To ſay any more of them, however, would be foreign to our Purpoſe.

We ſhall conclude this ſhort Account of him with his few memorable Maxims, *viz.*

1. Being

I. Being once aſked whether the Mountains of *Lampſacum* would, in Proceſs of Time, become Sea? His Anſwer was, Yes; in Caſe Time did not fail firſt.

II. Upon his taking a tranſient View of the Tomb of *Mauſolus*; he ſaid, a ſumptuous Monument was a Demonſtration, that the Subſtance was converted into Stone.

III. He peremptorily aſſerted, that *Homer*'s poetical Productions conſiſted of Virtue and Juſtice; to which another added the following ſhort Encomium, that he was an able and experienced natural Philoſopher.

IV. He conceived, that the Time before our Birth, and the Time we are aſleep, are both Leſſons of Inſtruction and Importance.

ARCHELAUS.

WHETHER *Athens* or *Miletum* was the Place of his Nativity; or whether he was the Son of *Apollodorus*, or of *Mylon*, Hiſtorians are not fully agreed: He was a conſtant Attendant, however, on the Lectures of *Anaxagoras*, and ſome conſiderable Time afterwards Tutor to the celebrated *Socrates*.

Notwithſtanding, he is ſaid to be the firſt that ever transferred natural Philoſophy from *Ionia* to *Athens*, and was dignified with the Title of *The natural Philoſopher*, by Way of Pre-eminence; yet *Caſaubon* peremptorily denies that Circumſtance to be real Matter of Fact, and not without very juſt Grounds; for it was very well known, that his Tutor *Anaxagoras* had taught natural Philoſophy in that very City for thirty Years ſucceſſively, before *Archelaus* aſſumed the Character, or Office, of a public Preceptor.

He was the laſt, indeed, that devoted the principal Part of his Time to that peculiar Study; for his great Pupil *Socrates* was afterwards a Profeſſor of Morality, and more famous on Account of his Golden Maxims and Precepts for the Conduct of Life, than for his extraordinary Penetration and Reſearches into Nature.

Notwithſtanding this, it muſt be allowed, that *Archelaus* had ſome Inſight into moral Philoſophy before him; for he had wrote a Treatiſe on the Laws, and on Things honeſt and juſt, before *Socrates* was in any Repute; and 'tis highly probable, that he was indebted to his Maſter's Works for his firſt Hints in that particular Branch of uſeful Knowledge.

'Tis true, indeed, that *Socrates* carried it to a much higher Pitch of Perfection, and for that Reaſon was generally looked upon as the Inventor; however, he could not poſſibly be ſo in Fact; for (as *Gaſſendus* very juſtly obſerves) moral Philoſophy was of a much more antient Date.

The ſeven Philoſophers, before mentioned in the Life of *Thales*, had the Attribute of *Wiſe* conferred upon them, principally on Account of their profound Skill in Œconomics. It muſt be allowed, however, that *Socrates* had ſome Right and Title to the Honour of being the Author of that Philoſophy; ſince he was the firſt that ever reduced it into a Science.

All we have to add here in regard to this *Archelaus*, are the peculiar Doctrines which he maintained.

I. He held, that the Mind, and the Rarefaction and Condenſation of the Air, (whereof one was Fire and the other Water) were the Principles of all Things.

II. That Heat and Cold were the two Cauſes of Generation.

III. That the Stars were all burning Plates, and that the Sun was by far the largeſt of thoſe Stars.

IV. That all Animals, of what Species ſoever, were produced from a Sort of Slime, or warm Earth; that ſuch humid Matter being diſſolved by the Fire; ſuch Part of it as ſettled into a fiery Subſtance was the Earth, and that which evaporated was the Air.

V. That the Motion of the Earth was owing to the violent Impulſion of the Winds, one upon another.

VI. That the Voice was a Percuſſion of the Air.

VII. And Laſtly, that what was juſt or diſhoneſt was defined by Law, and not by Nature.

Theſe five Philoſophers, namely, *Thales*, *Anaximander*, *Anaximenes*, *Anaxagoras*, and *Archelaus*, gradually ſucceeding one another, compleat the *Ionic* Sect.

THE

ACADEMIC PHILOSOPHERS.

PLATO.

AS *Socrates* was the Pupil of *Archelaus*, the laſt of the *Ionic* Sect, as before hinted, our Readers may probably expect, that we ſhould firſt give an Account of that *great Man*, before we enter on the Life of *Plato*; but as he wholly applied himſelf to the Study of Morality, and neglected both natural Philoſophy and the Mathematics, it would be foreign to our Plan to ſay any Thing more of him, than that he was the truly venerable Tutor of this Founder of the *Academic* Sect, who were ſo diſtinguiſhed from the Place called *Academia* (a pleaſant Grove with ſhady Walks and Seats) at *Athens*, in which the Profeſſors of Philoſophy daily taught their Diſciples.

This *Plato*, then, was an *Athenian* by Birth; notwithſtanding there are ſome Hiſtorians who tell us, he was a *Theban*. He was the Deſcendant of a very antient and illuſtrious Family; but we ſhall not here expatiate on his Pedigree; for we doubt not but it will be ſufficient for our Purpoſe, to aſſure our Readers, that his perſonal Merit ennobled him much more than his high Deſcent. Hiſtorians, indeed, widely differ in Point of the Time when he was born; but moſt of them allow, that it happened in one of the Years of the Eighty-eighth Olympiad.

He was peculiarly happy in being inured, even in his Youth, to Hardſhips and Fatigues; and in taking a great Delight in Study, and the Practice of every Virtue; which Virtues increaſed in him gradually with his Years. *Laertius* aſſures us, that he received his firſt Rudiments of Learning from *Dionyſius*, the Grammarian; and the Art of Wreſtling (a manly Exerciſe then in high Repute, as being one of the *Olympic* Games) of one *Ariſto* an *Argive*.

It was this Tutor of his, who gave him the Name of *Plato*; for he was named *Ariſtocles*, by his Parents, after his Grandfather;

father, when an Infant, which Name, however, was worn out by Degrees, and he retained the former to his dying Day.

As to his Perſon, he was very robuſt, and remarkably broad-ſhouldered, to which his new Name alludes; and, in ſhort, Nature was peculiarly indulgent to him. He had one Imperfection, however, and that was (according to *Timotheus*) a ſlow Voice, or, more properly ſpeaking, an Impediment in his Speech.

As he grew in Years, he applied his Mind very cloſely to Muſic, Painting and Poetry; and he arrived, by that Time he was Eighteen Years of Age, to ſuch a Pitch of Perfection in the laſt, that he not only wrote ſeveral ſelect Poems, but four dramatic Entertainments (as was then the Cuſtom) which he delivered to the Players, in order to be acted, propoſing at that Time to ſtand Candidate for the Laurel on the *Olympic* Stage; but hearing, by Accident, on the Day preceding that of the intended Repreſentation, a long and learned Harangue of *Socrates* before the *Bacchanals* on the ſame Stage, he dropt his intended Conteſt all at once, and charmed with his Elocution, ſet Fire to all his poetical Productions that very Night.

When he arrived at the Age of Twenty, he became a Diſciple of *Socrates*, and ſtudied Philoſophy under that accompliſhed Moraliſt, about the 4th Year of the 92d *Olympiad*.

He lived with *Socrates* for eight Years ſucceſſively, in which Time he committed to Writing (as was cuſtomary amongſt his Brother-Pupils) the Purport of a great Number of his Maſter's moſt excellent Diſcourſes, which he digeſted by way of philoſophical Converſations; but made ſo many judicious Additions and Improvements, that *Socrates* himſelf, hearing him rehearſe one Day his *Lyſis*, cried out, Oh, *Hercules!* How many fine Sentiments does this young Man aſcribe to me, that I never thought of! And *Laertius* aſſures us, that he compoſed ſeveral Diſcourſes which *Socrates* had no Manner of Hand in. At the Time when *Socrates* was firſt arraigned, which happened in the firſt Year of the 95th *Olympiad*, our *Plato* was a junior Senator, it is true, but then he was at leaſt Thirty Years of Age; for according to *Solon's* Law, no one was allowed to ſit in the Senate-houſe under that Age. The Judges being highly diſguſted at the Deportment of *Socrates*, *Plato* aſſumed the Orator's Chair, in order to plead his Maſter's Cauſe; but was interrupted in the ve-

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The Judges, in ſhort, were ſo far exaſperated againſt *Socrates*, that they paſt Sentence of Condemnation upon him. *Plato*, however, begged of him to accept of ſuch a certain Sum as would be ſufficient to purchaſe his Enlargement, but *Socrates* peremptorily refuſed the generous Offer.

Plato, finding his Maſter thus obſtinately bent on his own Ruin and Deſtruction, left *Athens* with Tears in his Eyes, and withdrew, being accompanied by ſeveral of his Brother-pupils, to the Habitation of one *Euclid*, who entertained them all in the moſt hoſpitable Manner, 'till the Storm was blown perfectly over.

Notwithſtanding the high Opinion he conceived of *Socrates* and his Doctrines, which doubtleſs were juſt and beautiful enough; yet all of them were inſufficient for the filling of his capacious Mind: He thirſted ſtill (ſays *Cicero*) to drink larger Draughts from the Fountains of Learning, and determined (as he had unhappily loſt his Maſter) to travel to any Place, how remote ſoever, for the Improvement of his Studies.

Accordingly his firſt Expedition was to *Italy*, where he had heard large Encomiums of the *Pythagorean* Philoſophers, who reſided in thoſe Parts; and in their Schools it was (as they themſelves boaſt) that he received his firſt Inſtructions in natural Philoſophy. Being conſcious to himſelf, however, that, if he would but travel into more remote Parts, he ſhould be able to make ſtill farther Improvements, he went from thence directly to *Cyrene*, where he ſtudied Geometry, and ſome other uſeful Parts of the Mathematics, under one *Theodorus*, who was at that Time univerſally admired as an Adept in that particular Science.

From thence he travelled into *Egypt*, and acted there in the Capacity of an Oil-Merchant; but the Advantages ariſing from Traffick were the leaſt Part of his Concern; his principal Aim was, to pry as narrowly as poſſible into their Inſtitutes of *Arithmetic* and *Aſtronomy* (as *Cicero* aſſures us) and to be fully informed of all the Ceremonies and religious Cuſtoms of their Prophets.

He travelled all over the Country (according to *Valerius Maximus*) and informed himſelf, by holding frequent Converſations with the Prieſts wherever he went, of all their Notions with reſpect to *Geometrical* Proportions, and the various Motions of the

Celeſtial Bodies: And during the Time that the young Students at *Athens* were enquiring after *Plato*, in order to become his Diſciples, he was employing himſelf in taking an accurate Survey of the Banks of the River *Nile*, the vaſt Extent of the Country, and the meandring Compaſs of its Trenches, and in acting as a Pupil under the Inſtructions of ſome of the wiſeſt as well as oldeſt of the *Egyptians*.

Having finiſhed his Survey to his own private Satisfaction, he at laſt ſettled himſelf in the Province of *Sais*; where he learned, from the wiſe Men of that Place, the Notions which they held concerning the Univerſe, its Nature and Origin, the Motion of the heavenly Bodies, *&c.*

From the Natives of this Place (as *Pauſanias* aſſures us) he learned the Doctrine, not only of the Immortality, but the Tranſmigration of the Soul into various Bodies.

Having reſided there a ſufficient Time, he determined to re-viſit *Italy*, and accordingly arrived there ſafe, and ſettled himſelf at a Place called *Tarentum*, where he kept Company principally (according to *Cicero*) with *Eurytus* the Elder, and one *Archytas*.

Thus he added to what he had learned from *Socrates* and from the *Egyptians*, the Doctrine of *Pythagoras*; and informed himſelf in ſeveral Articles, which *Socrates* totally neglected, as not thinking them any ways eſſential to the Happineſs of this Life; for he made nothing, in ſhort, his Study, but the ſtrict Rules of Morality and Logick.

Plato, if we may credit *Eugubimus*, borrowed the myſterious and intricate Part of his Philoſophy, but more particularly that which relates to the divine Goodneſs, from *Hermes Triſmegiſtus*. It is to be preſumed, however, that this Aſſertion was grounded rather on his own Conjecture, than any real Authority that he had to ſupport it. 'Tis imagined by ſome, that *Plato* received abundance of Information from the ſacred Writings of *Moſes*. *Joſephus* tells us, that in divers important Articles *Plato* copied after their great Law-giver: And another *Jewiſh* Author aſks the following Queſtion, What is *Plato?* and then returns this immediate Anſwer, *viz.* Nothing but *Moſes* ſpeaking *Greek* inſtead of *Hebrew*.

Now,

Now, tho' it be true, that there may be ſome ſmall Affinity between the Writings of *Plato* and *Moſes*, yet 'tis highly probable, that he never had any Inſpection of the ſacred Scriptures; ſo that the Notion at beſt is but mere Conjecture.

When *Plato* went to *Sicily*, he purchaſed (as *Laertius* affirms) the valuable Writings of one *Philolaus*, a *Pythagorean*, who was in great Repute there at that Time. The whole was digeſted into three ſeveral Tracts on natural Philoſophy; which were the Firſt (as we are told) that were ever expoſed to public Sale in that School. Some will have it, that he procured them from a Friend of *Dionyſius* for the Value of four *Alexandrian Minæ*. Others ſay, that *Dionyſius* bought them of a young Gentleman, that was a Pupil of *Philolaus* the Philoſopher, and beſtowed them on *Plato* as a free Gift. Others again inſiſt, that he ſent to *Dion* at *Syracuſe*, and requeſted him to purchaſe them for him at any Price he thought proper to give, which he bought accordingly, at the Rate of 100 *Minæ:* But, if we may credit *Aulus Gellius*, he ſays, the Purchaſe-money amounted to 10,000 *Denarii*. Whatever Value, however, were put upon them, be it more or leſs, *Plato* could very well afford it at that Time; for not long before he had received no leſs than 80 Talents from *Dionyſius*.

Now out of thoſe valuable Writings, it is generally thought (as both *Aulus Gellius* and *Laertius* poſitively affirm) that he *ſtole* (as the Critics term it) the beſt Part of his univerſally admired *Timæus*; for which he is too ſeverely reflected on by one *Timon*, in his *Sillis*, who envied him for his ſuperior Wiſdom.

In order to depreciate him, the ſarcaſtical Paſſage is couched in the three following Lines.

You, Plato, *with the ſame Affections caught*,
With a large Sum a little Treatiſe bought,
Where all the Knowledge which you own was taught.

Alcimus and *Laertius* likewiſe tax him with borrowing very largely from *Epicharmus*, the Comic Poet, and both quote ſeveral Paſſages for the Confirmation of what they aſſert.

Phavorinus, moreover, boldly affirms, that the whole Sum and Subſtance of *Plato*'s *Common-wealth* is to be met with in

Protagoras's Antilogics. As to his political Writings, they were all ſtolen (as others with equal Aſſurance and ill-Nature affirm) from his great Maſter *Socrates*.

And laſtly (to mention no more) *Laertius* aſſures us, that the moſt valuable Part of his moral Tracts, are little or nothing more than Extracts from the univerſally admired Book of *Sophron*, the *Minograph*, which were found under his Pillow at the Time of his Deceaſe.

Now all theſe ſeveral Charges upon him, as a Plagiary, it muſt be allowed, are very heavy, and the evident Effects of Spleen and Ill-nature; but we think them, in Reality, no Aſperſions at all, as they are not only beyond Meaſure partial, but abſolutely unjuſt.

That he obtained his Learning from the Peruſal of the beſt Authors then extant, and from his conſtant Attendance on the Lectures which his ſeveral Maſters read from Time to Time in public, redounds, in our Opinion, greatly to his Credit; and none but thoſe, who envied him for his ſuperior Merit to their own would preſume to depreciate him on that Account. On the contrary, his great Improvements drawn from thence are inconteſtible Proofs of his Judgment and indefatigable Induſtry in the Courſe of his Studies; for had the ſame Authors aſſerted, that he received it any other Way, it muſt have been by Inſpiration; and had they advanced ſuch an idle Notion, we ſhould have deemed them either void of Underſtanding, or very partial Hiſtorians.

That he borrowed his Thoughts, therefore, from all the Books he could by any Means procure, and from his frequent Converſations with Men of the profoundeſt Learning, we will readily allow; but then, in caſe it manifeſtly appears, that he made large Additions and Improvements to thoſe literary Flowers, from whence, like the induſtrious Bee, he extracted the beſt Part of his Honey; and that he turned and applied each Branch of Literature in a widely different Way, or to quite different Purpoſes than it ever had been applied before; if, in ſhort, it be evident, that he brought to Light, and expoſed to public View, what the wiſe Men of that dark Age ſo very diſingenuouſly ſtudied to keep concealed, in order to enhance their own Wiſdom, and to meet with diſtinguiſhed Deference and Reſpect

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from the Vulgar; if he did nothing more, we ſay, than this, and that therefore he could not, in a ſtrict and proper Senſe, be deemed an abſolute Inventor; yet ſtill he ought, at leaſt, to be highly valued, and looked upon as one of the profoundeſt Scholars of his Age, and juſtly merited that high Title by which he was afterwards diſtinguiſhed, namely, *Plato* the *Divine*.

Being returned to *Athens*, after his many long and fatiguing Journeys, he ſettled himſelf in a particular Spot (at ſome ſmall Diſtance from the City) called the *Academy*, as we are told, from one *Ecademus*, which was ſurrounded with Woods, and reckoned a very unhealthful Situation. *Plato*, indeed, was adviſed by his Phyſicians to remove from thence to the *Lyceum*, but he turned a deaf Ear to all their Perſuaſions; for he had made choice of it, it ſeems, as a neceſſary Corrective to his Corpulency, and with Hopes that it would incline him to fall away. His own Preſcription, indeed, met with the deſired Effect; for he ſoon caught there a Quartan-Ague, which ſhook him very ſeverely for a whole Year and a Half; but by the Dint of Temperance, and a very abſtemious Courſe of Life, he at laſt conquered his Diſtemper, and recovered his Strength to that Degree, that he was more active and vigorous than ever he had been before his Indiſpoſition.

He went thrice into the Field of Battle. His firſt Expedition was to *Tanagra*; his next to *Corinth*, and his laſt to *Delos*, in which Engagement the Party he eſpouſed became victorious. Thrice likewiſe he travelled into *Sicily*; the firſt Time he went thither with no other View, than to gratify his Curioſity, and be an Eye-witneſs of the Eruptions of Mount *Ætna*. At that Time he was about 40 Years of Age; and went to pay the Tyrant *Dionyſius*, the Elder, a Viſit, who had teſtified a great Inclination to have ſome Converſe with him. The Liberty, however, which he took in diſcourſing on the Topic of Tyranny had like to have coſt him very dear; and his Death had proved, in all Probability, the fatal Conſequence, had not one *Dion* and *Ariſtomenes* pleaded hard in his Behalf. Tho' the Tyrant, indeed, thro' their Interceſſion, ſpared his Life; yet he ſhewed his Reſentment ſo far, that he delivered him up to one *Polides*, a *Lacedemonian* Ambaſſador, at that Time reſident at *Dionyſius*'s Court, with expreſs Orders for his being ſold as a Slave. That

Ambaſſador ſoon after conveyed him away to *Egina*, and there executed the Tyrant's Commiſſion. The Natives of that Place had paſſed a Law, by Virtue whereof, every *Athenian* was ſtrictly enjoined not to enter their Iſland upon Pain of Death. His Preſumption, therefore, was inſiſted upon by one *Charmander*, the Son of *Charmandrites*, as a capital Crime, and that he ought in Juſtice to die for ſo open a Violation of their Laws: But ſome Perſons then preſent, not being ſo very vindictive, made a nice Diſtinction in his Favour; namely, that ſuch Law was made to deter *Men* from approaching their Iſland, but not *Philoſophers*. This Diſtinction prevailed; and they contented themſelves with puniſhing him no farther than by ſelling him for a Slave. Very providential was it for poor *Plato*, that one *Anniceres*, a Native of *Cyrene*, happened at that Time to be reſident in the Iſland, who purchaſed him for the Conſideration of twenty *Minæ*. No ſooner was the Money paid, but his new Maſter very generouſly took the firſt Opportunity of ſending him back to *Athens*, and reſtoring him to his Friends. As for *Polides*, the *Lacedemonian*, who had ſold him firſt, he was defeated by one *Cabrias*, and was afterwards thrown headlong into the Sea, as a juſt Puniſhment for the ſevere Afflictions which he had cauſed ſo divine a Man as *Plato* to undergo; and if the Report may be credited, he was informed by an Apparition of his approaching untimely End.

Dionyſius the Elder being informed that *Plato* was arrived once more at *Athens*, in a State of Freedom, contrary to his Expectations; was under ſome Apprehenſions that *Plato* would ſtudy ſome Way or other to gratify his Rage and Reſentment, for the Indignity that had been offered him; he wrote, therefore, a very complaiſant Letter to him, wherein he, in Effect, tho' not in direct Terms, begged his Excuſe for degrading him as he had done; and inſinuated, that it was with Pleaſure, he heard of his reſiding again amongſt his Friends. *Plato*, however, ſent but a very cold Anſwer to the Tyrant, which was to this or the like Effect, *viz.* "That he need not give himſelf any great "Concern about what had paſſed; for his Thoughts were ſo "much taken up with the Charms of Philoſophy, that he had no "Time to ſpare in the Gratification of any private Reſentment."

To ſome of his Detractors, who upbraided him, ſome Time afterwards, with his being diſcarded by *Dionyſius* the Tyrant; he

he made Reply, that it was a falſe Aſſertion, that *Dionyſius* had abandoned *Plato*; but the contrary is true, that *Plato* has abandoned *Dionyſius*, as a Tyrant, and the juſt Object of his Scorn and Contempt.

He went the ſecond Time to *Sicily*, in the Reign of *Dionyſius* the younger, with a View to prevail on that Tyrant, if poſſible, to reſtore his Fellow-Citizens to the Enjoyment of their former Privileges; or, at leaſt, to treat his Subjects with more Lenity than his Father had done before him; but after he had reſided there for four Months, and perceived plainly, that the Tyrant turned a deaf Ear to all his Solicitations in Favour of his Countrymen; that he had moreover ſent his good Friend *Dion* into Exile, and continued reſolute to tread in the Foot-ſteps of his tyrannical Predeceſſor, he went back to *Athens*, highly diſguſted, notwithſtanding the Tyrant preſſed him very earneſtly to tarry at his Court, and uſed his utmoſt Endeavours to convince him, that his Friendſhip and Reſpect for him was perfectly ſincere.

The laſt Time he went to *Sicily* was, with a View to ſolicit the Tyrant once more in Favour of his Friend *Dion*, and prevail on him, if poſſible, to diveſt himſelf of his deſpotic Power; but as *Dionyſius* had promiſed faithfully, that *Dion* ſhould be reſtored, and paid no Regard, in Effect, to his moſt ſolemn Engagements, he took the Liberty to upbraid him for his Want of Sincerity in ſuch warm Terms, that provoked the Tyrant to ſo high a Degree, that he run the Riſque of his Life; and in all Probability he had been actually cut off, had not *Archytas* of *Tarentum* ſent an Ambaſſador to him on Purpoſe to require him at his Hands, and a Veſſel likewiſe for his Embarkation. *Dionyſius*, at the Interceſſion of *Archytas*, did not only permit him to go on board, but furniſhed him with all the neceſſary Proviſions for his Voyage. Thereupon *Plato* withdrew to *Athens*, with an Intention never to depart from thence again: Upon his Arrival he was received with all the public Teſtimonies of the higheſt Deference and Eſteem; but notwithſtanding they entreated him to take upon him the Reins of Government, he peremptorily refuſed to accept of the Honour of ſo important a Poſt, as firmly believing, that, in the Midſt of ſuch a general Depravation of Manners; there were no Hopes of making any conſiderable Reformation.

No

No greater Teſtimony, however, can poſſibly be produced of that high Veneration and Eſteem which all *Greece* had for him, than the following remarkable Circumſtance which actually happened at the *Olympic* Games. He was there received more like a God deſcended from the Clouds, than a mortal Man: For the countleſs Multitude, who were exceſſive fond of all Sorts of public Shews, and had flocked thither from all Parts of *Greece*, in order to be Spectators of the *Olympic* Games, which were always executed with the utmoſt Pomp and Magnificence, abandoned at once, not only the Diverſion of their various Races, but of their Athletic Encounters likewiſe, for no other Pleaſure than that of gazing on the Man of whom they had heard ſo many marvellous Relations.

He ſpent his whole Life in a State of Celibacy, and kept up to the ſtricteſt Rules of Temperance, and Self-denial. He was of ſo reſerved a Temper, even in his Youth, that he never was known to expreſs a Pleaſure, with any greater Emotion than that of a Smile; and he had ſuch a perfect Command of his Paſſions, that nothing could provoke his Anger or Reſentment. And we are told, by way of Confirmation, that a young Pupil of *Plato*'s, who had reſided with him for ſome conſiderable Time, going accidentally home to pay a Viſit to his Relations, was ſo perfectly ſurprized one Day to ſee his Father in a Paſſion, that he could not forbear from remarking, that he had never ſeen any Thing like it at his Maſter's Houſe. Once, indeed, it happened, that one of his Slaves had provoked him to a very high Degree, by the Commiſſion of ſome very heinous Fault; but he gave Orders to one of his ſuperior Domeſtics to correct him; ſaying, that as he was a little too angry, he was not duly qualified to give him the Chaſtiſement he deſerved. Notwithſtanding he was naturally of a reſerved, and very penſive Diſpoſition; yet, if we may credit *Ariſtotle*, he was affable, courteous, and perfectly good-natured; and ſometimes would condeſcend to crack little innocent Jokes on ſuch of his Acquaintance as he thought he might make free with. Every now and then he would adviſe his two intimate Friends, *Xenocrates* and *Dion*, whoſe Deportment he imagined ſomewhat too rigid and reſerved, to ſacrifice now and then to the *Graces*, in order to render their Converſation a little more free and eaſy.

Plato

Plato had a great Number of Pupils; but the three who made the moſt diſtinguiſhed Figure afterwards, were *Spuſippus*, his Nephew, by *Potona* his Siſter, who was the Spouſe of *Eurimedon*, *Xenocrates* the *Caledonian*, and the celebrated *Ariſtotle*. Some Hiſtorians peremptorily aſſert, that *Theophraſtus* was another of his Diſciples; and that the celebrated *Demoſthenes* likewiſe looked upon him as his Maſter. In a Word, this laſt-mentioned Pupil, having fled for Shelter to ſome proper Aſylum, in order to ſecure himſelf from the Reſentment of *Antipater*; when *Archias*, whom *Antipater* had ſent in order to bring him by Force before him, promiſed him, upon Honour, that he ſhould not loſe his Life, in caſe he would voluntarily reſign, and make his perſonal Appearance: God forbid! ſaid he, that after I have heard *Xenocrates* and *Plato* diſcourſe ſo divinely on the Immortality of the Soul, that I ſhould prefer a Life led in Infamy and Diſgrace before an honourable Death.

Some Authors aſſure us, that there were two young Ladies amongſt the Number of his Auditors, one named *Laſthemia* the *Mantinean*, and the other *Axiothea* the *Phlyaſian*; both diſguiſed in Men's Apparel, as being deemed by them the moſt proper Dreſs for female Philoſophers.

He had ſuch a peculiar Affection for the important Science of *Geometry*, that is to ſay, the true Mathematical Rule of Proportion, that he ordered the following Inſcription to be painted in large Capitals over the Door of his Academy. LET NO ONE PRESUME TO ENTER HERE UNLESS HE HAS A TASTE FOR GEOMETRY AND THE MATHEMATICS.

All the Works of *Plato*, except his twelve Letters, which are to be met with only in the Cloſets of the Curious, are digeſted, by Way of familiar Dialogues. Theſe Converſations may properly be divided into three different Species; in the firſt he confutes the Sophiſts; the ſecond is peculiarly adapted to the Inſtruction of Youth; and the laſt are more peculiarly calculated for the Information of ſuch as are more adult, and Perſons of the deepeſt Penetration. There is likewiſe another Diſtinction to be made, in regard to his dialogical Diſcourſes; for whatever Poſition *Plato* lays down, when he aſſumes his own Name, either in his Treatiſe on the Laws, or in his *Epinomis*, he ſpeaks

his own real Sentiments; but whenever he advances any Doctrines in a fictitious Character, that is to ſay, when he borrows the Name of *Socrates*, *Timæus*, *Parmenides*, or *Zeno*, he only lays them down as probable Conjectures, without any Confirmation of them as his own private Opinion. Notwithſtanding, what Words he puts into the Mouth of *Socrates*, in any of his Dialogues, are always in the Taſte, and according to the Form and Method of Diſputation preſcribed by his great Maſter, we muſt not always take it for granted, that what he ſays are the real Sentiments of *Socrates*; ſince we are informed from very ſufficient Authority, that when *Plato* had read in Public his Dialogue entitled *Lyſis*, on the Topic of Friendſhip, which he compoſed in his Maſter's Life-time, *Socrates* could not refrain from inveighing againſt it, crying out, *Ye Gods! what Doctrines has this young Man made me advance, which never once entered into my Thoughts!*

The Style of *Plato*, according to the Teſtimony of *Ariſtotle*, his Pupil, was (if we may allowed the Expreſſion) a Medium between Poetry and Proſe. *Cicero* entertained ſuch a peculiar Veneration for the Beauties of it, that he did not ſcruple to aſſert, that if *Jove* himſelf was inclined to talk in any human Language whatſoever, he would never have expreſſed his Thoughts in any other Style than *Plato*'s. *Panætius* diſtinguiſhed him by the venerable Title of *Homer* the Philoſopher; which amounts to much the ſame Compliment, ſince paid him by the univerſally admired *Quintilian*, who, in his Animadverſions on the nervous Style of all his Compoſitions in general, was pleaſed to ſay, they were Copies of the divine Writings of *Homer* himſelf.

His Plan was built on the Sentiments of three very profound Philoſophers. He gave entirely into the Notions of *Heraclitus*, in regard to natural and experimental Philoſophy, that is to ſay, ſuch Objects as were open and obvious to the Eye, with reſpect to the Metempſychoſis, or the Tranſmigration of Souls, and ſuch Truths as were only to be diſcovered by the Dint of Reflection, he followed very cloſely the Foot-ſteps of *Pythagoras*. As to his political and moral Tracts he made his Maſter *Socrates* his grand Exemplar, and, in his humble Opinion, no One's Sentiments beſides could ſtand in Competition with them.

Plato,

Plato, if we may rely on the Veracity of *Plutarch*, in his firſt Book on the Maxims of the Philoſophers, admits of three Principles, the Supreme Being, Matter, and the Mind, or Underſtanding; the firſt, as the univerſal intelligent Being; the ſecond as the principal Agent, with reſpect to Generation and Corruptibility; and the laſt, as Subſtance incorporeal, and ſubſiſting in the Omniſcience of the Supreme Being. He acknowledged, in Fact, that the Creation of the World was the Handy-work of an omnipotent Being; but that he did not mean by the Term Creation, a Creation in a ſtrict Senſe; for he imagined, that the Almighty formed and erected the World (if the Expreſſion may be allowed) in a pre-exiſtent Manner, and that it had no Commencement; inſomuch that God, the Creator of all Things, acted, in regard to the World that he had made out of a meer Chaos and Confuſion, and to the Form and Faſhion which he had given to inanimated Matter, no otherwiſe than as an able and experienced Architect would do, with reſpect to his Materials of Timber, Brick and Stone, which he orders and diſpoſes of as he ſees moſt convenient for the Erection of a regular and magnificent Palace, or other pompous, tho' more private Structure.

'Tis univerſally allowed, that *Plato* had ſome Knowledge of the Supreme Being, or only true God, either from the Light of Nature, or from an Inſpection of the Writings of the ſacred Pen-men of the *Old Teſtament*. It muſt be acknowledged, however, likewiſe, that there were Numbers of ſuch Philoſophers, *who* (as St. *Paul* expreſſes it) *having known God, did not glorify him as God*, but were bewildered, and walked in the Dark, following the Dictates of their own vain and fooliſh Imaginations. In ſhort, he maintained, in his Treatiſe entituled *Epinomis*, three diſtinct Deities; that is to ſay, the ſuperior Gods, middle Gods, and ſuch as were inferior to them both, whom he diſtinguiſhed by the Name of Demons. In all Probability, *Plato* grounded his Notion of the middle Gods on what is ſaid in the ſacred Scriptures concerning the Angels.

Plato likewiſe maintained the Doctrine of the Metempſeuchoſis, which he borrowed, indeed, from *Pythagoras*, but very greatly improved it, as is apparent from his Dialogues, entituled *Phædrus*, *Phædon*, *Timæus*, &c. Notwithſtanding *Plato* publiſhed

liſhed a moſt excellent Treatiſe on the Immortality of the Soul; yet he ran into ſeveral very groſs Errors, not only in regard to the Subſtance of the Soul, which he imagined to be compoſed of two diſtinct Parts; one ſpiritual, the other corporeal; but with reſpect to its Origin, maintaining that the Souls of Men were pre-exiſtent, and formed before their Bodies; and that deriving their Being from Heaven, in order to animate, ſucceſſively, different Bodies, they returned to Heaven after a due Purification; from whence, after the Expiration of a certain Number of Years, they were again employed in animating different Bodies, one after another; inſomuch that it was nothing more than one continued Circle or Round of Defilements and Purifications; of Returns to Heaven, and from thence back again to Earth, in thoſe particular Bodies which 'twas their Province to animate. As he was entirely of Opinion, that ſuch Souls never totally forget the various Tranſmigrations and Scenes of Life, which they had underwent whilſt in the different Bodies which they had animated from Time to Time, he conceived, that ſuch Knowledge as they acquired was not new, but a Reflection on, or a Recollection rather of what they knew before; and he grounded theſe imaginary Recollections on his Dogma, or Tenet of the Pre-exiſtence of Souls.

However, without expatiating any farther on the Doctrines of this Philoſopher, which we have tranſmitted to us but in a very dark and imperfect Manner; we ſhall only obſerve, that his Notions on divers important Articles, ſeemed ſo novel, and ſo ſublime, that he in reality merited the high and venerable Title which he obtained in his Life-time, namely, that of *Plato the Divine*; and he was, moreover, looked upon by his Succeſſors, after his Deceaſe, but a little lower than one of the Gods. He died in the firſt Year of the 108th *Olympiad*, in the 81ſt Year of his Age, and, what is ſomewhat remarkable, on his very Birth-day.

ARISTOTLE

WAS one of the moſt illuſtrious Philoſophers amongſt the Antients, and more remarkable in particular for his moſt accurate and curious Reſearches into the hidden Beauties of Nature, than any of his learned, and moſt inquiſitive Predeceſſors: Nay, his Name is ſtill revered in all the Schools. He was the Son of *Nicomachus*, a celebrated Phyſician at that Time, a great Favourite of *Amintas*, then King of *Macedonia*, and an illuſtrious Deſcendant of *Machaon*, the Grand-Son of the celebrated *Eſculapius*. He was born at *Stagira*, a populous City of *Macedonia*, in the firſt Year of the 99th *Olympiad*. His Father and Mother unfortunately died, whilſt he was but an Infant; and his Guardians, to whoſe Care and Conduct his future Education was entruſted, were too unmindful of the important Charge which they had undertaken. He ſpent too many Years of his Youth in Intemperance, Riot, and Exceſs; inſomuch that, before he arrived at the Age of Manhood, he had ſquandered away the greateſt Part of that Subſtance which devolved to him by the Deceaſe of his Parents. Being thus plunged, through his Extravagance, into Misfortunes, he applied himſelf directly to the Army, in hopes of a genteel and comfortable Subſiſtence; but ſoon growing weary of a Military Life, as not being in all reſpects conformable to his natural Inclinations, he repaired to *Delphos*, in order to conſult the *Oracle* there, and know for certain what Station of Life would for the Future prove moſt to his Advantage. Whereupon, the *Oracle* directed him to go to *Athens* without Delay, and there apply his Mind to the Study of Philoſophy with the utmoſt Attention. At that critical Conjuncture, he was but 18 Years of Age. He ſtudied for 20 Years ſucceſſively in the Academy there under the Inſtructions of the Divine *Plato:* And foraſmuch as, by his former Ill-conduct, he had ſquandered away (as before hinted) all his Patrimony, he was reduced to the Neceſſity of acting the Part of a Phyſician, and vending his medicinal Packets all about the Town, for his daily Subſiſtence.

Ariſtotle eat but little, and ſlept leſs: He had ſuch an inſatiable Thirſt after Knowledge, that in order to withſtand the

natural Temptations of Sleep, he always placed a Braſs-Baſon by his Bed-ſide, and whenever he laid himſelf down to Reſt, he extended one of his Hands quite out of the Bed, in which he conſtantly held a leaden Bullet, which, when Sleep had overcome him, would drop down in courſe into the Baſon, and by the Sound thereof inſtantaneouſly awake him. *Laertius* aſſures us, that notwithſtanding he had an effeminate Voice, ſmall Eyes, and ſpindle Shanks; yet he had a Taſte for Dreſs, and affected, whenever he went abroad, to make a grand Appearance.

Ariſtotle was a Man of deep Penetration, and comprehended at once, without the leaſt Heſitation, the moſt difficult and abſtruſe Queſtions that could poſſibly be propoſed to him. He ſoon became an Adept, under the Inſtructions of ſo able and experienced a Maſter as *Plato*, and diſtinguiſhed himſelf, by his ſurpriſing Progreſs in Learning, from all the Reſt of his Brother-pupils. There was no Queſtion, of what Nature or Kind ſoever, propoſed in the Academy, but *Ariſtotle* was always conſulted, before the Debate was ended; notwithſtanding his Sentiments were ſometimes widely diſtant from thoſe of *Plato* himſelf. All the Pupils in general looked on him as an extraordinary Genius; and ſome of them were ſo prejudiced in his Favour, that they would prefer his private Opinion before that of their Maſter. *Ariſtotle* at laſt withdrew from the Academy, at which *Plato* was highly diſguſted. He could not refrain from treating him as a Truant and a Fugitive; and would frequently complain, that his Pupil was very undutiful, and flew in his Face, like an inſolent Chicken, that pecks at her Mother-Hen.

The *Athenians* pitched upon *Ariſtotle* to act as their Ambaſſador to King *Philip*, the Father of *Alexander* the Great. *Ariſtotle* reſided for a conſiderable Time in *Macedonia* accordingly, in order to diſcharge the important Truſt repoſed in him. When he had concluded all his Affairs to his Satisfaction, he returned to *Athens*; where he perceived, that *Xenocrates* had been ſubſtituted as Academiſt in his Abſence: Whereupon, he ſaid, that it would reflect on his Character ſhould he ſtand mute, whilſt *Xenocrates* was talking: He inſtituted a new Sect of Philoſophers,

phers, and maintained ſeveral Tenets widely diſtant from thoſe which he had learnt of his Maſter *Plato*.

The univerſal Character, which *Ariſtotle* had obtained, of ſhining in a diſtinguiſhed Manner, in every Branch of uſeful Knowledge, but more particularly in Politics and experimental Philoſophy, induced *Philip*, King of *Macedonia*, to invite *Ariſtotle* to take upon him the important Truſt of the Education of the young Prince, his Son. *Ariſtotle* was at that Time in his Bloom, between 30 and 40 Years of Age. *Ariſtotle* accepted of that honourable and royal Offer, and acted accordingly in that high Poſt for eight Years ſucceſſively; and communicated (as *Plutarch* aſſures us) to his young Pupil, ſome particular Points of Learning, which he induſtriouſly concealed from all the World beſides. As the Study of Philoſophy and the other abſtruſe Sciences had no bad Influence on his Deportment, and had not rendered him in the leaſt imperious or moroſe; he applied his Mind very cloſely to the due Adminiſtration of all public Affairs; and Nothing of Moment was tranſacted at the *Macedonian* Court, but what he had a principal Hand in the Execution of it. King *Philip*, out of a peculiar Regard and Affection for *Ariſtotle*, rebuilt the City of *Stagira*, (which was the very Spot whereon that great Philoſopher was born, and which had been laid in Ruins by the then late Wars) and for his Sake generouſly releaſed all thoſe who had been taken Captives, as well as thoſe who had fled for the Preſervation of their Lives and Liberties, to Parts remote.

Ariſtotle, after he had faithfully diſcharged his Duty to his Royal Pupil, and taken his Leave, in the moſt affectionate Manner, of that young, hopeful Prince, returned to *Athens*, where he was received with all the Teſtimonials of the higheſt Reſpect; becauſe King *Philip*, out of Gratitude and Love for his Son's Tutor, had conferred on the *Athenians* ſeveral very intereſting and important Favours. He pitch'd upon a particular Spot of Ground in the *Lycæum*, to which there was a long Avenue, or Gravel-walk, with a regular Row of verdant Trees on each Side, for the Place of his Reſidence, and the Eſtabliſhment of his public School: And foraſmuch as it was his conſtant Cuſtom to improve his young Pupils, by way of familiar Converſation, as they were walking backwards and forwards,

forwards, the whole Sect of *Ariſtotelians* were afterwards diſtinguiſhed by the Name or Title of the *peripatetic* Philoſophers. The *Lycæum* ſoon became a Place of public Notice, on Account of the vaſt Concourſe of People both of Learning and Faſhion, who reſorted thither from all Parts, for the Pleaſure as well as Advantage ariſing from his public Lectures; for his Fame was induſtriouſly ſpread all over *Greece*.

Some time after his Eſtabliſhment in this Academy, his Pupil *Alexander* deſired him to read public Lectures on experimental Philoſophy; and for that purpoſe, gave Orders that a great Number of Sportſmen, as well as Fiſhermen, ſhould wait on him from all Parts, and furniſh him with a Profuſion of the moſt curious Materials for the Objects of his Obſervation; and ſent him, at the ſame Time, eight hundred Talents in order to defray that extraordinary Expence.

Much about that Time, *Ariſtotle* publiſhed ſeveral metaphyſical as well as phyſical Tracts. *Alexander*, who was then in *Aſia*, hearing that his Books were expoſed to public Sale, being a jealous Prince, and very ambitious of being the greateſt Man in the World, in all Reſpects, was not only highly concerned, but even diſguſted, to find, that the profound Knowledge of *Ariſtotle* was laid open, and made plain and obvious to common Underſtandings; and communicated his Reſentments on that Account in a conciſe Epiſtle, which was couched in pretty warm Terms, to the following Effect.

ALEXANDER to ARISTOTLE.

"YOU have acted very indiſcreetly, in publiſhing your "ſeveral Treatiſes on all the ſpeculative Sciences; ſince, "when the Doctrines and Precepts, which you communicated to "us in private, are at once ſpread all over the World, we ſhall "have no Wiſdom to boaſt of above the meaneſt of our Sub-"jects. I would have you to know, that I had much rather "ſurpaſs all others in the Knowledge of ſome hidden Literary "Secrets, than to be the moſt powerful Monarch in the Uni-"verſe."

Ariſtotle, in order to pacify his ambitious Pupil, and to vindicate his paſt Conduct, returned him the following ſhort, but artful Anſwer. *SIRE*,

SIRE,

"TIS true, indeed, that I have expoſed my Works to pub-
" lic Sale; but I have caſt ſuch a dark Veil over them, that
" not one Eye in a Thouſand will ever be able to diſcover the
" literary Beauties which lie concealed under them."

By this artful Anſwer, he plainly intimated, that he had rendered his Doctrines ſo intricate and confuſed, that none but a few penetrating Virtuoſi would be capable of the leaſt Improvement from his elaborate and profound Inſtructions.

Ariſtotle, at laſt, was not that Favourite with *Alexander*, as he had been for many Years. He fell out with him for eſpouſing, with too much Warmth, the Intereſt of *Caliſthenes* the Philoſopher, who was a diſtant Relation of *Ariſtotle*'s, and his Niece's Son. *Ariſtotle*, it ſeems, had brought him up from his Infancy, under his own Roof, and had all along taken upon himſelf the Care and Concern of his Education. When *Ariſtotle* took his Leave of *Alexander*, and the *Macedonian* Court, he recommended this favourite Nephew of his, in the moſt ſanguine Manner, to be an Attendant on that young Prince in his future Expeditions. *Caliſthenes* ſpoke his Mind too freely to his Majeſty, and did not act the Part of a paraſitical Courtier with a good Grace. It was through his Perſwaſions, that the *Macedonians* abſolutely refuſed to worſhip *Alexander* as a God, as was a cuſtomary Piece of impious Flattery among the *Perſians*.

Alexander, who had conceived an innate Averſion to him, on account of his blunt Deportment, and Want of Complaiſance, was determined to get rid of this troubleſome Courtier at all Adventures. Whereupon he involved him, as he was not ſufficiently upon his Guard, into a Conſpiracy, which was firſt formed, and ſecretly carried on ſome Time after, by one *Hermolaus*, a Pupil of *Caliſthenes*; and would never ſuffer him to urge one ſingle Word in his own Vindication. In ſhort, ſome inſiſt, that *Alexander* cauſed him to be thrown into a Lions Den; others, that he was executed, by Way of Contempt, as a common Malefactor, on a Gibbet; and others again are of Opinion, that he died upon the Rack.

Ariſtotle, ever after this ignominious Treatment of his Nephew, looked on his royal Pupil with an Eye of Contempt,

and mortal Hatred: *Alexander*, on the other Hand, ſtudied every Way he could poſſibly deviſe to mortify his Tutor, and make him uneaſy. Accordingly, he promoted his Rival *Xenocrates*, and ſent him ſeveral very valuable Preſents. At this, *Ariſtotle* was nettled to the laſt Degree; and prompted by Jealouſy vowed Revenge. Some Hiſtorians aſſure us, that he carried his Reſentment to ſo high a Pitch, as to become an actual Party concerned in the Conſpiracy againſt him formed by *Antipater*, and to give him private Inſtructions, how to prepare thoſe poiſonous Ingredients which were ſuſpected to be the Cauſe of *Alexander*'s Death.

Though *Ariſtotle*, 'tis true, in moſt Reſpects, was a Man of Steadfaſtneſs and Reſolution; yet 'tis evident, from very authentic Accounts of him, that he had his Foibles, and Infirmities of Nature as well as other Men. Some ſhort Time after he had laid down his Academy, he withdrew to the Court of *Hermias*, the Tyrant of *Atarna*. Some Authors would inſinuate, that *Ariſtotle* was nearly related to that Prince; but others ſcruple not to aſſert, that he was criminally enamoured with him, and that he had ſome View of Intereſt and Advantage ariſing from the Payment of that Viſit, and the Gratification of that inordinate Paſſion.

Some Hiſtorians again aſſert, that, not long after his Arrival at *Atarna*, he married the Siſter of that Tyrant; but others are of Opinion, that his Spouſe was nothing more than One of his caſt-off Concubines.

But be that as it will, he was ſo far tranſported with the real or imaginary Charms of that young Lady, that he actually offered up Sacrifices to her, with all the Pomp and Solemnity imaginable, and paid her the very ſame divine Homage, as the *Athenians* did to the *Eleuſinian* Goddeſs *Ceres*; and moreover, compoſed ſeveral poetical and ſublime Panegyrics on his Favourite *Hermias* for his ſincere Friendſhip and condeſcending Goodneſs in beſtowing on him ſuch an angelic Partner.

Ariſtotle divided his Philoſophy into two Parts only; namely, Practice and Theory. The former is that, which lays down (as *Logic*, or the *Art* of *Thinking* does) thoſe certain Truths, which are beſt adapted to regulate and command the Operations of the Mind; or otherwiſe, ſuch other Rules and Maxims for the

the Conduct of human Life as are preſcribed us by the beſt Œconomiſts and the moſt experienced Politicians. The latter is that, which (like *Metaphyſics*, or *natural Philoſophy*) diſcovers to us ſuch particular Truths as are merely ſpeculative. According to the Tenets of this great Philoſopher, there are three Principles relative to all ſubſtantial Things in Nature, *viz.* Privation, Matter, and Form.

In order to demonſtrate that Privation ought to be deemed a Principle, he maintains, that the Matter whereof any new Thing is compoſed muſt have a Privation of the Form of ſuch new intended Thing. 'Tis abſolutely requiſite (for Inſtance) ſays he, that the Matter whereof any Table is to be compoſed ſhould have a Privation of the Form of that ſame Table; that is to ſay, in other Terms, that before any Table can be made, the Matter whereof it is to be compoſed, be it what it will, cannot actually be a Table.

He does not look upon Privation as a Principle, in regard to the Compoſition of Bodies; but as an external Principle only of their Production, in ſuch a Manner, that that Production becomes a Change or Variation, whereby ſuch Matter paſſes from that State and Condition in which it never was to another that it acquires, as in the before-mentioned Inſtance, a Block, or Plank of any Kind of Wood whatever, becomes a Table from being nothing like a Table before.

Ariſtotle gives us two different Definitions of Matter. The firſt, according to his Notion, is negative; that is, ſays he, 'tis neither Subſtance, Extenſion, or Quality; nor Exiſtence, in ſhort, of any Kind whatever; ſo that, according to his Idea, the Matter of Wood, for Inſtance, is neither its Length or Breadth, its Form, its Colour, its Solidity, its Weight, its Hardneſs, its Softneſs, its Roughneſs, its Smoothneſs, its Aridity or Moiſture; its Smell, nor, in a Word, any one other Accident whatever that may poſſibly attend ſuch Matter of Wood.

His other Definition is affirmative; but not in the leaſt more ſatisfactory than the former: He inſiſts, that Matter is the Subject whereof a new Thing is compoſed, and wherein it is at laſt reſolved. Now, according to his Notion, we ſhall for ever be

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at a Loſs to determine what the firſt Subject is, whereof all the Works of Nature are compoſed.

This ſame Philoſopher inſiſts, that, for the Formation of any natural Body, it is abſolutely neceſſary, it ſhould have another Principle, beſides that firſt Matter, which he calls Form. Some, indeed, imagine, that thereby he means nothing more than the Diſpoſition of its various Parts; others, however, are of Opinion, that he means a ſubſtantial Entity, really, and in all Reſpects diſtinct from that Matter; and that when any Corn, for Inſtance, is ground at the Mill, it aſſumes a new ſubſtantial Form, whereby the Corn is converted into Flower; and that afterwards, when Water is mingled with the Flower, the whole is metamorphoſed, as it were, and aſſumes directly another ſubſtantial Form, and is then no longer Flower but Paſte; and again, when that Paſte is thrown into the Oven and duly baked, it becomes at once a new ſubſtantial Form, and ſuch baked Paſte, in a Word, is metamorphoſed into Bread.

Theſe various Sorts of ſubſtantial Forms are admitted, indeed by ſome, in all other natural Bodies; thus, for Inſtance, in a Horſe, beſides his Bones, his Fleſh, his Nerves, his Brains, his Blood, which, by the Circulation thereof through his Veins and Arteries, nouriſhes and ſupports each individual Part of him; and beſides all theſe, the Animal Spirits, which are the Principles and Springs of all Motions; there are ſome Philoſophers, I ſay, maintain, with him, that there is a ſubſtantial Form, excluſive of all the before-mentioned Articles, which, they admit to be the Soul of the Horſe; they ſtrenuouſly maintain, that this imaginary Form is not drawn or extracted from the Matter itſelf, but the Energy or Power of that Matter: In a Word, they peremptorily inſiſt, that it is an Entity, really and truly diſtinct from the Matter, whereof it is not any individual Part, or even in the leaſt, any Modification of it whatſoever.

Ariſtotle ſtill farther maintains, that all terreſtrial Bodies are compoſed of the four Elements; that is to ſay, of Earth, Water, Air, and Fire; that the two firſt, being ponderous, naturally inclined to the Center of the World; and, on the other Hand, the two laſt, being light, keep at as great a Diſtance from it, as poſſibly they can. Beſides

Beſides theſe four Elements, however, he admits of a fifth, of which all celeſtial Bodies were compoſed, and the Motion whereof was always circular. He conceived, that above the Air, though under the Concavity of the Moon, there was a Globe of Fire, from whence all Flames had their Source, and into which they were reſolved; as Brooks and Rivers naturally diſcharge their Waters into the Sea.

Ariſtotle farther maintained, that Matter was diviſible *ad infinitum*; that the Univerſe was perfectly full, and that there was no ſuch Thing as a Vacuum in all Nature; that the World was eternal; that the Sun had rolled round its Axis from Eternity, as it does at preſent, and that ſuch Rotation will never ceaſe; that the human Species likewiſe were ſubſiſting before the Commencement of Time; that had there been any ſuch Thing in Fact as a firſt Parent, he muſt have been born without either Father or Mother, which is a direct Contradiction, and perfectly abſurd. In the ſame Manner he argues in Regard to the Birds of the Air: 'Tis downright ridiculous (ſays he) to imagine, that there was ever one particular Egg, from whence the whole Species of Birds received their Being; or that there ever was one particular Bird that laid the firſt Egg; becauſe the Bird proceeds from an Egg; but that Egg came from a Bird, and that from another preceding, and ſo backwards *ad infinitum*. The ſame Argument is farther made uſe of by him in Regard to all the other various Species of Animals throughout the Univerſe.

He maintains, moreover, that the Heavens are incorruptible; and that notwithſtanding all ſublunary Beings are liable to Corruption, yet the Parts whereof they are compoſed will never decay; that they only change their Poſition; that from the Deſtruction of one, another ſprings up to ſupply its Place, and by that Means the whole Maſs of the World will continue for ever complete. To this he adds, that the Earth is at the World's Center; and that the firſt and ſupreme Being cauſes the Heavens to roll round that Earth by ſuch certain Beings or Intelligences as are for ever employed in ſuperintending thoſe particular Rotations.

Ariſtotle inſiſts, that all that vaſt Expanſe, which at this Day is covered over with the Waters of the Ocean, was formerly

merly dry Land; and farther, that what now appears to be dry Land, ſhall, in Proceſs of Time, be covered with the Waters laſt mentioned. The Reaſon that he gives for the Support of this Aſſertion is this; that the Rivers and impetuous Torrents are continually carrying Sand and Earth along with their reſpective Currents; by Virtue whereof their Banks are gradually encreaſing, and the Sea, though imperceptibly, retreating; inſomuch that, ſince Time never ceaſes, thoſe Viciſſitudes of Earth into Sea, and Sea into Earth again, are continually happening from one Age ſucceſſively to another without End. He adds, moreover, that in divers Places, remote from the Sea, and on divers Mountains, the Sea, having withdrawn its Waters from them, has left behind a vaſt Variety of Shells; and that by digging into the Bowels of the Earth, the Workmen have frequently found Anchors, and broken Pieces of Ships. And, according to *Ovid*, *Pythagoras* was of the ſame Opinion.

Now *Ariſtotle* inſiſts, that theſe Alterations from Sea to Land, and Land to Sea, which are thus imperceptibly made, during a long Proceſs of Time, are, in a great Meaſure, the Reaſon why the Memory of Things paſt are ſo frequently eraſed. He adds, moreover, that other Accidents ſometimes intervene, which occaſion the Loſs of the Arts themſelves; ſuch for Inſtance, as Peſtilences, Wars, Famines, Earthquakes, Fires, or, in a Word, ſuch total Deſolations as at once extirpate and deſtroy a whole City or Country, except ſome few that eſcape by Flight into the adjacent Deſarts, where they lead a ſavage Life, and beget, in Proceſs of Time, a new Generation of People, who gradually cultivate thoſe Lands in which they reſide, or others, which they caſually diſcover, or revive thoſe Arts, which are above-mentioned to be loſt; and that the very ſelf-ſame Notions are recollected and renewed from one Time to another without End. This is his Way of arguing, and by ſuch Propoſitions as theſe, he maintains, that notwithſtanding thoſe various Viciſſitudes and Revolutions above allowed, yet the Machine of the World ſubſiſts without Corruption.

Ariſtotle, indeed, is very curious in his Reſearches after thoſe Things which are moſt capable of rendering Mankind happy

in this Life. He refutes, in the firſt Place, all ſuch Libertines, as imagine that Happineſs ſolely conſiſts in ſenſual Enjoyments. He inſiſts, that they are not only of ſhort Duration, but ſoon create a Diſguſt, enervate the Body, and ſtupify the Brain. In the next Place, he diſcards the Notion of ſuch as are ambitious, and think that Happineſs wholly conſiſts in Pomp and Grandeur, and never ſcruple the Practice of the vileſt and moſt indirect Means in the Attainment of any Poſt of Honour and Advantage.

He inſiſts, that Honour and Eſteem ſubſiſt in the Perſon who pays that Homage; and adds, that the ambitious Man is fond of being reſpected for ſome particular Virtue, which he willingly would have the World believe to be implanted in him; and, by Conſequence, that true Happineſs conſiſts rather in Virtue, than in Honours and Preferments, which are perfectly extraneous.

He confutes, in the laſt Place, the Notion of ſuch as are avaricious, and imagine, that true Happineſs ſolely conſiſts in Riches. He inſiſts, that Riches are not to be coveted for their own Sake; ſince they only render ſuch as poſſeſs them, and dread the Thoughts of making uſe of them, the moſt miſerable Wretches under the Sun; that the only Way to make them become Bleſſings, is to make a generous Uſe of them, and by Bounty and Benevolence, to relieve thoſe who are in Neceſſity and Diſtreſs; whereas real Happineſs ought to conſiſt in ſomething truly ſubſtantial, and of intrinſic Value, which ought carefully to be hoarded up, and never to be parted with.

In ſhort, *Ariſtotle* was of Opinion, that true Happineſs wholly conſiſted in the moſt diſintereſted and impartial Action of the Mind, and in the conſtant Practice of all ſocial Duties. He inſiſts, moreover, that the nobleſt Employment of the Mind is the Study of Nature; that is to ſay, that no Time can be ſpent more advantageouſly than in making deep Reſearches into all celeſtial and terreſtrial Bodies; but more particularly into the Exiſtence of the ſupreme Being. He obſerves, however, that no Perſon can be be ſaid to be perfectly happy, without having ſome competent Portion of the good Things of this Life; for unleſs we are ſo poſſeſſed, we cannot

not employ our Time on any ſublime Speculations, nor in the Practice of any ſocial Duties. As, for Inſtance, in Caſe we are poor and indigent, we can have no Opportunity of obliging our Friends; and 'tis doubtleſs one of the higheſt Pleaſures that this Life affords, to be in a Capacity of doing Good to thoſe whom we ſincerely love: And thus, ſays he, true Felicity conſiſts in three Things; firſt, in the Faculties of the Mind; ſuch, for Inſtance, as Wiſdom and Prudence; ſecondly, in natural Perfections; ſuch, for Inſtance, as Beauty, Strength, Health, and the like; and laſtly, in the Bleſſings of Fortune; ſuch, for Inſtance, as Riches and Honours. 'Tis his Opinion, that Virtue alone is not ſufficient to make a Man perfectly happy; that there is an abſolute Neceſſity for Mankind to be poſſeſſed, in ſome Degree, of the Bleſſings of Life; and that a wiſe Man muſt be inevitably unhappy, if he be either in Pain, or in Diſtreſs. On the other Hand, he aſſures us, that Vice is ſufficient of itſelf to make Mankind thoroughly unhappy; that notwithſtanding we roll in Riches, and are poſſeſſed of all the Bleſſings of Life beſides, yet ſtill, in Caſe we are vicious, we can never be happy; that tho' the wiſeſt Man in the World was not totally exempt from Afflictions, yet thoſe Misfortunes were ſuch only as were light and trivial; that Virtues and Vices were not inconſiſtent Things; that the ſame Man might poſſibly be very juſt and honeſt, and yet be a downright Libertine in his Heart.

He admitted of three ſeveral Degrees of Friendſhip; the firſt was that of Conſanguinity; the next that of Inclination; and the laſt that of univerſal Benevolence.

He was of Opinion, that the Study of the Belles Lettres contributed, in a great Meaſure, towards the Practice of Virtue, and aſſures us, moreover, that it was the greateſt Conſolation imaginable to all ſuch as were highly advanced in Years.

He acknowledges (as *Plato* did before him) a ſupreme Being, and an over-ruling Providence.

He inſiſts, that all our Ideas proceed originally from the Senſes; that a Perſon born blind could never have any adequate Notion of Colours; nor, on the other Hand, could one that had been deaf from his Birth, have the leaſt Conception of articulate Sounds.

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In Regard to Politics, his Notion was, that a monarchical State was preferable to all others, becauſe in all others there were more Perſons than one to ſit at the Helm of Government; as an Army is more likely to prove victorious when headed by one General, than if there were twenty commanding Officers inveſted with equal Power; ſo it is in the Regulation of a Kingdom. Whilſt the Deputies or leading Men in a Republic are waſting their Time in Aſſemblies and Debates, the Monarch has got Poſſeſſion of the Place he aimed at, and carried his Plan into actual Execution. The Adminiſtrators, or Heads of a Republic, are under little or no Concern for its real Benefit and Welfare, in Caſe they can but promote their private Intereſt by its Downfal: They ſoon grow jealous of each other; from whence ariſe Animoſities and Diviſions, and ſo, in Proceſs of Time, the Republic very ſeldom fails of being ruined and undone; whereas in a monarchical State, the Prince has no other Intereſt in View but that of his Kingdom; and, by Conſequence, his Subjects muſt be a flouriſhing People.

Ariſtotle was once aſked, what Benefit and Advantage could poſſibly ariſe from the Practice of Lying: Why this, replied he, he that is addicted to that mean-ſpirited Vice, may be aſſured, that no one will believe him whenever he ſpeaks the Truth.

Ariſtotle being once blamed by a Friend, for beſtowing his Benevolence on a wicked, unworthy Object; it is not, ſaid he, becauſe he is that wicked, worthleſs Perſon, as you obſerve, that I have Pity and Compaſſion on him; but becauſe he is my Fellow-Creature.

It was a common Saying of *Ariſtotle*'s, both to his Friends and Pupils, that Knowledge, in Regard to the Soul, was much the ſame as Light is to the Eye; and that, notwithſtanding its Roots might poſſibly prove ſomewhat bitter, yet its delicious Fruits made an ample Compenſation.

Sometimes when *Ariſtotle* was diſguſted at the Miſconduct of the *Athenians*, he would tell them, with an Air of Deriſion, that notwithſtanding they had a Profuſion of wholſome Laws, as well as of the beſt Corn, yet they would be laviſh of the latter, without paying the leaſt Veneration or Reſpect to the former.

Being once aſked, what Thing was ſooneſt blotted out of a Man's Remembrance, he made Anſwer, a grateful Acknowledgment for Favours received.

Another Time being aſked what Hope was; 'tis the Dream, ſaid he, of a Man that is awake.

One Day *Diogenes* made *Ariſtotle* a Preſent of a Fig; the latter plainly perceived, that in Caſe he refuſed to accept of his Favour, the former had ſome Piece of Raillery ready to throw out upon the Occaſion: He took the Fig, therefore, accordingly, and ſaid, with a Smile; Now *Diogenes* has not only loſt his Fig, but the Uſe he intended to make of it.

He uſed to ſay, that there were three Articles abſolutely requiſite for all young Children; that is to ſay, a natural Genius, Exerciſe, and Dicipline.

When any one aſked him what Difference there was between a wiſe Man and a Blockhead, he would ſay, that there was no more than between the Living and the Dead.

He would frequently ſay, that Knowledge was an Ornament in Proſperity, and a great Support and Relief under the Frowns of Fortune; that thoſe who beſtowed a liberal Education upon Children, were in Reality much more their Parents than thoſe who begat them; ſince the latter only brought them into Life, but the former enabled them to paſs away that Life in a happy and reputable Manner.

That a handſome Face, and a graceful Deportment, were Recommendations infinitely more ſtrong than any epiſtolary Encomiums whatſoever.

Being aſked one Day what Meaſures a Pupil had beſt take for his moſt ſpeedy Improvement; he replied, he ought always to have his Eye on thoſe who were his Superiors in Knowledge, and not on thoſe who knew leſs than himſelf.

Ariſtotle hearing a talkative Gentleman vainly boaſt of his being a Freeman of a very populous and trading City; don't lay, ſaid *Ariſtotle*, ſuch a Streſs on that Article, but reflect within yourſelf whether you are worthy or not of being a Member of any illuſtrious Country.

When *Ariſtotle* reflected on the Life which ſome certain People led, he would frequently ſay, that there were ſome Men who heaped up Bags upon Bags, with as much Avarice and

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Concern, as if they thought they ſhould live for ever; and others again, who were as profuſe and extravagant, as if they were well aſſured they ſhould die the next Day.

Ariſtotle being aſked what it was to have a ſincere Friend, he replied, to have one and the ſame Soul in two Bodies.

A certain Perſon aſked him one Day how we ought to deport ourſelves towards our Friends; to which he readily replied, juſt the ſame as we would willingly have them behave towards us.

He would frequently cry out, Ah! my Friends! There is no ſuch Thing as ſincere Friendſhip in the World.

One Day he was aſked why we had more Affection for Perſons who were handſome, than ſuch as were ugly or deformed: Friend, ſays *Ariſtotle*, you aſk me a very blind Queſtion.

When he was once aſked what Benefit and Advantage he had reaped from his Philoſophy: Why, replied he, a Power to do that of myſelf, without any Direction, which ſome others would never practiſe, was it not for fear of being ſubject to ſome penal Laws.

Some Hiſtorians aſſure us, that during his Reſidence at *Athens*, he had an uninterrupted and familiar Converſe with a Native of *Judea*, who inſtructed him thoroughly in all the intricate Knowledge of the *Egyptian* Hieroglyphics; whilſt all others, who were his Cotemporaries, were obliged to travel to *Egypt* itſelf for their Improvement in thoſe religious Studies.

Ariſtotle, after he had inſtructed his Pupils for thirteen Years ſucceſſively in the *Lyceum*, with unblemiſhed Reputation, was charged by *Eurimedon*, one of the Prieſts of the Goddeſs *Ceres*, as guilty of blaſphemous Expreſſions. The Recollection of what Treatment *Socrates* had before met with, terrified him to that Degree, that he determined to leave *Athens* at once, and to ſeek an Aſylum at *Chaleis* in *Eubœa*. Some ſay he died with Vexation, becauſe he found himſelf incapable of giving a rational Account of the Ebbing and Flowing of the Sea. Other Hiſtorians aſſure us, that he threw himſelf headlong into the Sea, and ſaid, whilſt he was falling; O Sea! bury me in thy Waves, ſince I can never comprehend thy Motions. Others again inſiſt, that he died a natural Death, in the ſixty-third

Year

Year of his Age, and two Years after the Death of his once royal Pupil *Alexander the Great*.

The Natives of *Stagira* erected Altars to his Memory, and paid him the Tribute of divine Adoration.

Ariſtotle made his laſt Will and Teſtament, and thereby conſtituted and appointed his Friend *Antipater* ſole Executor.

He left one Son behind him, named *Nicomachus*, and one Daughter, who had been married for ſome Time to the Grandſon of *Demaratus*, the King of *Lacedemon*.

DEMOCITUS.

DEMOCRITUS, one of the greateſt Philoſophy of Antiquity, was born at *Abdera* in *Thrace*; he was educated by the *Magi*, who taught him *Theology* and *Aſtrology*; afterwards he heard *Leucippus*, and learned of him the Syſtem of *Atoms*, and Doctrine of a *Vacuum*. The extraordinary Inclination he had for Learning, moved him to travel into all the Parts of the World, where he hoped to find ſome great Men. He went to the Prieſts of *Egypt*; he conſulted the *Chaldean* and *Perſian* Philoſophers, and went even to *India* and *Ethiopia*, to confer with the *Gymnoſophiſts*. In thoſe Travels he ſpent all his Patrimony, which was worth about 100 Talents; for which he would have incurred a Note of Infamy, had he not given good Proof of his very great Improvements, by which he ingratiated himſelf to the Regard and Aſſiſtance of his Brother.

It is Matter of Diſpute, whether he was ever at *Athens*; but there is a Paragraph in *Maximus Valerius* which implies it. "*Democritus*, whoſe Fortune was ſo great, that his Father could "with Eaſe furniſh out an Entertainment for *Xerxes*'s Army, "gave his Patrimony to his Country, reſerving only an inconſiderably Part to himſelf, to diſingage his Mind from every "Thing elſe but Study, which he proſecuted many Years, with "great Application, at *Athens*."

Unobſerved, as he owns in his Works, he gave two Proofs of an extraordinary Sagacity. *Democritus* went to viſit *Hippocrates*

crates, who called for ſome Milk, and ſuch was *Democritus*'s Skill, either from Smell or Colour, that he poſſitively determined it to be the Milk of a black Goat, that had never had but one Kid.

Hippocrates having alſo a Female with him, the firſt Time that *Democritus* ſaw her he called her a Maid; but the next Day he called her Woman; and it afterward became known, that ſhe had been deflowered the preceding Night. This was greatly admired at by *Hippocrates*. Some aſſert he had this Knowledge from an Alteration he obſerved in her Eyes; others ſay it was from a different Tone of her Voice.

At other Times he diſcovered peculiar Properties in Vegetables, Foſſils, Shrubs, and Minerals, the Effect of his Study and various Experiments. The Weather, Seaſons, *&c.* he made ſuch Obſervation of, that it enabled him to judge of them with great Accuracy, and probably occaſioned the Charge of Magic, of that Magic that's grounded upon Compact with the Devil.

At one Time foreſeeing that it would be a bad Year for Olive Trees, he bought up great Quantities of Oil at a low Price, which, notwithſtanding it proved true, and he might have made extraordinary Advantage of it, he declined making any Profit, let the Perſons have it of whom he had bought it, and contented himſelf with ſhowing that he could be rich, but that he deſpiſed it, and laughed at the Vanity of human Riches.

At another Time he adviſed his Brother to ſet all his Reapers to Work, to carry into the Barn what Corn was cut, when the Weather was very fine, and ſoon after a furious Storm aroſe: And it is ſaid that he was the firſt who diſcovered and demonſtrated the Influence of the Heavens on the Earth. This, however, ſeems indiſputable, that he had a fine Genius, a good Underſtanding, and a penetrating Wit, which by Study, both of natural and moral Philoſophy, the Mathematics, and the liberal Arts, he greatly improved, and acquired juſt Eſteem and Veneration in many Inſtances, as the Inventor or Diſcoverer of uſeful Truth; but in other Caſes he had his Errors. *Lucian* ſays he appeared undaunted, becauſe he was fully perſuaded the Soul died with the Body.

He alſo imagined the Air full of Images, and taught others to pray, that ſuch only might preſent themſelves as were agreeable and propitious, and would pleaſe and improve.

In his general Syſtem of Phyſics, he was the Fore-runner of *Epicurus*. *Cicero* ſays, What is there in the Phyſics of *Epicurus* that is not to be found in *Democritus?* They agree as to Atoms, Vacuum, Images, Infinity of Space, Infinity of Worlds, with their Formation and Diſſolution: But he is ſaid to differ in this from *Epicurus*, that he thought there was an animal and ſpiritual Nature in the Concourſe of Atoms, and *Epicurus* believed only an animal; and it is maintained by him, that there was nothing real but the Atoms and Vacuum, and that every Thing elſe conſiſted in Opinion only.—This is what the *Carteſians* ſay now.

He appears to have very imperfect Ideas of the Divine Nature; and he conceived our ultimate End to be the Tranquility of the Mind.

He had an Averſion to Matrimony, and ſome thought a criminal Diſlike to the Fair Sex; but he freely owned he diſliked Marriage, as the Increaſe of a Family, and the Trouble that attends it, was a great Hindrance to Things of greater Conſequence. He alſo ſaid the Pleaſure of Love was a little Epilepſy.

What is ſaid of the Diſpleaſure his Servant Maid gave him, by informing him of a Thing for which he was ſeeking a natural Reaſon, is curious enough. Thus *Montagne* tells the Story: *Democritus* having eaten at his Table ſome Figs which ſmelled of Honey, immediately began to revolve in his Mind what ſhould be the Cauſe: He roſe from Table to obſerve the Situation of the Place where the Figs were gathered. The Maid hearing the Reaſon of his riſing from Table, told him, laughing, ſhe had put them into a Veſſel that had Honey in it: Go, ſays he, you have vexed me, I ſhall nevertheleſs enquire into the Cauſe.

EUCLID, the Philoſopher.

EUCLID, a Native of *Megara*, and Diſciple of *Socrates*, did not follow the Taſte of his Maſter; for inſtead of addicting himſelf chiefly to the Doctrine of Morality, he ſet himſelf to refine the Subtleties of Logic. He founded a Sect, which paſſed for a Branch, or Continuation of the School of *Xenophanes*, *Parmenides* and *Zeno*. His Opinions are not very well known, being very difficult to comprehend any Thing in his Doctrine of Good. He managed his Diſputes with great Warmth and Impetuoſity, and many of his Pupils catched too much of the ſame Fire.

Eubulides, who ſucceeded him, invented divers Sophiſms exceeding captious and perplexing. *Aleximus*, who ſucceeded him, a great Lover of Diſpute, and engaged in it with unreaſonable Vehemence. *Diodorus*, another Diſciple, became alike intoxicated. If this Sect had contributed much to the Illuſtration of Truth, it ought to be looked upon as a Prodigy, ſince nothing tends more to confound and darken Things, and fill the Minds of Readers and Auditors with Doubts, than the Application to the Quinteſſence and Subtleties of Controverſy, managed with too much Heat. This brings near to Truth what *Timon*, the *Philaſian*, objected to our *Euclid* and his Followers.

Theſe Triflers, and their captious Clan, I hate,
Phædo *and* Euclid, *forward to debate*;
From them their Country catch'd infectious Rage.

Among all philoſophical Exerciſes, there is none in which Moderation is more neceſſary, than in that of Diſputation; for no ſooner are you paſſed certain Bounds, but you fall into uſeleſs Trifles and Irregularities, which give the Mind an ill Turn, and hinder it from finding Truth. To this may be applied the Words of *Aulus Gellius*, "When I heard or read theſe, or ſuch "like Subtleties, the Produce of an eaſy, undiſturbed Retire-"ment, but found herein no Solidity, nothing that tended to "the Improvement of Life, it confirms the Sentiments of *Ne-"optolemus*, Philoſophy has Bounds which it ſhould never paſs."

Diſ-

Diſputation has not been ill reſembled by the ſtriking of two Flints together, which fetches out the Sparks of Fire. Diſputation, well regulated, is of great Uſe, but it is very difficult to keep that Medium. It is ſaid of *Tacitus*, to his Honour, and what is moſt difficult, he retained a Mean in Philoſophy.

Euclid, and his Succeſſors, cannot be juſtified for attempting to diſtinguiſh themſelves by Inventions, which tended only to confound the Mind, and not advance uſeful Knowledge.

Ariſtotle ſays, that they taught there was no Power ſeparate from its Act; that is to ſay, that a Cauſe which does not actually produce an Effect has not the Power to produce it. This *Ariſtotle* has well confuted.

CONON, of SAMOS.

CONON, a Mathematician and Aſtronomer, was of *Samos*, and flouriſhed about the 130th Olympiad. He died before his Friend *Archimedes*, who had a great Eſteem for him, communicated his Writings to him, and ſent him ſome Problems, which *Archimedes* received with Approbation, ſaying, they ought to be publiſhed while *Conon* was living, for he comprehends them with Eaſe, and can give a proper Demonſtration of them.

At another Time he laments the Loſs of *Conon*, admiring his Genius, and interrogates after this Manner; How many Theorems in Geometry, which at firſt ſeem'd impoſſible, would in Time have been brought to Perfection? Alas! *Conon*, though he invented many, wherewith he enriched Geometry, had not Time to inveſtigate them all, but left many in the Dark, being removed by Death. He had an uncommon Skill in Mathematics, joined to an extraordinary Patience and Application. This is farther confirmed by a Letter ſent to *Archimedes* by a Friend of *Conon*'s.

" Having heard of *Conon*'s Death, with whoſe Friendſhip I " was honoured, and with whom you kept an intimate Correſ- " pondence; as he was thoroughly verſed in Geometry, I great- " ly lamented the Loſs of a ſincere Friend, and a Man of ſur-

" priſing

" prizing Knowledge in Mathematics. I then determined to " ſend to you, as I had before done to *Conon*, a Theorem in " Geometry, hitherto obſerved by no Body."

He had ſome Diſpute with *Nicoteles*, who writ againſt him, and treated him with too much Contempt. *Apollonius Pergæus* confeſſes it, tho' he acknowledges that *Conon* was not lucky in his Demonſtrations.

He invented a Kind of Volute, which differed from that of *Dynoſtratus*; but becauſe *Archimedes* explained the Qualities of it more clearly, the Name of the Inventor was forgotten; and inſtead of being called the Volute of *Conon*, ſaid to be the Volute of *Archimedes*.

As to *Conon*'s aſtrological Knowledge, it may be in ſome Meaſure learnt from the Poem of *Catullus*, who deſcribes it in the Beginning of his Poem on *Berenice*'s Hair, who was the Siſter and Wife of *Ptolomy Euergetes*.

Note, that *Conon* was ſo great a Flatterer, as to give out, that the Hair of that Queen was changed into a Conſtellation.

Who ſcann'd each Object of the ſtarry Sphere,
Knew when they riſe, and when they diſappear;
Who knew why Darkneſs dims the World's great Eye,
Why Stars at certain Periods ſeem to die;
Who knew why Cynthia *from her Orb ſhould move,*
The Plains of Latmos, *and* Endymion's *Love:*
Conon, *the ſame, who view'd me from that Height,*
Whence Berenice *ſpread ætherial Light.*

HIPPOCRATES.

HIPPOCRATES, a Phyſician, Philoſopher, and Mathematician, called in Contradiſtinction from others, the Divine *Hippocrates*, was born at *Coos* in the firſt Year of the 80th Olympiad, 458 Years before the Birth of our Saviour, and in the fifth Year of the Reign of *Artaxerxes Longimanus*, and was Cotemporary with *Socrates*, *Herodotus*, *Thucydides*, and other

great Men of his Time. His Father *Heraclides*, and Grandfather *Hippocrates*, both great Phyſicians, took Care to teach him, or have him taught not only Medicine, but Logic, Phyſics, or natural Philoſophy, Geometry, and Aſtronomy: He ſtudied Eloquence under *Gorgias*, the *Leontine*, the moſt celebrated Rhetorician of his Time, and made many ingenious Improvements in the Sciences, as may be gathered from his Writings, though chiefly celebrated as a Phyſician.

The Iſle of *Coos*, the Place of his Birth, is very happily ſituated, and had for a long Time been famous for a public School, founded by his Anceſtors; he had therefore all the neceſſary Conveniencies for learning the Theory of Medicine, but as the greateſt Cities in thoſe Times were not very populous, ſo, in order to perfect himſelf, he followed the Precept which he gives to others in his Νόμος, Law, where he ſays, that after acquiring the Science of Medicine, it is neceſſary to travel and viſit foreign Countries, in order to be ſomething more than a Phyſician in Name; for Ignorance, which proceeds from Want of Experience, is but a bad Stock for thoſe who poſſeſs it, and an unfortunate Incumbrance by Night and by Day.

He therefore travelled into *Macedon*, *Thrace*, and *Theſſaly*, and in making the Tour of thoſe Countries he made a great Variety of curious Obſervations. He went indeed thro' the greater Part of *Greece*, improving and rendering himſelf beneficial to Mankind. When the *Illyrians* ſent Ambaſſadors to him to intreat him to come and remove a raging Peſtilence, and he acquainted himſelf with ſome Circumſtances preceding and attending the Contagion, and of its probably ſpreading into *Theſſaly* and *Greece* by the ſame Winds, he immediately ſent his two Sons *Theſſalus* and *Draco*, with his Son-in-Law *Polybus*, and ſeveral of his Pupils, into different Places, with neceſſary Inſtructions, and went himſelf to the Aſſiſtance of the *Theſſalians*, from whence he paſſed to the *Dorians*, and thence to *Phocis*, viſiting *Delphos*, where he offered up Prayers and Sacrifices, and paſſing thro' all *Bœtia*, made his Appearance at *Athens*, behaving himſelf all the Way like another *Apollo*.

On another more preſſing Occaſion he delivered the City of *Athens* from the Plague, which had made infinite Ravages, mentioned by *Thucydides*, an Eye-witneſs, and afterward by

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Lucretius. One Method he made uſe of, and which is ſaid to be of great Uſe, was lighting great Fires thro' all the Streets, and directing all Sorts of aromatic Flowers and Drugs to be thrown into it, in order to purify the Air; a Method long before practiſed by the *Egyptians*, as mentioned by *Plutarch.*

So great was his Reputation, that he was ſent for to the Court of *Perdiccas*, King of *Macedonia*, who was thought to be ill of a Conſumption; where, after ſifting into the Circumſtances of it, he diſcovered that the Love of his Father's Miſtreſs, named *Phila*, was the Cauſe of it. Soon after *Artaxerxes* inviting him to come and remove the Peſtilence which reigned in his Territories, and previouſly ordered him 100 Talents, with the Promiſe of ſome entire Cities, *Hippocrates* regarding thoſe Riches as Enemies to his Country, and a Reproach to his Houſe, he refuſed them, and returned the Governor this generous Anſwer, *Write to your Maſter, that I am rich enough, and that I cannot with Honour accept his Offers, nor go to cure Barbarians, who are Enemies to the* Greeks.

He was ſent by the Senate of *Abdera* to cure *Democritus*, who paſſed with many for a Madman, but he ſoon undeceived them, finding him no Fool or Madman, (which is too often thought of ſome who are wiſe above the common Rank) and being offered ten Talents as a Reward, he gave a further Proof of his Diſeſteem for Riches, by abſolutely refuſing it, or any Gratuity.

When the *Athenians* ſent *Alcibiades* into *Sicily*, *Hippocrates*, free from the View of Intereſt, gave his Son *Theſſalus* as a Phyſician to their Army, and no Citizen ever gave a greater Proof of Patriotiſm, and the Love of his Country, than he did.

When the *Athenians* made Preparation to carry their Arms into the Iſle of *Coos*, *Hippocrates* immediately went to implore the Protection of the *Theſſalians*, and the neighbouring States, and ſent his Son *Theſſalus* to *Athens* to endeavour to allay the Tempeſt which threatened his Country; both Father and Son met with Succeſs, for the timely Preparations for Defence in *Macedonia*, *Theſſaly*, and *Peloponeſus*, made the *Athenians* hearken to the Remonſtrances of *Theſſalus.* And as *Pythagoras* taught, that the Way for Mortals to render themſelves like the Deity was to ſpeak the Truth, and do Good to all the World,

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this Maxim he adapted, and gave an Example of it in his Life; and which of the two, his Regard to Truth, or doing Good, were moſt conſpicuous, is difficult to ſay: In Regard to the former, he had ſo delicate an Idea, that he would not ſhun to diſcloſe the leaſt Inſtance of Weakneſs or Imperfection in himſelf, and with an Ingenuity, of which none but great Minds are capable; nor in the Practice of his Profeſſion would he favour the leaſt Illuſion or Deceit, Subtilty or unintelligible Diſtinctions; and his laudable Endeavour to do Good to all within his Power is well known to the ſucceeding Generations, and proclaimed in Hiſtory.

He deſired of the Gods in Recompence for his Labour, neither Riches nor Pleaſures, but a long Life in perfect Health, and Succeſs in his Art. This Deſire of his is declared in his Oath, and was accompliſhed in its full Extent, for he lived 109 Years in Soundneſs of Mind and Body: And he ſucceeded ſo well in his Art, that he has been regarded as the Founder of it; for which he received ſuch Honours during his Life, as were ſcarce ever conferred on any Mortal. The *Argians* erected a Statue of Gold to his Honour; the *Athenians* decreed him Crowns of the ſame Metal, and conferred a Title of Honour on him and his Deſcendants, and he has left behind him an immortal Reputation.

Plato and *Ariſtotle*, the two greateſt Geniuſes which perhaps ever appeared, followed him as their Maſter, and made it their Buſineſs to explain his Sentiments, to adapt his Aphoriſms, to imitate his Example, and to honour and perpetuate his Memory. In ſhort, *Hippocrates* has been always regarded as the moſt faithful Interpreter of Nature; no leſs conſpicuous for the Impartiality of his Repreſentations, than the Force and Strength of his Genius, improved by all the Methods in his Power, with indefatigable Diligence and Induſtry, that the Works of *Hippocrates* are to the Phyſician what the Polar Star is to the Mariner, his Guide and Director. No Wonder then if his Account of Diſeaſes, and the proper Method of Cure, procured the Attention, and attracted the Eſteem of the Wiſe and Sagacious in all Ages; and in all Appearance he will preſerve the Glory and Reputation, which more than 2000 Years has been ſupported, to the lateſt Poſterity.

Thus

Thus does Hiſtory characteriſe *Hippocrates*, Prince of Phyſicians; and if this be thought repugnant to Truth, becauſe the Knowledge of Medicine depends on Obſervation, that this Knowledge was then in its infant State, and capable of receiving great Advances and Improvement ſince his Time: This is in ſome Meaſure true, but it is equally true and certain, that *Hippocrates* had the Experience and Improvement of ſome regular Phyſicians, who preceded him, and conveyed in lineal Deſcent from Father to Son, till it reached, and centered in this incomparable Genius, which, according to Hiſtory, was the 18th or 19th Generation. And if to theſe Circumſtances we add his Care, his Diligence, the Length of his Life, his Travels through *Babylon*, *Egypt*, and the *Indies*, we ſhall eaſily account for his large Fund of experimental Knowledge. But as he had all the Learning and Science neceſſary to lay a Foundation for great Atchievements, ſo he always diligently ſtudied Philoſophy, that he might add the *Rationalie* to Experience, ſearching into the Meaſure, Motion, Proportion, and Equilibrium of the Solids and Fluids, in Health or Diſeaſes, as may be fully ſeen in his Book *De Flatibus*, *Natura Hominis*, *de Diæta*, &c.

That he might explore not only the moſt apparent, but the more remote and hidden Cauſes of Diſtempers, he punctually wrote down his Obſervations in the Courſe of his Practice in Phyſick and Surgery, which led him to ſee the Uſefulneſs of Anatomy, and engaged him, with great Application, to ſtudy the whole Animal Machine, which was attended with great Advances. This is fully evidenced from his Book *De Fiſtulis*, *de Articulis*, *de Vulneribus Capitis*, &c. and many others, mentioned in *Le Clerc*'s Hiſtory *De la Medicine*. Many of his Writings are tranſlated into Variety of Languages, and univerſally celebrated. A ſhort Compendium of his general Principles, Aphoriſms, *&c.* with References to his various Works, are now extant, publiſhed by Sir *Conrad Springell*, printed at *London* in 1735.

He died at *Theſſaly* in the 2d Year of the 107th Olympiad, 349 Years before the Birth of Chriſt, and was buried between *Lorriſſa* and *Gortona*.

EUDOXUS.

EUDOXUS, of *Cnidus*, the Son of *Æſchines*, flouriſhed in the 97th Olympiad. According to *Euſebius*, he was an Aſtronomer, Geometrician, Phyſician, and Legiſlator. *Archilaus* taught him Geometry, *Plato* Philoſophy, according to *Appus* of *Alexandria*, and *Philiſton*, of *Sicily*, the Knowledge of Phyſics; and as he was deſirous of making the greateſt Improvements in Knowledge, he travelled into *Egypt* with *Chryſippus*, a Phyſician, carrying with him Letters of Recommendation from *Angeſilaus* to *Nectabis*, and there converſed with the moſt learned and judicious, in which Time he wrote his Hiſtory of eight Years, and probably his Elements of Geometry.—From hence he went to *Cyricus*, and to *Propontis*, teaching Philoſophy, *&c.*

At his Return Home from his Travels, his diſtinguiſhed Accompliſhments, and his ſuperior Capacity, were ſo conſpicuous, and ſo ingratiated him into the Love and Eſteem of his Country, who advanced him to ſenatorial Dignity, placed him as their Legiſlator, and yielded a due Deference to his Injunctions. He diſcovered a very great Knowledge of the Sciences, and wrote on ſome with great Accuracy, tho' few of his Writings were preſerved.

He died, greatly regretted, about the Year of *Rome* 401, in the 107th Olympiad.

EUCLID.

EUCLID, the celebrated Mathematician, according to the Account of *Pappus*, was born in *Alexandria*. *Proclus* ſays he lived in the Reign of *Ptolomy Sagus*, King of *Egypt*, who began to govern about 300 Years before the Chriſtian Æra.

He was the firſt who ſet up a Mathematical School at *Alexandria*, where, from his Time, till the Conqueſt thereof by the *Sara-*

Saracens, all the eminent Mathematicians were either born, or ſtudied; and it is to *Euclid*, and his Scholars, we are beholden for *Eratoſthenes*, *Archimedes*, *Apollonius*, *Ptolomy*, *Theon*, &c.

He was a Perſon of a courteous and agreeable Behaviour, and was in great Eſteem and Familiarity with King *Ptolomy*, who once aſking him, whether there was any ſhorter Way of coming at Geometry than by his Elements, is ſaid, as *Proclus* teſtifies, to have made Anſwer, there was no other royal Way or Path to Geometry.

His Works, as we learn from **Pappus* and †*Proclus*, are the *Elements*, *Data*, *Introduction to Harmony*, *Phenomena*, *Opticks*, *Catoptricks*, *a Treatiſe of the Diviſion of Superficies*, *Poriſms*, *Loci ad Superficiem*, *Fallacies*, and *Four Books of Conicks*.

The *Elements*, as commonly publiſhed, conſiſt of 15 Books, of which the two laſt, not without Ground, are ſuſpected by ſome not to be *Euclid*'s, but a Comment of *Hypſicles* of *Alexandria*, who lived 200 Years after *Euclid*, which is probable from their Want of that Conciſeneſs of Demonſtration as runs thro' the reſt.

They are divided into three Parts, *viz.* the Contemplation of Superficies, Numbers, and Solids; for, as *Proclus* obſerves, *Euclid* has given us no expreſs Diſcourſe of Points and Lines in his Elements. The firſt four treat of Planes only; the fifth of Magnitudes in general; the ſixth of the Proportion of plain Figures; the ſeventh, eighth, and ninth give us the fundamental Properties of Numbers; the 10th contains the Theory of commenſurable and immenſurable Lines and Spaces; the eleventh, twelfth, thirteenth, fourteenth, and fifteenth, treat of the Doctrine of Solids.

It is paſt Doubt, that, before *Euclid*, Elements of Geometry were compiled by *Hippocrates* of *Chius*, *Eudoxus*, *Leon*, and many others, mentioned by *Proclus*, in the Beginning of his ſecond Book; for he affirms that *Euclid* new ordered many Things in the Elements of *Eudoxus*, made many Things in thoſe of *Theatetus* more complete, and beſides ſtrengthened ſuch Propoſitions as before were too ſlightly, or but ſuperficially eſtabliſhed, with the moſt firm and convincing Demonſtrations.

On

* *Collectiones Mathemat. Lib.* 7.
† Comment on *Euclid*.

On the other Hand, ſome are of Opinion, that *Theon* had a Share in modelling and diſpoſing theſe Elements, and making ſome Addition to them, as we are aſſured from his own Words in his Comment on *Ptolomy*'s *Almageſt*, that the laſt Propoſition of the ſixth Book, with the Demonſtration, is his; and perhaps are many *Lemmata*, and ſome Propoſitions of the tenth Book, neither is it unlikely but ſome Definitions and Axioms, ſuch as Axiom 10 and 11, have him, or ſome other for their Author.

Be this as it will, it is of little Conſequence. We have the Work; a Work, whoſe Propoſitions have ſuch an admirable Connection and Dependance, that take away but one, and the whole falls; whoſe Method is the moſt juſt, admitting and advancing nothing without a Demonſtration, and no Demonſtration but from what foregoes, and theſe ſo convincing, elegant, and perſpicuous, that it is beyond the Skill of Man to contrive better. Here the moſt artful and diligent Carpers have never been able to ſet Footing. The *French*, who have of late attempted to compile new, have apparently made Alterations for the worſe. This is the happy Empire wherein Truth has had an uninterrupted Reign for more than 2000 Years. 'Tis from hence the Heroes of the geometrical World receive Force to vanquiſh the Obſtinate and Ignorant, and extend their Dominions.

One Objection againſt them indeed is, that ſome Propoſitions are demonſtrated that were ſelf-evident, and ſo might have been thrown among the Axioms.* Here I anſwer, that *Euclid*, on the contrary, is rather to be commended and admired than blamed; for no Care can be too great in eſtabliſhing the firſt Principles of a Science: It is far better to have ſeveral redundant Demonſtrations than one to be wanting, whereby the Learner will proceed with leſs Suſpicion, Fear, and Heſitation, and his Faith not detained, and his Mind kept back with a Multiplicity of Suppoſitions, nor at all accuſtomed to take Things upon Truſt: It is beſides moſt pleaſant and uſeful to ſhew the Coherence and Dependance the firſt Propoſitions of the Elements have on each other; and if *Euclid* be cenſured for this, theſe acute Gentlemen muſt have likewiſe to deal with the

* *Peter Ramus, Schol. Mathemat. Lib.* iii.

the whole Body of the antient Geometricians, the great *Apollonius*, Dr. *Barrow*,* *Wolfius*, &c.

Euclid's Definitions are ſometimes cenſured as not plain and intelligible, or not conveying clear and diſtinct Ideas: This may ſometimes ariſe from want of a Capacity to diſcern, or a Diſpoſition to Criticiſm; though this is not always the Caſe. *Taquet* cenſures his Definition of Parallel Right Lines; the true Senſe of it is generally apprehended, though a more conciſe one is poſſible; at preſent Lines which no where incline to one another are called Parallel.

The next Thing remarkable is the Definition of the fifth Element, ſpecifying the Condition that four Magnitudes in the ſame *Ratio* muſt have, which is greatly oppoſed, and even by ſome modern Writers. *Taquet* ſays,‡ it does not explain the Nature of equal *Ratios*, but only a Property of them, and would have it firſt demonſtrated, that ſuch Properties attend equal *Ratios*; ſaying withal, it is an uncommon Theorem of a remote and obſcure Nature. *Borellus* ſays, we know not whether four Magnitudes in Nature can be found having ſuch a Property as that mentioned in the Definition, neither can theſe Compariſons of Infinities be underſtood; and *Euclid* was ſo apprehenſive of this, that he made uſe of another Definition of the Proportionality of commenſurable Magnitudes, in the ſeventh Book; neither can we get from it, ſays he, this ſmall Truth, *When four Magnitudes are proportional, and the firſt exceeds the ſecond, the third muſt neceſſarily exceed the fourth.*

Theſe are the moſt material Objections made againſt our Maſter's Definitions, by the aforeſaid ingenious Perſons, which have moſtly proceeded from the Want of duly conſidering the Nature of it; and however plauſible the Objections may appear, yet notwithſtanding the Definition is very good, of excellent Uſe, and wiſely adapted to the Buſineſs of Proportionals, moſt of the chief and general Properties, as alſo the Proportionality of particular Quantities being immediately directed, briefly and elegantly deduced from it.

Euclid, from the Greatneſs of his Penetration into the mathematical Sciences, was ſenſible of the Fitneſs of thoſe Problems he

* Lect. V. Mathemat. ‡ Geom. Lib. V. Part I.

laid down as the Ground and Foundation of it, and of their more extenſive Uſefulneſs in other Parts of Literature; that he frequently and ſtrenuouſly recommended this Study as of very great Importance; that very few wanted Capacity (if they would but attend to it) to underſtand ſo much as would be exceedingly advantageous; and laſtly, that the Pleaſure which would reſult from a progreſſive Improvement therein, would abundantly more than compenſate the fancied Trouble: To the ſame Purpoſe *Plato* writes; but Hiſtory is ſilent as to the Death of this celebrated Mathematician.

THEOPHRASTUS.

THEOPHRASTUS, of *Ereſus*, a Philoſopher, the Son of *Melanthus*, in whom very early was diſcovered a quick Apprehenſion, and an admirable Acuteneſs, with a Genius capable of great Improvements in Knowledge, and equal Induſtry to obtain it. He placed himſelf firſt under the Tuition of *Lucippus*, but ſoon after became the Pupil and Diſciple of the celebrated *Plato*, who admiring his Readineſs to inveſtigate the Nature and Properties of Things, beſtowed on him very high Encomiums, and eſpecially for the divine Eloquence of his Speech, wherein he exceeded all his other Diſciples: He was for theſe Reaſons recommended to, and highly ingratiated into the Eſteem of *Ariſtotle*, under whom alſo he became a Student and an Auditor; and after he had made ſome Proficiency under his Direction, was at the Requeſt of the Students in his School appointed (by *Ariſtotle*) his Succeſſor. This we find was in the ſecond Year of the 114th Olympiad; according to *Pliny* he flouriſhed about the 440th Year from the Building of *Rome*.

Thus *Theophraſtus* was qualified, and undertook the Government of perhaps one of the greateſt poiloſophical Schools in the World: The Number of thoſe who came to hear him, according to *Laertius*, were two thouſands, and according to *Suidas*, many more. He conducted himſelf in his Profeſſion with great

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Œconomy, appropriating certain Hours to particular Purpoſes. He diſcourſed in ſuch an affecting Manner, and adapted his Geſture ſo ſuitably to the Argument whereof he treated, as gained him great Eſteem.

In the fourth Year of the 118th Olympiad, *Sophocles*, a tragic Poet at *Athens*, Son of *Amphiclides*, procured a Law to prohibit philoſophical Schools. On this Decree *Theophraſtus* and others quitted *Athens: Theophraſtus*, however, did not abſent himſelf long, but returned the Year following, when *Philo* accuſed *Sophocles* that he had acted contrary to Law, whereupon the *Athenians* reverſed their Decree, fined *Sophocles* five Talents, and reinſtated *Theophraſtus* in his School.

During the intermediate Time he had not been idle, but had made Collections of Money for the more private Conventions of Philoſophers, and Encouragement of Learning; and from his cloſe Application to Study, made great Improvements; for he wrote on a great Variety of Subjects, as *Laertius* mentions, with great Learning and Penetration, particularly of the Nature of Animals, Foſſils, Metals, Phyſics or natural Philoſophy, Ethics or moral Virtue, Politics, *&c.* though few of his Writings are now extant. His Treatiſe of Foſſils is ſtill extant, which was lately tranſlated by Mr. *Hill*, and to which we refer the Curious; only obſerving, he had ſo far inveſtigated the general Syſtem of the Foſſil World, as might be preſumed poſſible at the Time he wrote, more than 2000 Years ſince, when the Sciences to which the preſent Age owes its Improvement were ſo little underſtood, and ſo few of the Experiments which have now given Light into it had been made.

Plutarch mentions to his Honour, his Love of his Country, and that he had twice freed it from the Oppreſſion of Tyrants.

His Characters of Virtue and Vice are in general eſteemed very juſt; they are ſtill extant in *Greek*, and tranſlated into *French* by Mr. *de la Bruyere*.

In his own Life he exhibited many of the Virtues he recommended, particularly Temperance and Beneficence.

He greatly recommended to his Pupils the Employment of Time, ſaying, nothing was ſo precious as Time, and that to laviſh it was the greateſt Prodigality.

He

He diſcovered a great Contempt of Riches; and bemoaned the Shortneſs of human Life, as inſufficient for attaining great Perfection in Literature.

He died at *Athens* in the 85th Year of his Age, greatly eſteemed, the whole People of *Athens* following him to his Grave.

EPICURUS.

EPICURUS, one of the greateſt Philoſophers of his Age, was born at *Gargettium* in *Attica*, the 3d Year of the 119th Olympiad. His Father *Neocles*, and his Mother *Chereſtrata*, were among thoſe Inhabitants of *Attica* whom the *Athenians* ſent into the Iſle of *Samos:* This is the Reaſon why *Epicurus* paſſed his Youth in that Iſland, and did not return to *Athens* till he was 18 Years old. He did not deſign to ſettle there; for at the Age of 23 he went to his Father at *Colophon*, and afterwards travelled and ſojourned in ſeveral Places, before he ſettled at *Athens*.

When about 36 Years old, he ſet up a School there, in a fine Garden which he purchaſed, and there paſſed his Time with his Friends in great Tranquillity, and taught a great Number of Diſciples, obſerving ſo good Œconomy, that few Societies were ſo well regulated.

The Reſpect his Followers paid to him while living, is greatly to be admired, his School being never divided, and his Doctrines and Precepts highly reverenced; ſo that his Memory was perpetuated with great Eſteem; and the Books he wrote, which were many, regarded as Oracles.

He brought the *atomical* Syſtem into great Reputation: He was not the Inventor of it, but he made ſome Alterations in it, though not always for the better; for Inſtance, he ſpoiled the Syſtem in not retaining *Democritus*'s Doctrine touching the Soul of Atoms.

Democritus is ſaid to differ from *Epicurus* in natural Philoſophy: The former imagines there is an animal or ſpiritual Nature in the Concourſe of Atoms; whereas *Epicurus* allows nothing

thing but Atoms in the Principles of Things. To pretend, that a Collection of inanimate Atoms can be a Soul, and can emit ſuch Images as occaſions Thought, is an abſurd Hypotheſis: However, this *Epicurus* imagin'd, and he would allow nothing but Bodies to think, and in order to make them capable of Thought, he ſays, that Images flow from thoſe Subſtances, which he ſuppoſes form'd of Atoms, and inſinuate themſelves into the Mind, as being of a more ſubtle Contexture than thoſe that preſent themſelves; but if we once ſuppoſe that Atoms have a Soul, we may eaſily conceive that their ſeveral Combinations form divers Species of Animals, divers Manners of Senſation, and divers Combinations of Thought.

He alſo attributed to the ſame Cauſe the Formation of innumerable Worlds. He conceived of God as a material Being, (conſequently of ſome Form) though not of the ſame Kind or mutable Matter, but independently happy and immortal, and whoſe Reſidence, he conceives, is not in any particular World, but beyond the Limits of them all.

Where Show'rs nor fall, nor Winds unruly blow,
Where neither blaſting Froſt, nor hoary Snow,
Riſe the Place; but Heav'n is ever bright,
Spreading his glorious Smiles with chearful Light.

Seneca wrote him an Epiſtle on the particular Opinions he held,* particularly concerning God, wherein he reminds him, that the Doctrine of the fortuitous Concourſe of Atoms diveſt God of his Power and Goodneſs, and that conſequently, we lie under no Obligation to him. If I aſk, wherefore you love him? You anſwer, for the Majeſty and Excellence of his Nature. Be it granted, that neither Intereſt nor Expectations are your Motives to worſhip him, there is ſomething of Dignity in

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* *Auguſtine*, and other antient Hiſtorians, have controverted *Epicurus*'s Notions of God, ſometimes expreſſed in the Singular, and at other Times in the Plural. *Diogenes Laertius* ſays, he taught us to believe of God, that he was perfectly happy and incorruptible, and to aſcribe nothing to him repugnant to Bliſs, or incompatible with Immortality; and the learned *Gaſſendus*, who has given the largeſt Account of his Works, has taken great Pains to prove his Ideas of God were not at all impious.

the Generoſity with which you are influenced; but nevertheleſs greatly abſurd. And indeed he always expreſſed a Diffidence of his own Underſtanding; for which Reaſon, probably, we find it was his uſual Method to recommend to his Diſciples, as their firſt and principal Study, the Immortality and Felicity of God.

But however erroneous his Sentiments were, *Seneca* ſays, his outward Religion was never called in Queſtion, though he did not conceive of God as the Source of all Good, and the Center of all Happineſs: He always entertain'd a high Veneration of the Supreme Being, inculcated the ſame on his Diſciples, and expreſsly forbad attributing any Imperfection to him, or Want of independent Felicity, ſaying, "he is not an impious Man who "rejects the Gods whom the People adore, but he who enter-"tains ſuch impertinent Opinions of them as ſome People do."

He believed the Supreme Being had a Right to be adored for the Excellency of his Nature, and that we ought to worſhip him neither from the Hopes of any Reward, or Fear of Puniſhment; he highly blaming Superſtitions, with which the People were abuſed, and were too often made uſe of as a Pretence for, or Extenuation of the greateſt Enormities.

He greatly exploded the Idea of God's Reſidence in particular Places, ſaying, we muſt not believe them to reſemble the fineſt Palaces in this World; that the Gods, by Reaſon of the fine Matter of which they are made, are inviſible to the Senſes, and can hardly be perceived by the Eye of the Mind; and it muſt neceſſarily follow, that the Place of their Abode muſt bear ſome Reſemblance to the Tenuity of their Nature.

He alſo held, that the Univerſe was boundleſs; that this great All had neither Middle nor End; and that from any imaginary Point, the Space you had to traverſe was infinite, that there was no End of it.

And as the Subjects of his Enquiries were many, and Philoſophers were divided very much in the Criterion of diſtinguiſhing what is true from what is falſe, he made this a Subject of Importance, and accordingly makes the Senſes the Standard of Judging, and that we know nothing but by their Report, or by what is inconſiſtent with them.

He

He believed there was nothing more great and noble than the Study of Philoſophy; that young Perſons could never begin it too ſoon, and that they who were old ought never to be weary, ſince the End propoſed thereby is Happineſs, the only End which all reaſonable Beings ought to have in View.

And he placed the *Summum Bonum*, or chief Good, in Pleaſure, not in infamous and unlawful, but in Pleaſure inſeparable from Virtue, ſuch a State of Happineſs as may be attained by the Strength of Nature in general; in the Tranquility of the Mind. Sometimes Health of Body he joined with it, but chiefly in the former, in regard the Goods of the Mind were better than thoſe of the Body; and therefore he ſtiles Philoſophy the Medicine of the Mind.

This by no Means proves, that *Epicureans* place Happineſs in good Cheer, or an Intercourſe of the different Sexes; for at beſt, theſe are but efficient Cauſes of ſome Degrees of Satisfaction, which are not here in Queſtion. When there is Occaſion, he ſays, to treat of the efficient Cauſes of Content and Pleaſure, they will mark out the beſt; on the one Side they will direct you to thoſe Objects which are moſt capable to preſerve the Health of your Body; and on the other, will point out what has the greateſt Tendency to the Tranquility of the Mind: Conſequently, they will preſcribe you Sobriety, Temperance, and the checking the tumultuous Paſſions, which deprive the Soul of its State of Felicity. Theſe were the governing Maxims with this Philoſopher.

Nevertheleſs, ſome of his Diſciples degenerated, and gave Occaſion for miſtaken Notions concerning their Maſter, though his whole Time was devoted to the Study of Philoſophy, and he always exerciſed the utmoſt Temperance.

He taught, that Virtue was the only Means of making Life happy; becauſe nothing is more pleaſant than to live wiſely, according to the Rules of Prudence, Honour, and Juſtice, to have nothing to reproach us. To injure no Man, to do all the good Offices in our Power to our Fellow-Creatures; this, he ſays, is Pleaſure; this is Happineſs.

He inceſſantly recommended Temperance and Sobriety, as the only Way to preſerve the true Uſe and due Exerciſe of the governing

verning Faculties, as tending to the Health of the Body, and to the repairing it when decay'd.

He conſidered the Senſes in their due Uſe, adminiſtering to Pleaſure; but, he ſaid, though Pleaſure is deſirable, yet we cannot keep it at too great a Diſtance, when the Evil that will follow will be ſuperior to the Satisfaction enjoyed; and cautions us to avoid ſuch Pleaſures that attach us to Bodies.

Some of his Maxims of Temperance, Sobriety, *&c.* being ſo perfectly agreeable to his Life, we may remark the following, *viz.*

Never covet Delicacies; that which is plain and ſimple will not offend the Head.

He moſt enjoys Riches that leaſt wants them. If you live according to Nature, you will never be poor; if according to Opinion, you will never be rich.

They live ill, who are always beginning to live; there is no living pleaſantly without living virtuouſly.

He ſaid, there were few who knew how to make a right Uſe of Life; that the Generality of Men were diſſatisfied with their preſent State; every one propoſed to live more happily for the Time to come, but were ſurprized by Death before they could put their Projects in Execution; and that this was the Thing that made Man's Life ſo extremely miſerable: This being the Caſe, it was beſt for a Man to enjoy the Time preſent, without deferring it to uncertain, future Time, nor meaſure Life by the Number of Years, but by the Pleaſures he enjoyed; for a ſhort and pleaſant Life, he ſaid, was more deſirable than a longer, full of Care; as at an Entertainment, we do not chuſe the moſt in Quantity, but the Meat that is ſweeteſt, and beſt dreſt.

As he rejected the Notion of Fate, he look'd on the Art of Divination as a ludicrous Thing; believing it impoſſible for any one to know thoſe Contingencies, which having no neceſſary Cauſe, abſolutely depended upon the Humour and Choice of Man.

Though *Epicurus*'s Notions concerning God and the Soul, *&c.* were the juſt Ground of Cenſure, all Hiſtorians in gene-

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ral agree, he lived a moſt exemplary Life, according to the Rules of philoſophical Wiſdom.* *Cicero* cries out, in his *Tuſculan* Queſtions,

O good Gods, how great was his Abſtinence!

St. *Jerom* beſtows great Commendations on his Life, and objected it to Chriſtians, to make them aſhamed of their Debauches: And *Seneca*, tho' a Stoic, ſpeaks honourably of him.

St. *Gregory* gives us an illuſtrious Teſtimony of the Chaſtity of this Philoſopher.

Epicurus tells us, ſays this Father, that Pleaſure was the End of Man; and that we might not imagine the Pleaſure he meant was ſenſual, he lived a Life no leſs regular than temperate; and confirmed the Truth of his Doctrines by the Purity of his Morals.

His perſonal Character was eminent for Candour and Sincerity: He was courteous and affable to all, and had that Tenderneſs for his Friends and Pupils, as would be quite tedious to particularize: He recommended to them Generoſity and Kindneſs, even to their Slaves, and by his own Example inculcated Humanity: He not only permitted his Slaves the Liberty of learning Philoſophy, but took Care to inſtruct them, as if they had been Scholars.

We muſt not forget how juſtly he is commended for the Love of his Country and Diſciples; he did not abandon it at the Time of the greateſt Diſtreſs, whilſt *Demetrius* beſieged *Athens*, but ſhared the Miſeries of his Countrymen, and divided his ſcanty Diet equally with his Diſciples; and many of his Diſciples from other Places, who reſorted to his Houſe, reſided with him as a Kind of Community; each out of his Superfluity ſhared with his Neighbour, tho' not as one common, or Bank Stock, which might occaſion Miſtruſt.

M. Tully ſpeaks of his conſtant, undiſſembled Friendſhip, with diſtinguiſhing Epithets of Commendation, and as the peculiar Honour of his Sect.

* Among thoſe who miſunderſtood, or diſapproved his Sentiments, they uſually uſed this Diſtich:

His Practice with his Doctrine diſagreed;
Strict was his Life, tho' Pleaſure was his Creed.

His Submiſſion to Governors is alſo recorded to his Honour; he put up Vows for the Safety of the Common-wealth, and the antient Form of Government, but complied with the preſent State of Affairs, and ſubmitted to thoſe who had the Fortune to govern; never chuſing to be concerned in the Government of the Republic, but preferred a Life of Peace and Tranquility to that Trouble and Perplexity which are inſeparable from State Affairs.

Thus advanced beyond the uſual Period of human Life, the 72d Year of his Age, he fell ſick at *Athens*, where he had never diſcontinued his Inſtructions. His Diſtempers were a Retention of Urine, and *Dyſentery*, which were exceeding painful to him; however he bore them with Patience invincible.

When he perceived his End approaching, he gave his Slaves their Liberty; and ordered his Birth-day to be annually kept on the 10th of *Gamelien*, or *January*.

He left his Garden and Books to the Uſe of Scholars that ſhould ſucceſſively attend there; and wrote after this Manner to *Idomeneus*.

" I Am come, I thank the Gods, to the laſt and moſt happy Day of my Life. I am tormented with violent Pain, " yet even in the Midſt of theſe my Sufferings, I feel a Spring " of Joy within me, when I reflect on the Service I have done " to Philoſophy in general, and the Remembrance of our Friend- " ſhip. Take Care of the Children of *Metrodorus*, and bear " my Doctrines in your Mind.

" Farewel."

Having been ill about 14 Days, he went into a Bath of hot Water; he called for a Glaſs of Wine, which he drank, and ſoon after expired, in the firſt Year of the 127th *Olympiad*, 271 before the Chriſtian Æra.

Public Statues were erected to his Memory at the Charge of the City of *Athens*, which, with other Marks of Eſteem, teſtify his diſtinguiſhed Merit; and his Writings for many Ages ſince proclaim his great Penetration, and amiable Character.

Thus

Thus the Poet:

When Epicurus *roſe, when he began,*
That Oracle of Truth, that more than Man;
The Fame of whoſe Inventions ſtill ſurviv'd,
And rais'd an everlaſting Pyramid,
As high as Heav'n, as Earth the Baſis wide.
For he, obſerving ſome that could ſupply
Contented Nature's thrifty Luxury,
Happy in Honours, and in Wealth's Embrace,
And doubly happy in a noble Race,
Still groan'd and pin'd, with Care and Grief oppreſt,
Each found a ſad Diſturber in his Breaſt;
Imagin'd right, the Fault lay hid in Man,
Whence this Corruption of his Joys began:
Becauſe his Wiſh is boundleſs, vaſt his Mind,
Much Good paſs thro' and leave no Sweets behind;
Or elſe, ſome ill Opinion ſtill deſtroys
The preſent Good, and ſours all his Joys:
Then he, the mighty he, by pow'rful Rules,
And true Philoſophy, reform'd our Souls;
He purg'd away all vain and empty Care,
And taught what Man ſhould hope, what Man ſhould fear;
The End at which we ought to aim he ſhow'd,
And taught an eaſy Way to find the Good.

Thee, who haſt Light from 'midſt thick Darkneſs brought
And Life's Advantages and Pleaſures taught;
Thee, chiefeſt Glory of the Greecian *State,*
Thy Paths I'll trace, reſolv'd to imitate.
Thou, Parent of Philoſophy, has ſhewn
The Way to Truth, by Precepts of thy own.
Thee, who haſt taught the World Delight and Peace,
Fame ſhall attend, thy Praiſe ſhall never ceaſe.

LUCRETIUS.

Again,

Great Epicurus *died, his Life's Race run,*
Whoſe Wit Mankind exceeded, as the Sun
Eclipſeth, by his Riſing, all the Stars.

ARA-

ARATUS.

ARATUS, the Philoſopher and Poet, by way of Diſtinction from *Aratus*, the General, was born at *Soli*, a City of *Cilicia*, and flouriſhed about the Time of *Ptolomy Philadelphus*, (according to *Suidas*) in the 124th *Olympiad*, was remarkable for his Quickneſs of Wit, and Solidity of Judgment.

By theſe Accompliſhments, he was early introduced to the Favour of the King, and ſpent moſt of his Time in the Court of *Antigonus Genatos*, the Son of *Demetrius Poliorcetis*. Here he had great Opportunities of improving himſelf, which his Genius was ſo naturally adapted to, that it enabled him to make very curious Reſearches into the Works of Nature; and from Nature up to Nature's God, whom he acknowledged, in thoſe early Ages of Ignorance, the Creator of all Things.

To this Poet St. *Paul* alludes, when diſcourſing on the Being and Perfections of God, to the *Athenians*, *Acts* xvii. 28. *As certain alſo of your own Poets have ſaid, We are alſo his Offspring.*

This Quotation of the Apoſtle is the fifth Verſe of his Poem; beſide which, in the Beginning of this Poem are ſeveral remarkable Expreſſions concerning the Deity. His firſt Words are, *We begin from Jove*, whom we ought never to paſs by unmentioned; *for all Things are full of Jove*; Men, Earth, Sea, and every Thing, every where, ſtand in Need of *Jove*; for *this benevolent Deity ſupplies them with all good Things*; with ſeveral other Expreſſions, importing his Reverence of the Deity, whom he alway conſiders in the ſingular Number, and as the one ſupreme Governor of the World.

From his aſſiduous Diſpoſition to enquire into the Nature and Properties of Things, he made many uſeful Diſcoveries, and publiſhed many of them in his Poem entitled *Phænomena*, or the Appearances of Nature, but more particularly of the celeſtial Bodies, *&c.* and his *Dioſemia*, which were ſo pleaſing to *Cicero*, *Claudius*, and *Germanicus Cæſar*, that all three tranſlated them into *Latin*: He alſo wrote Hymns to the God *Pan*; he

he likewiſe wrote ſome Things in Medicine; as alſo, a Treatiſe concerning Manners; and ſome Epigrams upon *Antigonis*'s Wife: And not only thoſe who were his Cotemporaries eſteemed and valued his Lucubrations, but many learned Men, in divers Ages of the World, have beſtowed Commendations upon theſe Pieces, particularly Sir *Edward Sherbourne*, *Voſſius*, &c. And as his Principles relating to the Deity were regulated by the moſt natural and conſiſtent Idea of Things; ſo his moral Character was uniformly virtuous, ſuitable to what he inculcated on others, and to the Idea of his derived and dependent State, which afforded a laſting Credit and Honour to his Memory.

Hiſtory is ſilent with regard to the particular Time and Manner of his Death. Authors are inclined to think he did not arrive to old Age, but exchanged this Life in a ſomewhat early Period.

PROCLUS.

PROCLUS, denominated, from his Country, *Lycius*, was a Diſciple of *Syrianus*, a Philoſopher of the *Platonic* Sect, and preſided over a School at *Athens*. He wrote many learned Commentaries on Philoſophy, Mathematics, and Grammar; upon the whole Works of *Homer*, *Heſiod*, and *Plato*'s Books of the Republic: He wrote likewiſe concerning the Conſtruction of the *Aſtrolabe*. He flouriſhed in the Time of *Trajan* the Emperor, and wrote many Things againſt the Chriſtians after *Porphyry*; but was anſwered by *John*, called the *Grammarian*, in his Apology for the Chriſtians.

We learn from *Suidas*, and *Philoſtratus*, that there were many of his Name; but *Proclus* the Mathematician is the only one whoſe Works are extant: The principal of which is his Book *on the Doctrine of the Sphere*; in which he treats of the *Axis* and *Poles* of the World; of the *Circles* of the *Sphere*, great and ſmall; of the *Parallels* of the *Colures*; of the *Zodiac*, and its *Signs*; of the *Horizon*; of the *Meridian*; of the *Ga-*

laxy, or *Milky Way*; of the *Conſtellations*; of the *five Zones*; of the *Climates*; and the *Conſtellations of the Heavens*.

It is not certain how long he lived, or when he died. His above-mentioned Book is deſervedly reckoned one of the beſt Pieces of *Aſtronomy* among the antient *Greek* Authors, and is worthy the Peruſal of the Curious in ancient Learning of that Kind.

CLEOMEDES.

CLEOMEDES is another *Greek* Author, who though he has wrote a large Treatiſe of the *World* in general, and *Aſtronomy* in particular; yet we find no Mention made of him among Authors, neither as to the Age in which he lived, or of what Profeſſion or Sect he was. It is only ſaid of him, that he wrote a very elegant Treatiſe, which is ſtill extant, and is divided into two Books: The firſt of which treats of the *Magnitude* and *Dimenſions* of the *Earth*; of the *Celeſtial Circles*, or *Diviſions* of the *Heavens*; of the *Motions* of the *Planets* and the *Stars*; of the *Zodiac*, and *Celeſtial Signs*; of the *Torrid*, and other *Zones*; of the *Encreaſe* of *Days* and *Nights*; of the *Earth*, as a habitable Globe; that the World is round; that the Earth is in the Middle of the World; and of the *Magnitude* of the *Earth*. In the ſecond Book he treats of the *Quantity*, or *Bulk* of the *Sun*, and again, of the *Magnitude* of the *Earth*; alſo of the *Magnitude* of the *Sun*, *Moon*, and *Stars*; of the *Nearneſs* of the *Moon* to the *Earth*; of the *Eclipſes* of the *Moon*; and laſtly, of the *Planets*. He tells us, that many Things which he wrote in this Treatiſe were extracted from *Poſſidonius*; but tho' theſe Names were great among the Ancients, yet their Writings muſt appear very ſterile, and their Notions very imperfect and vague, to a Perſon verſed in the *modern Coſmology*. However, this Piece of *Cleomedes* muſt be reckoned among the pompous Remains of Antiquity, and well deſerves a Place in the Library of the Curious.

DIONYSIUS.

Dionyſius Periegetes muſt not be overlooked, as he is intitled to a Place in our *Biographia Philoſophica*, on Account of a *Greek* Poem which he has wrote, upon a geographical Deſcription of the Surface of the whole Earth, as far as it was known in his Time. He lived in the Reign of *Auguſtus*, and of Courſe could treat only of the three great Parts of the World which were then known, which he reckons in this Order, *viz. Lybia*, i. e. *Africa*, *Europe*, and *Aſia*.

Priſcian tranſlated his *Greek Hexameters* into *Latin Pentameter* Verſe; but the moſt complete Edition of this Author is given us by Dr. *Edward Wells*, who has not only illuſtrated this Author by Maps of ancient Geography, but modernized them by Notes, explaining the ſeveral Countries he treats of, according to their preſent State.

This poetical Geographer is uſually read in *Weſtminſter*, and other eminent Grammar-Schools, as a *Greek Claſſic*, of whom *Turnebus* ſays; "If this Poem was well digeſted, it would "make a Man as thoroughly acquainted with the ancient Geo-"graphy of the whole Earth, as he is with the Town in which "he was born and bred."

It is obſervable, that he ſpeaks of the *Inſulæ Heſperidæ*, or *Weſtern Iſlands*, with reſpect to the large Quantities of Tin found there, which, he ſays, were poſſeſſed by the illuſtrious *Iberians*. He ſpeaks of two *Britiſh* Iſlands, and aſſerts, that they are the largeſt of all the Iſlands of the known World. It is plain, in ancient Times, the Inhabitants of the Weſtern Part of this Iſland were included under the Name of *Iberians*; and by the two great *Britiſh* Iſlands, ſituated oppoſite to the Mouth of the *Rhine*, he muſt undoubtedly mean *Great-Britain* and *Ireland*. This Author is ſaid to have wrote ſome other Books concerning the Nature of Stones, *&c.* which are now loſt.

Authors are ſilent as to his Profeſſion, and the Time of his Death.

APOLLONIUS.

APOLLONIUS, of *Perga*, a City in *Pamphilia*, was a famous Geometrician in the Reign of *Ptolomy Euergetes*, which reaches from the 133d Olympiad, to the 3d Year of the 139th. He ſtudied a long Time in *Alexandria*, under the Diſciples of *Euclid*, and compoſed ſeveral Books, of which only his Books of *Conic Sections* are ſtill extant.

It appears from the Author's Epiſtle Dedicatory to *Eudemus*, a Geometrician in *Pergamus*, that this Work conſiſted of eight Books; and that the Public have not yet ſeen the laſt of theſe eight.

Some Authors attribute to him the Comment on the *Phænomena* of *Aratus*. It is much eſteemed, and ſeveral ancient and modern Authors have taken the Pains to comment upon, or tranſlate it; though Mr. *Des Cartes* had no favourable Opinion of it. After many other Tranſlations and Comments upon it, *Martin Gibertaldus* endeavoured to correct it, according to the Senſe of the Author, and to reſolve the Problems; and by this Means reſtored Life to this antient Geometrician.

Claude Richard, Profeſſor of Mathematics in the Imperial College of his Order at *Madrid*, in the Year 1632, explained, in his public Lectures, the firſt four Books of *Apollonius*, which were reprinted at *Antwerp* in 1655, in Folio; and the great Duke *Ferdinand* II. and his Brother, Prince *Leopold de Medicis*, employed a Profeſſor of the Oriental Languages at *Rome* to tranſlate the 5th, 6th, and 7th Books of *Apollonius* into *Latin*, printed at *Florence* in 1661; with the Commentary of *Borelli*, who maintains theſe Books to be the ingenious Productions of our *Apollonius*, by many unqueſtionable Authorities.

Some have thought, that *Apollonius* appropriated the Writings and Diſcoveries of *Archimedes*, *Heraclius* affirms it; but *Eutocius* endeavours to confute him; and, upon the whole, he is allowed the Honour of explaining a difficult Subject better; and has made ſeveral Improvements both in *Archimedes*'s Problems and in *Euclid:* And it ſeems a groundleſs Suppoſition, that *Archi-*

Archimedes was the first who wrote of *Conics*, notwithstanding his Treatise of *Conics* was greatly esteemed.

Apollonius had a Son of the same Name, who was the Messenger that presented the second Book of the *Conic Sections* to the Person to whom it was dedicated, who paid him the Compliment of the *great Geometrician*; but his Cotemporaries spake with this Restriction, that his Treatise of *Conics* was formed on the best Rules of any that had at that Time appeared of his particular Profession. As to the Time of his Death Authors are silent.

ARISTARCHUS.

ARISTARCHUS, a *Greek* Philosopher, and Native of *Samos*, was one of the first, who maintained, that the Earth turned upon its Center, and described annually a Circle round the Sun. *Sextus Empericus* confirms this Opinion. *Plutarch*, intending to clear up a Thought of *Plato*, and considering with himself whether that Philosopher did not believe the Motion of the World, adds, that this Opinion was afterwards that of *Aristarchus*. And *Archimedes* intimates this more plainly. These are his Words: *Aristarchus*, the *Samian*, confuting the Notions of Astrologers, laid down certain Positions, from whence it follows, that the World is much larger than generally imagined; for he lays it down, that the fixed Stars and the Sun are immoveable; and that the Earth is carried round the Sun in the Circumference of a Circle. According to some Historians, *Cleanthus* was of Opinion, that *Greece* ought to have tried *Aristarchus* for Irreligion, for endeavouring to preserve the regular Appearance of the heavenly Bodies, by supposing that the Heavens themselves stood still; but that the Earth revolved in an oblique Circle, and at the same Time round its own Axis. He invented a peculiar Kind of Sun-Dials, mentioned by *Vitruvius*. There is extant of his Works only a Treatise of the Magnitude and Distance of the Sun and Moon, translated into *Latin*, and commented on by *Frederic Commandin*, and published with the

Explication of *Pappus*, in 1572. Dr. *Wallis* publiſhed it in *Greek*, with the *Latin* Verſion of *Commandin*, in 1688, and inſerted it in the third Tome of his Mathematical Works. The Syſtem of the World, which appeared under his Name, is controverted, and ſaid to be *Robervals*. The Time when *Ariſtarchus* flouriſhed is not certainly known; but that he was born in the Life-time of *Archimedes* is not diſputed. Some ſay, that he was a Cotemporary with him. *Blancanus* mentions, that he flouriſhed about the 89th Olympiad, but probably it was later. *Vitruvius*, naming ſome Mathematicians who were Inventors, places *Ariſtarchus* in the firſt Rank.

ARCHIMEDES.

IN the early Dawn of the *Roman* Glory abroad, when *Marcellus* was Conſul at *Rome*, and *Hiero* King of *Syracuſe*, in *Sicily*; there flouriſhed in this latter City a Perſon, named ARCHIMEDES, whoſe Mathematical Genius ſet him with ſuch diſtinguiſhed Excellence in the View of the World, as made him not only the Honour of his own Age, but the Admiration of Poſterity: He was an Inſtance, of late Years, well confirmed, to what a Height of Knowledge the human Mind is capable of attaining, when attentive only to one Species of Science.

His MECHANICS are at large diſcourſed of in *Polybius*, *Livy*, and *Plutarch*; particularly concerning ſome Engines, invented by him to defeat the Approaches of the Enemy, when his paternal City was beſieged by the *Romans*.

It is not to be diſputed, but that he invented the Properties and Proportions of the Cylinder and Sphere, and ſome other Mathematical Figures; as one Sort of *Spiral*, which to this Day goes by his Name. He was the firſt that made a Sphere of Glaſs, through which were ſeen the heavenly Bodies in Motion; but upon what Syſtem they moved does not appear. We have not any direct Authority in reſpect to this Invention; but Tradition has delivered the Facts down to us with ſtrong Circumſtances, leading to a Confirmation of the Truth; as that

theſe eminent Monuments of his Invention were graved on his Tomb, at a Time, when the Truth was well known. TULLY, in his *Tuſculan* Queſtions, tells us, that the Tomb was wholly unknown in his Time, being over-grown with Buſhes; but when he was *Queſtor* there, he found it out; and cauſed the Place to be cleared. And the Poet *Claudian* has an Epigram on this Invention:

Jupiter in parvo cum cerneret æthera vitro,
Riſit, et ad ſuperos talia dicta dedit;
Haccine mortalis progreſſa potentia cura?
Jam meus in fragili luditur orbe labor.
Jura poli, utrumque fidem, legeſque deorum,
Ecce *Syracuſius* tranſtulit arte ſenex.
Incluſus variis famulatur ſpiritus aſtris,
Et vivum certis motibus urget opus.
Percurrit proprium mentitus ſignifer annum,
Et ſimulata novo *Cynthia* menſe redit,
Jamque ſuum volveus audax induſtria mundum
Gaudet, et humana ſidera mente regit.
Quid falſo inſontem tonitru *Salmonea* miror
Æmula natura parva reperta manus.

ENGLISHED.

When in a glaſs's narrow ſpace confin'd,
Jove *ſaw the fabric of th' almighty mind,*
He ſmil'd, and ſaid: Can mortal art alone
Our heavenly labours mimic with their own?
The Syracuſians *brittle world contains*
Th' eternal law, which through all Nature reigns.
Fram'd by his art ſee ſtars unnumber'd burn,
And in their courſes rolling orbs return.
His ſuns through various ſigns deſcribe the year,
And every month his mimic moons appear.
Our rivals laws his little planets bind,
And rule their motions with a human mind.
Salmoneus *could our thunder imitate,*
But Archimedes *can a World create.*

The

The ſame Stories are reported of him, as have ſince been told of Sir ISAAC NEWTON, which Two bear, in Character, a very near Reſemblance; for he was frequently loſt in a Kind of *Reverie*, ſo as to appear hardly ſenſible: And *Plutarch* tells us, that he uſed to be carried to the Baths by Force. It ſeems, however, that the Bath awakened him; as it was there he diſcovered what other Metals might be included in, or mixed with Gold. The Book wherein this Diſcovery is illuſtrated is loſt, and we have only what follows from VITRUVIUS.

HIERO, King of *Syracuſe*, intending to make an Offering to the Gods of a golden Crown, contracted with an Artificer to make one of a great Price, and gave him the Gold, which the Workman finiſhed, and delivered full Weight. It was afterwards diſcovered, that Part of the Gold was ſtolen, and its Place ſupplied with Silver. HIERO, diſpleaſed at the Impoſition, deſired *Archimedes* to conſider how it might be known, what Quantity of different Metals might be contained in the ſame Veſſel. While engaged in the Solution of this Difficulty, he happened to go into the Bath; where obſerving, that a Quantity of Water over-flowed in Proportion to the Body that was in it, it immediately occurred to him, that *Hiero*'s Queſtion might be ſolved by a like Method. Accordingly, he made two Maſſes of equal Weight with the Crown; one of Gold, and one of Silver. Then filled a Veſſel to the Brim with Water, and put the ſilver Maſs into it; upon which a Quantity of Water over-flowed equal to the Maſs; then taking the Maſs out, he filled up the Veſſel again, meaſuring the Water exactly that he put in; this ſhewed him what Meaſure of Water anſwered to the Maſs of Silver. Then he tried the Gold in like Manner, and found leſs Water to overflow, as the Bulk of the Gold, tho' of equal Weight, was much leſs than the Silver. Then he filled up the Veſſel a third Time, and put therein the Crown of Gold, when he found more Water to over-flow than in the golden Maſs of the ſame Weight, whence by the Difference he computed, what Silver was mixed with the Gold, and thus expoſed the Fraud.

Many of his Works are loſt. Thoſe come to our Knowlege are, — two Books of the *Sphere* and *Cylinder*. — The Dimenſion of a Circle. — Of Aquiponderants, or Centres of Gravity. — Of Spheroids and Conoids. — Of Spiral Lines. — The Qua-

Quadrature of a Parabola — of the *Number of the Sand* — and of *Bodies that float on Fluids*. He is ſaid to have invented an Engine, called the *Cochlea*, § by which he drained all *Egypt*, and would empty the Water from any Depth; that he launched *Hiero*'s great Ship, and ſet the *Roman* Veſſels on Fire with Burning-glaſſes. Theſe ſeem great Matters to ſome Writers; but as a Veſſel is eaſily burnt, that comes within the Focus of a Burning-glaſs; ſo is a Ship of any Magnitude eaſily launched being conſtructed on a declining Slip, as all muſt be, or muſt be out of the Power of any Mechaniſm to effect.

We do not find any Deſcription of this launching Engine, nor any authentic Account of the Magnitude of the Ship, tho' attempted by many Authors, very little to the Satisfaction of a curious Enquirer. As to the Burning-glaſs, if the Relation is to be depended upon, it is only to be thus conſidered; that what is there called Ships, were generally but ſmall Veſſels, and might by the Situation of the Place be obliged to go near the Shore, and on the South-ſide of the Station, where a very large Glaſs, with a proper Focus, might be ſet, and in ſuch a Caſe be fired by the converging Rays: But as this requires many Circumſtances to make it feaſible, I believe that none but thoſe unacquainted with the Nature and Reaſon of this Subject will give much credit to the Story. * It is no

§ This Machine is ſtill called *Archimedes*'s SCREW, and is in general Uſe.

* As there is no Probability in the Nature of Things of the above-mentioned extraordinary Effects of Burning-glaſſes, whether *Speculums* or *Lenſes*, uſed ſingly by themſelves, tho' in the Hands of ſo ſkilful a Perſon as *Archimedes*, much more abſurd muſt it be to pretend, that they had the Knowledge of any compound Burning-glaſs; eſpecially ſuch a one as conſiſts of Pieces of plain Looking-glaſs, put together in the Manner of that invented lately by Monſieur *Buffoon*. For this ſuppoſes, that they had not only the Art of making large Concave Speculums; but alſo, that they underſtood the Art of making and foliating Looking-glaſſes; nothing of which appears from Hiſtory, or is worth the Belief of any judicious Perſon. If any Thing of this Kind had been extant, the great *Roger Bacon* would undoubtedly have hence been fond of the Subject, and related the wonderful Effects of theſe Burning-glaſſes, among other Things of the like Nature, on which he has a particular Chapter, *viz.* Concerning the Inventions and wonderful Machines of the Antients, in his Book *De Nullitate Magiæ*: Upon the whole, *Richard Waller*, Eſq; has a particular

Eſſay

Diſhonour to ARCHIMEDES critically to examine Relations concerning him, as it is the Fate of human Affairs, to be extravagant in our Characters, and to give them to the World with great Addition or Diminution; and in this Light are moſt Hiſtorians to be read. In reſpect to this great Man, we are apt to imagine, that we have various Accounts concerning him that are not true, and unhappily deficient in many that are, and that might be of eminent Service to Mankind.

After all his Efforts to ſave *Syracuſa*, when beſieged, it was at length taken by Storm, and *Archimedes* was ſo very intent upon a Demonſtration of Geometry, that he neither heard the Noiſe, nor minded any Thing elſe, until a Soldier that found him tracing of Lines, and drawing Circles, aſked him his Name, and upon his Requeſt to be gone, and not diſorder his Figure, ſlew him. *Marcellus*, who had given ſtrict Orders to uſe him civilly, was much concerned for his Death, and received his ſurviving Friends very kindly for his Sake. He was ſlain in the 542d of *Rome*, in the firſt Year of the 142d Olympiad, and in the 212th Year before Chriſt.

HIPPARCHUS.

Hipparchus, a great Philoſopher, Son of *Piſiſtratus*, a Native of *Nicæa*, in *Bythinia*, flouriſhed between the 154th and the 163d Olympiad. We have the ſtrongeſt Argument that can be for it; ſince it is drawn from the Aſtronomical Obſervations which he made in that Interval of Time. *Ptolomy*, King of *Egypt* has related ſome of them. *Voſſius*, *Calviſius*, and *Suidas*, differed ſomewhat about the Time; but *Moreri* has placed *Hipparchus* in the Year 570 of *Rome*, under the Reign of *Ptolomy*; we are not, however, over-ſollicitous to determine this

Eſſay on this Subject (publiſhed among the Philoſophical Experiments and Obſervations of Dr. *Hook*) in which, after having examined all the Paſſages of antient Authors relative to this Subject, he concludes in theſe Words.—" I am of Opinion, that the Antients were wholly " ignorant of refracting Burning-glaſſes, except Spheres; and there- " fore, that it is no ſtrange Thing, that they had neither Teleſcopes " nor Microſcopes; both which noble Inventions have diſcovered " new Worlds to the laſt and preſent Age."

this Point. We have ſtill ſome of his Works extant, *viz.* his Commentary upon the Phænomena of *Aratus*, which is properly a Criticiſm; for he notes his Errors, and even accuſes him of having ſtole from *Eudoxus*'s Writings. The firſt Publiſher of *Hipprachus*'s Commentary was *Peter Victorius: Petavius* has given us a more correct Edition of it, to which he has added a *Latin* Tranſlation; his other Works were *de Conſtitutione Stellarum inerrantium, et Statione Immotâ, deque menſtra Lunæ Motu ſecundum Latitudinem, &c. Pliny* makes frequent and honourable Mention of *Hipparchus:* he places him in the Number of thoſe ſublime Geniuſes, who by the Prediction of the Eclipſes ſhewed, that Men ought not to be ſurprized at this Phænomenon. *Thales* was the firſt among the *Greeks*, who could foretel the Time of Eclipſes. *Sulpitius Gallus*, among the *Romans*, began to be ſucceſsful in that Sort of Prediction; and he made a very ſeaſonable Trial thereof the Night before the Battle in which *Perſeus* was overcome. *Hipparchus*, after theſe two, extended his Science much farther; for he made an *Ephemerides* for ſix Hundred Years to come, being thoroughly acquainted with the different Computations of the Months, Days, and Hours, Situations of Places, and the different Aſpects in the ſeveral Nations; in ſuch a Manner, that *Pliny*, and others, called him on this Account the *Confident* of *Nature:* The Eulogies he beſtows upon the Aſtronomers upon that Occaſion ſeem to be very well grounded, which may be thus read.—Illuſtrious Men, nay more than Men, who firſt diſcovered the Laws by which thoſe great Divinities are governed, and firſt ſet free the Minds of Men, who uſed to tremble at Eclipſes, fearing that they ſhould occaſion terrible Calamities, or the Extinction of thoſe glorious Luminaries. Hail! ye Interpreters of Heaven, learned in the Nature of all Things, and Diſcoverers of a Subject, whereby you have overcome both Gods and Men; for what Mortal, ſeeing theſe Things, and the ſtated Labours of the Stars, will not be content with the Neceſſity to which his own Nature is ſubjected. *Hipparchus* did ſo carefully obſerve what concerns Eclipſes, that he found out the Proportions of their Intervals. He obſerved, that the Eclipſes of the Moon might return at five Months End, and the Eclipſes of the Sun at ſeven,

and that the Sun might be eclipſed twice in the Space of 30 Days, with reſpect to the different Parts of the Earth.

Hipparchus alſo aſſerted, that the Gods are ſubject to a Law. *Pliny* owns there is a Propriety in ſaying, that God loves Order, and Good, by a neceſſary and indiſpenſible Law; for, on the contrary, it would be an Imperfection to violate that Law. But it is doubtleſs an Imperfection to be ſubject to an Order, which retards or weakens our Functions; and therefore they, who pretended the Stars were Gods, were obliged to ſay, if they argued conſiſtently, that the Aſtronomers had diſcovered the Weakneſs of the Divine Nature, and its Dependence on a very burthenſome Law, which ſubjected it to a Sort of Annihilation, Fainting, or Slavery. To this it may be objected, that the Sun is no leſs luminous in itſelf at the Time of an Eclipſe than before, or after; but may I not anſwer, that a Courier, who is ſtopped, loſes nothing of his Vigour and Health; it is nevertheleſs a Proof of his Submiſſion to a Law; it is, in a Word, a Sign of Weakneſs, to ſee that he cannot continue his Journey. Apply this to the Sun, and you will find, that his Eclipſes are a Sign of Imperfection. They hinder him from enlightening the Earth; he is a Prince whoſe Couriers are ſtopped, and whoſe Functions are interrupted. If *Pliny* had reaſoned well, he had not drawn the Conſequence, which he has from that Phænomenon: He would not have ſaid, that this ought to comfort Men on Account of their Mortality; he would rather have ſaid, the Stars were not of a divine, independent Nature, but the Offspring of God.

Hipparchus is greatly admired for having taken a Review of the Stars, and is even ſaid to be the firſt who counted them, and deſcribed their Situation, and Magnitudes, who put his Poſterity in a Capacity of diſcovering, not only whether they appear or diſappear, but alſo whether they change their Place, and increaſe or decreaſe.

We learn from a Paſſage of *Pliny*, that *Hipparchus* aſcribed to our Souls a Celeſtial Original. In the *Latin* it is very beautiful, and to this Purpoſe. *This ſame* Hipparchus *can never be ſufficiently praiſed; for No-body more clearly proved, that Men are allied to the Stars, and that our Souls are a Part of Heaven, divine, &c.* He mentioned a new Star, which was produced in his

his Days; and by its Motion, at its firſt Appearance, he began to doubt whether this did not frequently happen, and whether thoſe Stars, which we call fixed, do not likewiſe move. He endeavoured alſo to reduce to Rule the many Diſcoveries he made, and invented new Inſtruments, whereby he marked their Places in the Heavens, and their Magnitudes; ſo that by Means of them it might be eaſily obſerved, not only whether they appear and diſappear, but likewiſe whether they paſs by one another, or move, and whether they increaſe or decreaſe. He recommended the Knowledge of the Heavens as worthy the Study of Mankind, and what would recompence the greateſt Labour of any who ſhould be able to fathom thoſe Myſteries. *Strabo* accuſes this Aſtronomer of being too critical, and of having made Uſe of a Manner of criticiſing which ſavoured more of *Chicane* than Accuracy; but *Pliny* appears to have judged more juſtly of him: And indeed it deſerves Mention to his Honour, that however he might ſee it expedient to conform to ſome popular Cuſtoms relating to Pagan Idolatry, his Sentiments of God were far more ſublime than conſiſted with it, and might, if properly reaſoned upon, have afforded great Light to Poſterity on ſo important a Subject.

Hiſtory alſo celebrates him for the Love of his Country; and from his Zeal therein, he is ſaid to have delivered their Country from Tyranny: Therefore Statues were alſo erected to his Memory; but Hiſtory is ſilent as to the Time of his Death.

ZENO.

ZENO was a Native of *Citium*, in the Iſle of *Cyprus*. His great Application to Study and Love of Philoſophy rendered him famous in Hiſtory. He was the Head of the Sect of the *Stoics*. Before he entered on any Profeſſion, ſome Hiſtorians ſay, he conſulted the *Oracle*, from whom he is ſaid to have received a very ambiguous Anſwer, *viz.* that in order to be happy, he muſt become of the Colour of the Dead. This, however, he conſtrued that he was to apply himſelf to Study; and other Hiſtorians mention a different Cauſe. They mention his Application

to the Study of Philoſophy, and ſay, that he was poſſeſſed of a conſiderable Eſtate, or Effects; and in his Return from *Phenicia* he was ſhip-wrecked in the Port of *Pyrhea*, and to ſupport his Mind under the Loſs, he read the Writings of *Xenophon*, which gave him ſo much Delight, that he ſoon forgot his Loſs; and having aſked his Bookſeller where thoſe Sort of Men lived of whom *Xenophon* ſpoke, the Bookſeller ſeeing *Crates*, the *Cynic*, going by accidentally, ſaid to *Zeno*, behold the Man! follow him. *Zeno*, who was then thirty Years of Age, followed *Crates*, and became his Diſciple: And his Ingenuity and Penetration led him early to diſtinguiſh the Nature and Difference both of Opinions and Actions. His modeſt and reſerved Temper prevented him from falling into ſome Imprudencies for which the *Cynics* were blameable.

Zeno continued his Studies for ten Years under *Crates*. At Length, having acquired a Knowledge of the ſuperior Improvements of *Stilpo*, a Philoſopher of *Megara*, he reſolved to place himſelf under his Tuition. When going, *Crates* held him by his Garment, and would have engaged him to continue with him; but *Zeno* told *Crates*, there was no retaining a Philoſopher but by his Ears: Convince me, ſaid he, that your Doctrine is preferable to *Stilpo*'s; for otherwiſe, though my Body be with you, my Soul will be with him.

Zeno ſtudied ten Years more under *Stilpo*, *Zenocrates*, and *Polemon*: After which he retired, and inſtituted a new Sect of his own; and having obtained great Credit from writing a Treatiſe concerning the *Common-Wealth*, a great Number of Diſciples adhered to him, and he became the Head of the Sect denominated *Stoics*.

The *Stoics* were diſtinguiſhed by that Name from *Zeno*'s uſing to preach, or read Lectures on Philoſophy in a Gallery, called by the *Greeks Stoa*, which was ſometimes uſed as a Place to conſult or diſpute about Opinions.

The *Stoics* held, that there was only one Supreme Being; that all Things happened by a fatal Neceſſity, which they defined to be ſuch a fixed Order, and Concatination of Cauſes, as were unalterable by God himſelf. Hence the Names given to this Deity was ſometimes *Fate*, ſometimes *Spirit*, and at other Times *Jupiter*; that this Being was an Animal, immortal,

reaſonable, perfect, happy, and free from all Evil; that his Providence governed the World, and all the Beings that were therein.

They admitted of two Principles which were the *Agent* and the *Patient*; that is to ſay, *God* and the *World*.

They were of Opinion, that Matter was diviſible to Infinity; that there was but one World, and that the World was of a round Figure, which is the propereſt for Motion. They believed, as well as *Pythagoras* and *Plato*, that it was animated by a ſpiritual Subſtance, which was diſpoſed throughout all its Parts; that this Subſtance was not diſtinguiſhed from God, and that it formed with the World one and the ſame Animal; whereof, according to Some, the principal Part was the Heavens; and according to Others, the Sun: That the World was placed in the Center of an infinite, void Space; and that none of the Parts of the World admitted of a *Vacuum*; becauſe the fluid Matter which agrees with all Sorts of Figures, filled up the Spaces that were left by the groſs Bodies, which could not immediately join every where, becauſe of their Irregularity.

The *Stoics* alſo held, that the World was ſubject to Corruption; becauſe every Part that conſtituted the Syſtem of the World was conſtantly tending to Decay; and that there was nothing created could be exempt from it; that the fixed Stars were borne away by the Motion of the Heavens; that the Sun was a Fire, whoſe Body was larger than that of the Earth, ſince the Earth caſt a Shadow in the Form of a Cone; and that the Sun and the other Planets ſubſiſted by the Vapours which were exhaled from the Earth and the Sea. They had a ſome Knowledge of the Cauſes of Eclipſes of the Sun and Moon, and of Thunder and Lightening. They ſaid, that the two frigid Zones were uninhabitable, by reaſon of the extraordinary Cold; and that the torrid Zone was likewiſe uninhabitable, becauſe of the exceſſive Heat. Theſe were ſome of the diſcriminating but crude Sentiments of the *Stoics* with reſpect to philoſophical Science; but there was alſo a Variety of Opinions which prevailed amongſt Others, who divided into leſſer Sectaries.

Ariſto, the *Stoic*, declared himſelf an Enemy to Logic, comparing ſubtle Arguments uſually to Cobwebs, which really

ſhewed ſomething very ingenious, and well contrived, but were intirely uſeleſs.

Chryſippus on the contrary, had a great Eſteem for Logic; and ſo far excelled in that Art, that every one agreed, had the Gods ſtood in need of Logic, they would have choſen no other than that of *Chryſippus*.

But to return: King *Antigonus* admired *Zeno* the Philoſopher ſo much, that, whenever he came to *Athens*, he always was preſent at his Lectures, and uſed often to go and eat at *Zeno*'s Houſe, or invite him to *Ariſtotle*'s. But *Zeno* afterwards avoided going to public Aſſemblies, for fear he ſhould become too familiar with Pleaſure.

Antigonus uſed his utmoſt Endeavours to engage him to live with him; but *Zeno* excuſing himſelf, ſent *Perſeus* and *Philonides* with this ſolid and obliging Letter.

"GREAT SIRE,

"I am extremely pleaſed to find *Antigonus* expreſs ſo great an "Inclination for the Sciences; ſince nothing would ſooner "divert him from ſenſual Pleaſures, and incline him to Virtue "than the Love of Philoſophy. Did not my Age and Infirmities prevent me, I would not fail to attend you as you deſire; but as I cannot poſſibly do it, I ſend you two of my "Friends, who are no Ways inferior to me either in Senſe or "Doctrine, and are of a much ſtronger Conſtitution; if you "will converſe ſeriouſly with them, and apply yourſelf to the "Performance of thoſe Precepts they will lay before you, you "will ſee then that Nothing will be wanting to compleat your "Knowledge and Happineſs."

But as ſome Diamonds have their Specks, and the greateſt Men their Foibles, ſo this truly wiſe Man had his Errors.

He held, among other unjuſtifiable Notions, that every Man might lawfully deprive himſelf of Life, when, and in what Manner he pleaſed; which he confirmed by making his own untimely Exit. After a ſmall Accident, in coming out of his School, he hit his Hand againſt ſomething, and broke one of his Fingers, which he took for a Warning from the Gods. And

ſtriking his Hand againſt the Ground, he ſaid, Doſt thou require me? I am ready; and immediately ſtrangled himſelf, in the 98th Year of his Age, without ever being ſubject to any Infirmity, and in the 129th Olympiad. He was greatly regretted by *Antigonus*, who deſired the *Athenians* to bury him with Marks of diſtinguiſhed Honour. This was executed purſuant to a Decree made as follows:

"Whereas, *Zeno*, the Son of *Mnaſea*, of *Citium*, hath "ſpent many Years in teaching Philoſophy in this City, and "on all Occaſions hath behaved himſelf like a good Man, "continually recommending Virtue to the Youth under his "Care, and hath always lived conformable to the Precepts "that he taught; therefore, it is thought reaſonable to cele-"brate his Praiſe in a public Manner, to preſent him with a "Crown of Gold, and to erect a Monument for him, at the "public Expence,* in the *Ceramic* Suburbs. The People re-"quire that five Men in *Athens* be choſen to have the Direc-"tion of making the Crown, and the Monument; and that the "Scribe of the Republic ſhall engrave this Decree upon two "Columns, one whereof ſhall be placed in the Academy, and "the other in the *Lycæum*; and that the Money, neceſſary for "finiſhing this Work, be immediately depoſited in the Hands "of the Perſons who are intruſted with the Care of this pub-"lic Affair; to the End that all the World may know, that "the *Athenians* are mindful of beſtowing Honours on Men of "a diſtinguiſhed Merit, both during their Lives, and after their "Death."

THEODOSIUS.

THEODOSIUS, a Native of *Tripoli*, flouriſhed in the Times of *Cicero* and *Pompey*. He cultivated that Part of Geometry which relates to the Doctrine of the Sphere, con-

* This Decree was made whilſt *Archenidas* was *Archon*, chief Magiſtrate of the City of *Athens*.

cerning which he publiſhed three Books; the firſt of which contains 22 Propoſitions; the ſecond 23, and the third 14. They were all publiſhed in *Greek*, with a *Latin* Verſion at *Paris*, by *John Pena*, Regius Profeſſor of Aſtronomy. *Ptolomy* borrowed many Things from *Theodoſius*; as alſo from *Pappus*, *Proclus*, *Theon*, and many others; but without mentioning his Name. *Vitellio*, likewiſe, acquired great Reputation by tranſlating *Theodoſius* into *Latin*; and ſo highly was this *Greek* Author eſteemed by the *Arabians*, that they likewiſe tranſlated his Book of the Sphere into their own Language. From the *Arabic* his Works were again tranſlated into *Latin*, and printed at *Venice*; but the *Arabic* Verſion being exceedingly defective, occaſioned the above-mentioned Tranſlation and Edition by *Pena*, printed at *Paris* in the Year 1558. This Author's Works were afterwards commented upon and illuſtrated by *Clavius*, and *Heleganiius*, *Guarinus*, and laſtly by *C. Millet de Shales*, in his *Curſus Mathematicus*. *Theodoſius*, the *Tripolite*, is mentioned by *Suidas*, and is, undoubtedly, the ſame with *Theodoſius* the Philoſopher of *Bythinia*, whom *Strabo* aſſerts to have excelled in the mathematical Sciences, as alſo his Sons; for the ſame Perſon might have travelled from *Bythinia* to *Tripoli* in *Africa*, and there have lived the Remainder of his Life, in the ſame Manner, as *Hipparchus* was called by *Strabo* the *Bythinian*; but by *Ptolomy*, and others, the *Rhodian*.

Theodoſius wrote concerning Habitations; as alſo, concerning *Days* and *Nights*; which Copies, in *Greek*, are to be found in the King's Library at *Paris*. Of theſe there was likewiſe a *Latin* Edition, publiſhed by *Peter Daſypody*, in the Year 1572; but that Edition of *Theodoſius*'s *Spherics*, which is now moſt in Uſe, was tranſlated, and publiſhed, by the learned Dr. *Barrow*, in the Year 1675, illuſtrated and demonſtrated in a new and conciſe Method. By the ſame Author's Account, *Theodoſius* appears, not only to be a great Maſter in this more difficult Part of Geometry, but is the firſt conſiderable Author of Antiquity that has wrote on the Subject. We find nothing relating to the Time and Manner of his Death.

LUCRETIUS.

LUCRETIUS.

LUCRETIUS, commonly called *Titus Lucretius*, was born, according to *Euſebius*, in the 2d Year of the 171ſt Olympiad. As he diſcovered a very great Readineſs of Wit and a Diſpoſition to Learning, he was ſent by his Relations to Study at *Athens*, under *Zeno*, an *Epicurean* Philoſopher, and his Improvements were ſo great, that he was juſtly eſteemed, as well by *Cicero*, as others, the ſublimeſt of all the Poets: And *Cicero* ſays, he would venture to affirm, that none of the *Roman* Writers deſerve to take Place of *Lucretius* in Point of Purity of Language. He alſo diſcovered a conſiderable Genius in the philoſophical Sciences, of which his Writings are a Demonſtration. He compoſed ſix Books, entituled *de Rerum Naturâ*, wherein he learnedly explains *Epicurus*'s *Phyſics*. The ſame Author informs us, that *Cicero* corrected his Works; but notwithſtanding the Excellency of his Parts, and his Reaſoning well on ſome Subjects, he entertained the groſſeſt Errors with reſpect to God, his Providence, and the Nature of the human Soul; which, probably, might be partly owing to ſome falſe Principles imbibed in his Education. Concerning God, *&c.* we may gather his Sentiments from the following Lines:

That whatſoe'er's Divine muſt live in Peace,
In undiſturb'd, and everlaſting Eaſe:
Not care for us; from Fears and Dangers free,
Sufficient to its own Felicity:
Nought here below, nought in our Pow'r it needs,
Nor ſmiles at Good, nor frowns at vicious Deeds.

He held alſo the Doctrine of *Atoms*, and a *Vacuum*; and that the Souls of Men were mortal; notwithſtanding which, he was celebrated for his Honeſty, and eſteemed for his ſundry moral Virtues. Many Eulogies on this Writer are to be ſeen in Mr. *Creech*'s *Engliſh* Edition of this Work, with an excellent Paraphraſe and Notes.

TARRENTIUS.

TARRANTIUS.

LUCIUS TARRANTIUS, ſurnamed *Firmanus*, becauſe he was a Native of *Firmum*, a Town in *Italy*, flouriſhed at the ſame Time with *Cicero*, and was one of his Friends and Cotemporaries. He was a mathematical Philoſopher, and was therefore thought to have great Skill in judicial Aſtrology. He has been rendered moſt famous by his drawing two *Horoſcopes*; * (which ſignifies the Degree of the Aſcendant, or Star riſing above the Horizon) one was the *Horoſcope* of *Romulus*, and the other of *Rome*. *Plutarch* gives the following Account of it. "*Varro*, who was the moſt learned of the *Romans* in Hiſtory, "had a particular Friend named *Tarrantius*, who, out of Curio- "ſity, applied himſelf to draw *Horoſcopes*, by Means of aſtro- "nomical Tables, and was eſteemed the moſt eminent in "his Time." Hiſtorians controvert ſome particular Circumſtances of his Calculations; but all agree in conferring on him the honorary Title of *Prince of Aſtrologers*.

M. TULLIUS CICERO.

MARCUS TULLIUS CICERO is remarkable in Hiſtory, as an Orator, a Politician, Hiſtorian, and Philoſopher. Our Buſineſs leads us chiefly to conſider him as the Latter, in which, tho' he did not make any conſiderable Diſcoveries, he recommended what had been the Entertainment and Improvement of his Youth. He ſpent great Part of his Time under the Tuition of the moſt ſkilful Philoſophers at *Athens*, where he ſtudied under *Atticus*, the Philoſopher; and purſued the Study of Oratory under the Care of *Demetrius*. He flouriſhed in the Reign of *Julius Cæſar*. Being advanced to about 31 Years of Age, he arrived at that full Perfection which had ſo long

* Viz. *Caſting the Nativity* of *Romulus*; and erecting a *Scheme of the Heavens*, from whence to predict the *Fate* of *Rome*, according to the Jargon of thoſe *Tarrantine* Profeſſors.

long taken up his whole Wiſhes and Endeavours; and which has been ever ſince the Admiration, or Envy of the World. That *Cicero* is the firſt of all Authors for Matter, Method, and Stile, is denied by no Man of any Experience: None appears to have been more bleſſed with a clear Penetration into the Nature, Relation, and Properties of Things, and an undiſguiſed Simplicity and Frankneſs in declaring his Sentiments. Philoſophy, particularly of the Moral Kind, received great Improvements from him. His *Tuſculan* Queſtions are univerſally admired, and are ſaid to excel all that was ever written by any heathen Writer before him. In the Origin, Progreſs, and Perfection of Eloquence, he far excelled the *Grecks*, whom he at firſt very carefully ſtudied; and after that, uſed his beſt Endeavours to extend the Bounds of the *Roman* Learning, as wiſely eſteeming that Attempt ſuperior to his extending the Bounds of their Empire. When he recommended Oratory, he always guarded his Pupils againſt a mere Jargon of Words, tho' ever ſo elegant and ſelect, if they carried no Weight of Senſe and Learning along with them. And for this Reaſon, *Quintilian* ſays, "That Perſon may be ſure to make great Improvement in the learned Sciences, who has a true Reliſh for the Writings of *Cicero*." This was that *Cicero* who was firſt dignified with the Title of *The Father of his Country*, by *Quintus Catulus*, the Head of the Senate: Nay, he was ſo called by *Cato*, who was never ſuſpected of Flattery. *Lucius Gellius* alſo ſays, "That he had deſerved a Crown." We ſhall therefore finiſh our Account of him with the Eulogium given him in *Toland*'s Character, *&c.* "How great is the Dignity, Efficacy, and Sweetneſs of his Eloquence! How exuberant the Source of his Invention! How juſt his Topics for Amplification! How exquiſite and beautiful his Method! What Perſpicuity, what ſtupendous Elegance, and what beautiful Figures adorn the Whole! What an uninterrupted Courſe of Argument! What an irreſiſtable Strength of Perſwaſion, and yet how eaſy! How ſimple! How pleaſant! How genteel! And how greatly does this Eulogium come ſhort of his Deſerts, whom all his Cotemporaries admired, whoſe Death all his Country regretted, and whoſe Memory all their Poſterity honoured!"

SOSIGENES.

SOSIGENES was an *Ægyptian* Mathematician, whoſe principal Studies were Chronology and the Mathematics. He made great Improvements, and gave ſome Proofs of his being able to demonſtrate the Certainty of his Diſcoveries; by which Means he became popular, and obtained Repute with thoſe who had a Genius to underſtand and reliſh ſuch Enquiries. He was thence ſent for by *Julius Cæſar*, who being convinced of his Capacity, employed him in reforming the Kalendar; and it was he who formed the *Julian* Year, which begins 45 Years before the Birth of Chriſt. This remains to perpetuate his Memory to this Time. His other Works are loſt ſince that Period.

He was well verſed in the Mathematics and Aſtronomy of the Ancients; particularly of thoſe celebrated Mathematicians, *Thales*, *Archimedes*, *Hipparchus*, *Callipus*, and many others, who had undertaken to determine the Quantity of the Solar Year; which they had aſcertained much nearer the Truth than one can well imagine they ſhould with Inſtruments ſo very imperfect; concerning which we refer the Reader to *Ptolomy*'s *Almageſt*. ——— We have no Account of the Time, or Manner of his Death.

MANILIUS.

MANILIUS, ſometimes called *Marcus Manilius*, the Aſtronomer and Poet, deſcended from a noble Family at *Rome*, and lived in the Age of *Auguſtus*, had a liberal Education ſuitable to his Quality, and the Time in which he lived. His Writings ſhew him to be well-acquainted with the Principles of the ſeveral Sects of Philoſophers, but addicted to the *Stoics*, whoſe Hypotheſes, in all their Out-lines, bear a very near Reſemblance. The *Stoics* aſſert, "That there is One infinite, eternal, almighty Mind, which, being diffuſed thro' the whole Univerſe of well-ordered and regularly diſpoſed Matter, actuates every Part of it, and

and is, as it were, the Soul of this vaſt Body: The Parts of this Body, they ſay, are of two Sorts, the Celeſtial, *viz.* the Planets and fixt Stars, and the Terreſtrial, *viz.* the Earth, and all the other Elements about it. That the Celeſtial continue the ſame without any Change or Variation; but that the whole ſublunary World is not only ſubject to a Diſſolution, but ſhall be reduced to *Chaos* by *Fire*; and that out of That, another Syſtem ſhould ariſe; that God governs the World by enduing the ſeveral Parts of Nature with certain Powers ſufficient to produce the deſigned Effects; this they call *Fate*; and upon this Principle their Syſtem of Aſtrology depends."

This is the Hypotheſis which *Manilius* endeavours to explain in *Latin* Verſe: Had he lived to reviſe it, we have Reaſon to think that it would have been finiſhed with maſterly Improvements. He had a Genius equal to his Undertaking; his Fancy was bold and daring; his Skill in the Mathematics great enough for his Deſign; his Knowledge of the Hiſtory, and Acquaintance with the Learning of the Antients, general: Some of the Critics place him amongſt the judicious and elegant; and all allow him to be One of the uſeful, inſtructive, profitable Poets. He hints at the ſame Opinions which later Ages have thought fit to glory in as their own Diſcoveries. Thus he defends the Fluidity of the Heavens againſt the Hypotheſis of *Ariſtotle*.

He aſſerts particularly, "that the fixed Stars are not all in the ſame concave Superficies of the Heavens, and equally diſtant from the Centre of the World. He maintains, that they are all of the ſame Nature and Subſtance with the Sun, and that each of them has a particular Vortex of his own; and laſtly, he affirms, that the milky Way is only the undiſtinguiſhed Luſtre of a great many ſmall Stars, which the Moderns now ſee to be ſuch, thro' the Help of Glaſſes adapted to this Purpoſe."*

And ſpeaking of the Conſtellations, he ſays,

All theſe ſtill keep one Courſe, and all purſue
Their conſtant Track, nor vary in a New.
From one fix'd Point they ſtart, their Courſe maintain,
Repeat their Whirl, and viſit it again:

And

* This he has ingeniouſly expreſſed in the Lines quoted in the *Gentleman and Lady's Philoſophy*, page 145.

And this is ſtrange, and this doth more ſurprize
Than all the other Wonders of the Skies,
That ſuch unweildy Frames their Signs ſhould draw,
As mov'd by Reaſon, and confin'd by Law;
No Change in Diſtance nor in Site appear,
Tho' great the Number, long the rolling Year.

It appears from ſome of his Writings, that he wrote his *Aſtronomical Poems* in his younger Years, which is alſo corroborated by Others, who have quoted him; and that he died before he arrived to a middle Age. He frequently diſcovered a great Deſire to live to be old. It is highly probable, that Deſire might ariſe from his eager Thirſt after Knowledge: It is probable too, that he was ſenſible of the Weakneſs of the human Capacity to pry into the ſecret Springs and Effect of Nature, and that he might ſuſpect his own Sentiments, and wiſh for the lateſt Period of Life in hopes of arriving at the higheſt Pitch of human Knowledge. Notwithſtanding this Suppoſition, it is certain, he had attained to a great Proficiency in the Aſtronomical Science, and was, in the Language of an Hiſtorian, a moſt diſcerning Philoſopher, as well as an Adept in Poetry. According to the beſt Judges in *Latin* Poetry, his *Aſtronomical Poem* was always eſteemed a very great Performance; and if we may believe his Tranſlator, Mr. *Creech*, his Poem was as correct as VIRGIL's *Georgics*; and that he had a Deſign, when he wrote it, to rival the inimitable Elegance of that Poet. At leaſt, he values himſelf greatly, on his Subject being new, and far different from thoſe of the Poets before him; for, in the *Preface* to his *Second Book*, after recounting the various Topics of other Poets, he has theſe Lines:

I ſeek new Springs, which rowl refreſhing Waves
Thro' Plains untrod, and purl in hidden Caves,
Kept pure for Me, *which Birds did ne'er profane,*
And thirſty Phœbus *oft hath ſought in vain:*
My Verſe ſhall be my own, *not* ſtoll'n *but* wrought;
Mine, *not the Labours of* another's *Thought.*
My Veſſel trimm'd, tho' never launch'd before,
I ſpread my Sails, and boldly leave the Shore.

And

And the ſame aſpiring Spirit evidently appears in the *firſt Lines* of his *third Book.*

Whilſt I new Ways attempt my grov'ling Name
To raiſe from Earth, and wing my Flight for Fame;
Thro' Woods untrodden whilſt I take my Way,
Ye Muſes, lead; for I extend your Sway
To larger Bounds, and make the World obey.

Theſe Flights of his Imagination, this Fondneſs to excel and gain Applauſe, correſponds with the Grandeur of his Birth, Education, and Eſteem at Court, and is a farther Proof that he wrote very young; his Poem is too fierce and fiery for an advanced Age; and he ſometimes wants Tranſition, when he is obliged to give Rules. Though he ſtruggles againſt theſe Fetters, and ſtrives to reach the ſtrongeſt Metaphors; yet from his Deſcriptions a Man may read his Youth in his Writings. However, notwithſtanding his Works may have their Imperfections, yet they plainly indicate a ſtrong Genius, capable of great Improvements. It is no mighty Wonder, that he was not included in *Ovid*'s Liſt of celebrated Poets, ſince nothing of his Works were publiſhed till after *Ovid*'s Deceaſe; and it is highly probable, that from this Circumſtance, his Works have been leſs taken Notice of than otherwiſe they would have been. As it appears, that he was born at *Rome*, and reſided much at that Court, we may reaſonably conclude with Hiſtorians in general, that he died there, though the Time and Manner of his Death is not aſcertained.

VIRGIL.

PUBLIUS VIRGILIUS MARO was born on the fifteenth Day of *October*, in the Year of *Rome* 684, in the Conſulſhip of *Pompey* and *Craſſus*, at a Village called *Andes*, now *Petuta*, not far from *Mantua* in *Italy*. His Father's Name was *Virgil*, according to the Opinions of *Servius* and *Probus*; for if he had been called *Maro*, as *Donatus* affirms, our Poet's Name muſt

have been, according to the Cuſtom of the *Romans*, *Publius Maro Virgilius*.

Though his Father was undoubtedly of low Birth, and mean Circumſtances; yet, by his Induſtry, he ſo much recommended himſelf to his Maſter, that he gave him his Daughter, named *Maia*, in Marriage, as a Reward of his Fidelity. *Virgil*, diſcovering very early Marks of a very fine Genius, was ſent, at 12 Years of Age, to ſtudy at *Cremona*, where he continued till his ſeventeenth Year. He then removed to *Milan*, and from thence to *Naples*, being the Reſidence of ſeveral Teachers of Philoſophy and polite Learning, where he proſecuted his Studies with great Induſtry and Intenſeneſs, careſully peruſing the moſt elegant of the *Greek* and *Roman* Writers; but Phyſic, the Mathematics, and natural Philoſophy, were his favourite Sciences, and to which he principally attached himſelf; and to this early Tincture of geometrical Learning were owing that Regularity of Thought, that Propriety of Expreſſion, and that Exactneſs of conducting all Subjects, for which he is ſo remarkable. He learned the *Epicurean* Philoſophy under the celebrated *Syro*, of whom *Cicero* ſpeaks twice, with the greateſt Encomiums, both of his Learning and Virtue. His Acquaintance with *Varus*, his firſt Patron, commenced by his Fellow-ſtudent with him under this Philoſopher, for whom *Virgil* ſeems to have had a prodigious Affection and Eſteem. The ſmall Patrimony that *Virgil* had in *Italy*, was loſt by a Decree of *Auguſtus*, who divided that Part of this Country among his Soldiers; and our young Poet, being involved in the common Calamity, applies himſelf to *Varus*, who recommended him to *Pollio*, then Governor of the Province, whoſe Favour introduced him into the Court of *Auguſtus*. From this Prince and Protector of Learning he obtained a Grant, by which his Lands were exempt from the general Diviſion, and reſtored to him. Another Incident that procured him Favour with *Auguſtus* was, that the Emperor having a Colt preſented him by the *Crotoniates*, which promiſed prodigious Swiftneſs and Spirit, *Virgil* immediately pronounced, that he came from a ſickly Mare, and would be good for Nothing, which proved the Caſe.

We cannot imagine, that ſuch an exalted Genius as *Virgil* was bleſſed with would lie long unactive and unexerted. We

are

are told accordingly, that in the Warmth of early Youth, he formed a noble Deſign, and boldly intended to write a Poem on the Wars of *Rome*; but after ſome Attempt, he was diſcouraged by the Roughneſs and Aſperity of the *Roman* Names, or for the Reaſon aſſigned by our *Engliſh Boileau*, that it was an Undertaking above his Years. Captivated with the Beauties of *Theocritus's Idyliums*, and ambitious of introducing a new Species of Poetry among the *Romans*, our Poet from hence-forward ſeems to have bent his whole Thoughts on the Imitation and Rivalſhip of that ſweet *Sicilian*: To this End, he firſt applied himſelf to the Writing of Paſtorals.

Of theſe Compoſitions, it is highly probable, that his *Alexis* was his firſt Performance. Dr. *Martyn* thinks it might have been written in the Year of *Rome* 709, when the Poet was in his twenty-fifth Year, which was but a ſhort Time before the Death of *Julius Cæſar*. Probably the *Palæmon* was his ſecond Performance.

We may here mention the *Silenus*, as the next Compoſition in the Order of Time. This fine Piece of Philoſophy is ſaid to have been publickly recited on the Stage.

Virgil compoſed his celebrated Eclogue, in the Year of *Rome* 714, intended chiefly to celebrate the Honour of *Pollio* to whom he dedicated it, not only as his Patron, but as the Friend of his Country, as the Guardian of Liberty, a Promoter of Arts and Sciences, and an accompliſhed Courtier. Conſcious of the Dignity of the Perſon he was writing to, he has exerted his Genius and warmed his Fancy, and has given us ſome of the moſt ſpirited and ſublime Images that are to be found in his Works.

Pollio was the firſt who erected a public Library at *Rome*, adorned with curious Buſto's of the moſt celebrated Writers, as well as furniſhed it for the Purpoſes of Learning. It was none of the ſmalleſt Honours *Virgil* met with to be protected and eſteemed by this accompliſhed Senator.

In another of his Eclogues, he introduces his Friend *Cornelius Gallus*, which highly pleaſed *Auguſtus*.

About this Time, he was much in the Eſteem of *Auguſtus*, who enabled him to enjoy his Studies, and to retire to a delightful and convenient Privacy at *Naples*, for the Sake of his Health, as the Air of *Rome* was not agreeable to his Conſtitution.

He

He now enters on the 34th Year of his Age, and lays the Plan of his inimitable *Georgics*; Corn and Ploughing are the Subjects of the Firſt; Vines of the Second; Cattle of the Third; and Bees of the laſt Book. This he undertook at the Entreaties of that wiſe and able Miniſter *Mecænas*, not to rival and excel *Heſiod*, as he had lately done *Theocritus*; but to promote the Welfare of his Country. Great was the Deſolation occaſioned by the Civil Wars. *Italy* was almoſt depopulated, the Lands uncultivated, and untouched; and to revive the decayed Spirit of Huſbandry, and to introduce a general Taſt for Agriculture, was a Taſk worthy a *Mecænas* to propoſe, worthy an *Auguſtus* to promote, worthy a Philoſopher, and a Poet, ſuch as *Virgil* was to execute. And what Method ſo likely to effect it, as to recommend Agriculture, with all the inſinuating Charms of Poetry. And this Deſign the *Georgics* fully anſwer; wherein are all the maſterly Beauties that might be expected from an exalted Genius, whoſe Judgment and Imagination were in full Vigour and Maturity; and who had Leiſure to give the laſt Poliſh and Perfection to his incomparable Workmanſhip. *Virgil* ſeems to be the moſt perfect in his Style. There's a Profuſion of the moſt daring Metaphors, and moſt glowing Figures; there's ſuch a Majeſty and Magnificence of Diction throughout the *Georgics*, that notwithſtanding the marvellous Harmony and Grandeur of the *Greek* Verſification, is ſcarcely equalled by *Homer* himſelf.

Virgil's Terms and Epithets are choſen with ſuch Propriety, Elegance and Expreſſiveneſs, that, as Mr. *Addiſon* truly obſerves, we receive more ſtrong and lively Impreſſions from his Words, than we could have done from the Objects themſelves, and find our Imaginations more affected by his Deſcriptions, than they would have been by the very Sight of what he deſcribes. *Virgil*, doubtleſs, merits Praiſe for giving Life and Feeling, Love and Hatred, Hope and Fear, Wonder and Ambition to Plants, and to Trees, and to the very Earth itſelf; and for exalting his favourite Inſects (the Bees) by endowing them with Reaſon, Paſſion, Arts, and Civil Government. To uſe *Ariſtotle*'s Expreſſion, *Every Thing in this Poem hath Manners*, and all the Creation is animated. According to Hiſtorians, he ſpent ſeven Years in compiling his *Georgics*. In the progreſſive Taſk, he paſſed the

the moſt exact Scrutinity on his Works, having wrote a few Lines in the Morning, he uſed to reviſe them in the remaining Part of the Day.

We are now advanced to that Period of his Life, when he enters on his *Æneid*, in the 45th Year of his Age; the main and principal Purport of which was, to repreſent the Glory of the *Auguſtine* Age, and pay his Tribute of Homage to his Royal Prince. Minutely to deſcribe the Parts, point out the Connection, and deſcribe the Beauties of this matchleſs Poem, would be no leſs tedious, than beſide our Purpoſe.*

His Perſon was ſomewhat tall. He was of a ſwarthy Complexion, of a ſickly Conſtitution, and often afflicted with the Head-ach. He was temperate in his Diet, and very regular, ſober, and chaſte in his Morals. Tho' he was ſo baſhful, that he frequently went into Shops to avoid being gazed at in the Streets of *Rome*; yet ſo honoured was he by the *Romans*, that coming once into the Theatre of *Rome*, the whole Company roſe up out of Reſpect to him. He was of a thoughtful and melancholy Diſpoſition, ſpoke little, lov'd Retirement and Contemplation, and was an Enemy to thoſe talkative Impertinents, from whom no Court (not even that of *Auguſtus*) could be free. His Fortune was not only eaſy, but affluent; he had a delightful *Villa* in *Sicily*. His Behaviour was ſo benevolent and inoffenſive, that even his cotemporary Poets agreed in paying the utmoſt Reſpect to him.

Auguſtus, returning from the Eaſt with Victory, met with *Virgil* at *Athens*, who thought himſelf obliged to wait on the Emperor back to *Italy*; but he was ſuddenly ſeized with a fatal Diſtemper, which being increaſed by the Agitation of the Veſſel, he had ſcarce Time to land at *Brunduſium*, where he died on the 22d Day of *September*, in the 52d Year of his Age. What can give any Reader an higher Opinion of his Modeſty and Genius than his earneſtly requeſting, on his Death-bed, that his *Æneid* might be burnt, becauſe it had not received his laſt Corrections and Improvements? His Remains were carried to *Naples* according to his Requeſt; and a Monument was erected to his Memory, at a ſmall Diſtance from the City.

* See his Life, prefixed to *Pitt*'s Edition of his Works.

We ſhall conclude by only obſerving, that he went out of the World with all that Calmneſs and Serenity of Mind with which the antient Writer of his Life ſays he came into it; making the Inſcription of the Monument himſelf. He ended his poetical Compoſitions with an Epitaph; and this he made exactly according to the Law of his Maſter *Plato* on ſuch Occaſions, without the leaſt Oſtentation.

I ſung Flocks, *Tillage*, *Heroes*; Mantua *gave*
Me Life, Brunduſium *Death*, Naples *a Grave.*

OVID.

PUBLIUS OVIDIUS NASO, a *Roman* Knight, and one of the moſt celebrated Poets, Orators, and Philoſophers of the *Auguſtine* Age, was born at *Salmo*, a Town in the Country of the *Peligni*, about 90 Miles from *Rome*, in *March*, 43 Years before the Chriſtian Æra, and in the Year of *Rome* 710. He deſcended from an ancient Family of great Honour and of the Equeſtrian Order, and had the Advantage of a liberal Education.

His Father deſigned him for the Bar, but Nature inſpired him with ſo ſtrong a Diſpoſition to Poetry, that his Love to the Muſes diverted him from that Application neceſſary to arrive at Dignity in that Profeſſion.

He ſtudied Eloquence and Oratory under *Aurelius Fuſcus* and *Porcius Latro*, under whoſe Inſtruction he acquired a good Proficiency therein. He ſaid, of himſelf, he pleaded in Cauſes at the *Centumviri*; but his Inclination to Poetry was ſtill predominant, and upon the Death of his elder Brother, he became poſſeſſed of an ample Fortune, and then followed his Genius and Studies.

His fine Parts for Poetry were ſoon diſtinguiſhed by the *Roman* Wits and ingratiated him into the Favour of *Tibullus*, *Severus*, *Sabinus*, *Græcinus*, and *Flaccus*, Men of Note and Learning, and

and from whoſe Acquaintance he had the Opportunity of informing his Mind, and improving his Genius.

His Talent and Diſpoſition for Philoſophical Enquiries appear very conſpicuous in many Parts of his Works; and had he uſed more Application to this Study, his Parts would, doubtleſs, have ſhined in this Science with peculiar Luſtre. We ſhall attempt to give ſome Inſtances of the vaſt Extent of his Imagination, interſperſed throughout his Works; and tranſcribe ſome Lines here and there, worthy our Notice on this Subject.

Thus he imitates, and in other Words conveys *Job*'s elegant Sentiment of God's hanging the Earth upon nothing.

Nec circumfuſo pendebat in aere tellus
Ponderibus librata ſuis.

Here it is obvious (ſays Sir *Samuel Garth*,) that *Ovid* had a diſcerning Notion of the Gravitation of Bodies. 'Tis now demonſtrated, ſays he, that every Part of Matter tends to every Part of Matter with a Force, which is always in a direct, ſimple Proportion of the Quantity of the Matter, and an inverſe duplicate Proportion of the Diſtance; which Tendency or Gravitating is conſtant, and univerſal. This Power, whatever it be, acting always proportionably to the ſolid Content of Bodies, and never in any Proportion to their Superficies, cannot be explained by any material Impulſe; for the Laws of Impulſe are phyſically neceſſary. There can be no arbitrary Principle in meer Matter; its Parts cannot move, unleſs they be moved, and cannot do otherwiſe, when preſſed on by other Parts in Motion; and therefore, 'tis evident, from the following Lines that *Ovid* had ſtrictly adhered to the Opinion of the moſt diſcerning Philoſophers, who taught, that all Things were formed by a wiſe and intelligent Mind.

Juſſit & extendi campos ſubſidere valles
Fronde tegi Sylvas———

The *Fiat* of the *Hebrew* Law-giver is not more ſublime, than the *Juſſit* of the *Latin* Poet, who goes on in the ſame elevated and philoſophical Style.

His

His ſuper impoſuit liquidum & Gravitate carentem
Æthera ———

Here the Author ſpreads a thin Veil of Æther over his infant Creation; and tho' his aſſerting the upper Region to be void of Gravitation may not be mathematically true; yet it is found from the natural Enquiries made ſince, eſpecially by the learned Sir *Iſaac Newton*, in his *Principia*, that the Planetary Syſtem conſiſts of ſo fine an Æther as to give no Reſiſtance to Bodies in Motion, or none that is ſenſible for many Ages, ſince the Planets and Comets ſtill move with the ſame Velocity as they were found to do in the earlieſt Ages of Aſtronomy.

Some Critics have inſinuated that he miſtook the annual Motion of the Sun for the diurnal, from the following Paſſage

Sectus in obliquum ———, *&c.*

Tho' the Sun be always in one or other of the Signs of the Zodiac, and never goes by either Motion more Northward or Southward than is here deſcribed; yet *Phaeton* being deſigned to drive the Chariot but one Day, ought to have been directed into the Equator, or a Circle parallel to it, and not round the other oblique one of the Ecliptic; a Degree of which, and that by a Motion contrary to the Diurnal, he was obliged to go in that Length of Time.

Thus it appears, ſays our Author, that *Ovid* had ſome Knowledge of Aſtronomy; but it is highly probable, that he had ſo great an Attention to poetical Embelliſhments, that he voluntarily declined a ſtrict Obſervance of any aſtronomical Syſtem. For tho' that Science was far from being neglected in former Ages, yet the Progreſs which was made in it by no Means equalled that of our preſent Time.

However, it has been generally allowed, that *Ovid*'s *Metamorphoſes* contain all the principal Parts of moral and natural Philoſophy known in thoſe Times, in a poetical Diſguiſe, and as to that of the *Pythagoreans*, in particular, which is not only the moſt antient, but the moſt juſt Syſtem of Nature, we cannot paſs by his auguſt Deſcription both of that Philoſophy, and its Author, in the following Lines.

Here

Here dwelt the Man, divine, whom Samos *bore,*
But now, ſelf-baniſh'd from his native Shore,
Becauſe he hated Tyrants; nor could bear
The Chains, which none but ſervile Souls will wear.
He, tho' from Heav'n remote, to Heav'n could move,
With Strength of Mind, and tread th' Abyſs above;
And penetrate, with his interior Light,
Thoſe upper Depths, which Nature hid from Sight:
And what he had obſerv'd and learnt from thence,
Lov'd in familiar Language to diſpence.
The Crowd with ſilent Admiration ſtand,
And heard him, as they heard their Gods' Command;
While he diſcours'd of Heav'n's myſterious Laws,
The World's Original, and Nature's Cauſe.
And what was God, and why the fleecy Snows
In Silence fell, and rattling Winds aroſe:
What ſhook the ſteadfaſt Earth, and whence begun
The Dance of Planets round the radiant Sun;
If Thunder was the Voice of angry Jove,
Or Clouds, with Nitre pregnant, burſt above.
Of theſe, and Things beyond the common Reach,
He ſpoke, and charm'd his Audience with his Speech.

In Poetry, according to Sir *Samuel Garth*, he excelled many in the Propriety of his Similies and Epithets, in the Perſpicuity of his Allegories, the inſtructive Excellence of his Morals, and the peculiar happy Turn of his Fancy. His Works can only ſuggeſt to what a Pitch of Perfection he was capable of attaining, had he uſed more Application in his Youth, and been leſs unfortunate in his middle Age.* His natural Eaſe of Temper, Wit, and Good-humour, engaged him too much in Company, eſpecially with the Fair Sex, to leave him Time to be exact in his Compoſitions.

He was very amorous in his Youth, and indulging the faſhionable Vice of the Age, he had ſeveral Miſtreſſes. We ſhould much rather caſt a Veil over his miſtaken Notions of Happineſs and irrational Purſuit of ſenſual Pleaſure; and tho'

* *Garth*'s Preface to *Ovid*.

we cannot intirely paſs it by, it may ſuffice, in Brief, to mention the unhappy Conſequences attending them.

Notwithſtanding the Favour and high Eſteem he was in, and the Honours conferred upon him by *Auguſtus*, thro' his over Gaity of Temper, he made and uttered ſome Verſes ſo juſtly cenſured by *Auguſtus*, that he was expelled the Court; and he alſo committed ſome other Acts for which he was baniſhed (by *Auguſtus*) to *Gatæ*; and tho' he was never ſo happy as to be recalled from Baniſhment, he ſeemed to acquieſce in the Juſtice of his Sentence, and ſpent the latter Part of his Life, in ſome Meaſure, conſiſtent with his State of Adverſity, and behaved himſelf in ſuch an engaging Manner, that he met with Humanity and Tenderneſs even from the Barbarians. He deſired, if he died in the Country of the *Gatæ*, his Aſhes might be carried to *Rome*. The Epitaph he compoſed for his Tomb was, in *Engliſh* thus,

Here lies Love's faithful Slave beneath this Stone,
Ovid, *the Poet, by his Wit undone.*
Let ev'ry Lover as he paſſes by,
Wiſh that his Bones may unmoleſted lie.

He died in his Exile, in the 4th Year of the Emperor *Tiberius*, in the Year of *Rome* 771, in the 60th Year of his Age; and the People of *Gatæ* raiſed a Tomb to his Memory, and paid many ſuperſtitious Honours thereto.

AURELIUS CORNELIUS CELSUS.

THIS Perſon is celebrated in Antiquity for his Skill in *Phiſic* and *Surgery*; but more particularly for the excellent Writings which he has left us on thoſe Subjects. They are contained in eight Books; the firſt ſix of which treat of the various Diſorders incident to human Bodies in their ſeveral Parts, for which he has preſcribed the proper Medicines to remove them. The two laſt Books are taken up on the Topic of *Surgery*; wherein

wherein he gives a Deſcription of the ſeveral Bones of the human Body, and of the various Accidents to which they were frequently expoſed, with the various Proceſſes of *Surgery* uſed in thoſe Times. He has been looked upon, in the Capacity of a *Phyſician* and *Surgeon*, to have excelled any *Roman* Author that ever wrote; and even in Judgment and Character, equal to *Hippocrates* himſelf. Indeed, he has been ſeveral Times ſtiled the *Roman Hippocrates*. However, this is well known, that in his Writings, he conſulted that Author principally, and quotes a great Number of Paſſages from his Writings in general; but one Half of his *Aphoriſms* are tranſlated *verbatim* in his Works; as may be ſeen at the End of the *Dutch* Edition of this Author; where near 40 Pages are employed by *Henricus Stephanus* in collecting the ſame. It would be endleſs to collect all the Encomiums given him in different modern Authors of the higheſt Reputation; ſome of whom have been ſo bold as to ſtyle him *Medicorum Deus*, *The God of the Phyſicians*: Others ſay, that he contributed more to the Glory of *Rome*, than either *Galen* or *Hippocrates* did to *Greece*. We ſhall ſum up the Whole in the Words of *Hieronymus ab Aquapendente*, who ſays, *Celſus is wonderful in every Thing*; *I conſult him continually both by Day and Night*. It is not certain whether he was a *Roman*, by Birth, or by obtaining his Freedom of the *City*; but he lived and wrote at *Rome*; and tho' the Time be not preciſely certain, yet it is well known, that it was in, or near the Time of *Auguſtus*; and conſequently in the Age of the pureſt *Roman* Eloquence: And this is another Thing that makes this Author ſo valuable, for his Language hath, by many Critics in *Latin*, been thought little inferior to the pureſt *Roman* Claſſic Writers. For this take *Quintilian*'s Teſtimony, who ſays, "That *Celſus* was a learned Man "among thoſe *Latin* Philoſophers who have been celebrated for "their Eloquence." He wrote many Things in a moſt accurate and poliſhed Stile. He has been ſtiled the pureſt Writer of the *Roman* Tongue, and has been compared to *Cicero* himſelf, and reckoned the Father of the Elegance and Eloquence of the *Roman* Language. There is little known of his Parentage or Family; but that he was a conſiderable Perſon is evident from his having been honoured with a triple Denomination, the *Nomen*, *Prænomen*, and *Cognomen*; for to People of inferior Rank

or

or Station in Life, no more than Two of theſe were allowed; and this alſo appears from ſeveral Medals that were ſtruck of him. It is not certain how long he lived, or when he died. He was the Author of many other Writings, which have not reached our Times; particularly, ſeveral Epiſtles of his, and ſome Writings upon military Subjects; ſome on Rhetoric, and others upon Huſbandry, which are comprized in the following Epigram of *J. Douſa.*

Facta urbana tuo res ruſtica munere, ſcriptis;
Nec minus illuſtris eſt medicina tuis.
Hinc quoque Militiae tractâſti commoda, Rhetor,
Hoc martem Muſis jungere, Celſe, fuit.

PLINY.

PLINY the Elder was born at *Verona*, a Town in *Italy*, in the State of *Venice*, and flouriſhed in the Reign of *Veſpatian* and *Titus*. According to Hiſtory, his admirable natural Capacity, improved by the Knowledge of Science, enabled him to act in various Capacities, and ſuſtain a Diverſity of Characters with Dignity and Applauſe; as a Politician, an Orator at the Bar, a Commander in the Field, an Hiſtorian, and what crowns all, a Philoſopher. He wrote the Hiſtory of *Nero*, the Life of *Pompey* the IId, and the Wars of *Germany*; but theſe are buried in the Ruins of Time. And the only Writings of his extant, and which afford us no ſmall Proof of his diſtinguiſhing Abilities, are his natural Hiſtory of the World in 36 Books, wherein he hath diſcourſed with great Penetration of the Nature of God; of the Sun, Moon and Stars; of the Planets in general; of the various Laws of Nature; of the Figure and Boundary of our Syſtem; of the various Productions of Nature; in ſhort, of every Thing from the ſtarry Heaven to the Center of our Earth.

That he applied himſelf to ſtudy with indefatigable Diligence, appears, not only from the Number of his Works, but from the

the Teſtimonies which we meet with of the great Improvement he made of his precious Time. Whether at home or abroad on Journeys, he had always an Amanuenſis that attended him, to make Minutes of his own Improvements, and commit them to Writing for the Uſe of Poſterity. He wrote great Part of his Works in *Greek*, which he took the Pains to tranſlate into *Latin*, to render the ſame more extenſively uſeful: And made it his Care not to deliver his Ideas in abſtruſe and unintelligible, but in the moſt plain and expreſſive Manner.

The Critics, at that Time, cenſured him for inſiſting too much on the Powers and Force of Nature, with regard to many extraordinary Events; as tho' it detracted from the Idea of the particular Providence of God; but from this Imputation one of his Friends has fully cleared him, by aſſerting, that he acknowledged all thoſe Powers of Nature were dependent on God.

His too ardent Purſuit of Knowledge, joined to an unneceſſary Curioſity, proved the Means of ſhortening his Life; for being deſirous to know why Mount *Veſuvius* burned as it did, he approached ſo near, that the Sulphur ſuddenly ſtopped his Breath, and put a final Period to his Life in the 44th Year of his Age.

As this Incident, tho' the laſt in his Life, was ſo very extraordinary, we cannot but think it may be very agreeable to the Reader, to have a more particular Account of it, which we ſhall give in the Words of *Pliny* the younger, who was his Nephew, being the Subſtance of two Letters which he wrote to *Tacitus*, in which he gives the following moſt affecting Narrative.

" My Uncle was at that Time with the Fleet under his Command at *Miſenum*. On the 23d of *Auguſt*, about one in the Afternoon, my Mother deſired him to obſerve a Cloud, which appeared of a very unuſual Size and Shape. He had juſt returned from taking the Benefit of the Sun, and after bathing himſelf in cold Water, and taking a ſlight Repaſt, was retired to his Study: He immediately aroſe, and went out upon an Eminence, from whence he might more diſtinctly view this very uncommon Appearance. It was not, at that Diſtance,

diſcernable from what Mountain this Cloud iſſued; but it was found afterwards to aſcend from Mount *Veſuvius*. I cannot give you a more exact Deſcription of its Figure, than by reſembling it to that of a Pine-Tree; for it ſhot up a great Height, in the Form of a Trunk, which extended itſelf at the Top into a Sort of Branches; occaſioned, I imagine, either by a ſudden Guſt of Air that impelled it, the Force of which decreaſed as it advanced upwards, or the Cloud itſelf, being preſſed back again by its own Weight, expanded in this Manner: It appeared ſometimes bright, and ſometimes dark and ſpotted, as it was either more or leſs impregnated with Earth and Cinders. This extraordinary Phænomenon excited my Uncle's philoſophical Curioſity to take a nearer View of it.

" He ordered a light Veſſel to be got ready, and gave me the Liberty, if I thought proper, to attend him. I rather choſe to continue my Studies; for, as it happened, he had given me an Employment of that Kind. As he was coming out of the Houſe, he received a Note from *Rectina*, the Wife of *Baſſus*, who was in the utmoſt Alarm at the imminent Danger which threatened her; for her Villa being ſituated at the Foot of Mount *Veſuvius*, there was no Way to eſcape but by Sea; ſhe earneſtly entreated him therefore to come to her Aſſiſtance. He accordingly changed his firſt Deſign, and what he began with a philoſophical, he purſued with an heroical Turn of Mind. He ordered the Gallies to put to Sea, and went himſelf on board with an Intention of aſſiſting, not only *Rectina*, but ſeveral others; for the Villas ſtand extremely thick upon that beautiful Coaſt. When, haſtening to the Place from whence others fled with the utmoſt Terror, he ſteered his direct Courſe to the Point of Danger; and with ſo much Calmneſs and Preſence of Mind, as to be able to make and dictate his Obſervations upon the Motion and Figure of that dreadful Scene. He was now ſo nigh the Mountain, that the Cinders, which grew thicker and hotter the nearer he approached, fell into the Ships, together with Pumice-ſtones, and black Pieces of burning Rock: They were likewiſe in Danger not only of being a-ground by the ſudden Retreat of the Sea, but alſo from the vaſt Fragments which rolled down from the Mountain, and obſtructed all the Shore.

" Here

" Here he ſtopped to conſider whether he ſhould return back again: to which the Pilot adviſing him, *Fortune*, ſaid he, *befriends the Brave*; *carry me to* Pomponianus. *Pomponianus* was then at *Stabiæ*, ſeparated by a Gulph, which the Sea, after ſeveral inſenſible Windings, forms upon that Shore. He had already ſent his Baggage on board; for tho' he was not at that Time in actual Danger; yet being within the View of it, and, indeed, extremely near, if it ſhould in the leaſt increaſe, he was determined to put to Sea as ſoon as the Wind ſhould change. It was favourable, however, for carrying my Uncle to *Pomponianus*, whom he found in the greateſt Conſternation: He embraced him with Tenderneſs, encouraging and exhorting him to keep up his Spirits; and the more to diſſipate his Fears, he ordered, with an Air of Unconcern, the Baths to be got ready; when after having bathed, he ſat down to Supper with great Chearfulneſs, or at leaſt (what is equally heroic) with all the Appearance of it.

" In the mean while, the Eruption from Mount *Veſuvius* flamed out in ſeveral Places with much Violence, which the Darkneſs of the Night contributed to render ſtill more viſible and dreadful. But my Uncle, in order to ſooth the Apprehenſions of his Friend, aſſured him it was only the Burning of the Villages, which the Country People had abandoned to the Flames: After this, he retired to Reſt, and it is moſt certain, that he was ſo little diſcompoſed as to fall into a deep Sleep; for being pretty fat, and breathing hard, thoſe who attended without actually heard him ſnore. The Court which led to his Apartment being now almoſt filled with Stones and Aſhes, if he had continued there any Time longer, it would have been impoſſible for him to have made his Way out; it was thought proper therefore to awaken him. He got up, and went to *Pomponianus*, and the Reſt of his Company, who were not unconcerned enough to think of going to Bed. They conſulted together whether it would be more prudent to truſt to the Houſes, which now ſhook from Side to Side with frequent and violent Concuſſions; or fly to the open Fields, where the calcined Stones and Cinders, tho' light indeed, yet fell in large Showers, and threatned Deſtruction. In this Diſtreſs they reſolved for the Fields, as the leſs dangerous Situation of the two: A Reſolution, which, while the Reſt of

the

the Company were hurried into by their Fears, my Uncle embraced upon cool and deliberate Conſideration.

" They went out then, having Pillows tied upon their Heads with Napkins; and this was their whole Defence againſt the Storm of Stones that fell round them. Tho' it was now Day every where elſe, with them it was darker than the moſt obſcure Night, excepting only what Light proceeded from the Fire and Flames. They thought proper to go down farther upon the Shore, to obſerve if they might ſafely put out to Sea, but they found the Waves ſtill run extremely high and boiſterous. There my Uncle having drank a Draught or two of cold Water, threw himſelf down upon a Cloth which was ſpread for him; when immediately the Flames and a ſtrong Smell of Sulphur, which was the Forerunner of them, diſperſed the Reſt of the Company, and obliged him to ariſe. He raiſed himſelf up with the Aſſiſtance of two of his Servants, and inſtantly fell down dead; ſuffocated, as I conjecture, by ſome groſs and noxious Vapour, having always had weak Lungs, and being frequently ſubject to a Difficulty of Breathing. As ſoon as it was light again, which was not 'till the Third Day after this melancholy Accident, his Body was found intire, and without any Marks of Violence upon it, exactly in the ſame Poſture that he fell, and looking more like a Man aſleep than dead."

" The Letter which, in Compliance with your Requeſt, I wrote to you concerning the Death of my Uncle, has raiſed, it ſeems, your Curioſity to know what Terrors and Dangers attended me while I continued at *Miſenum*; for there, I think, the Account in my Former broke off:

Tho' my ſhock'd Soul recoils, my Tongue ſhall tell.

Æneid II. *by Mr.* PITT.

" My Uncle having left us, I purſued the Studies which prevented my going with him, 'till it was Time to bathe. After which I went to Supper, and from thence to Bed; where my Sleep was greatly broken and diſturbed. There had been for many Days before ſome Shocks of an Earthquake, which the leſs ſurprized us, as they are extremely frequent in *Campania*; but

but they were ſo particularly violent that Night, that they not only ſhook every Thing about us, but ſeemed, indeed, to threaten total Deſtruction. My Mother flew to my Chamber, where ſhe found me riſing, in order to awaken her. We went out into a ſmall Court belonging to the Houſe, which ſeparated the Sea from the Buildings.

" Tho' it was now Morning, the Light was exceedingly faint and languid; the Buildings all around us tottered; and tho' we ſtood upon open Ground, yet, as the Place was narrow and confined, there was no remaining there without certain and great Danger: we therefore reſolved to quit the Town. The People followed us in the utmoſt Conſternation, and (as to a Mind diſtracted with Terror, every Suggeſtion ſeems more prudent than its own) preſſed in great Crowds about us in our Way out. Being got at a convenient Diſtance from the Houſes, we ſtood ſtill, in the Midſt of a moſt dangerous and dreadful Scene. The Chariots which we had ordered to be drawn out, were ſo agitated backwards and forwards, tho' in the open Fields, that we could not keep them ſteady, even by ſupporting them with large Stones. The Sea ſeemed to roll back upon itſelf, and to be driven from its Banks by the convulſive Motion of the Earth; it is certain, that the Shore was conſiderably enlarged, and ſeveral Sea-animals were left upon it. On the other Side, a black and dreadful Cloud burſting with an igneous, ſerpentine Vapour, darted out a long Train of Fire, reſembling Flaſhes of Lightening, but much larger.

" Soon afterwards the Cloud ſeemed to deſcend, and cover the whole Ocean; as indeed, it intirely hid the Iſland of *Caprea*, and the Promontory of *Miſenum*. My Mother ſtrongly conjured me to make my Eſcape at any Rate, which as I was young,* I might eaſily do: As for herſelf, ſhe ſaid, her Age and Corpulency rendered all Attempts of that Sort impoſſible; however, ſhe ſhould willingly meet Death, if ſhe could have the Satisfaction of ſeeing that ſhe was not the Occaſion of mine. But I abſolutely refuſed to leave her, and taking her by the Hand, I led her on: She complied with great Reluctance, and not without many Reproaches to herſelf for retarding my Flight. The Aſhes now began to fall upon us, tho' in no great Quan-

* But eighteen Years of Age.

tity. I turned my Head, and obſerved behind us a thick Smoke, which came rolling after us like a Torrent. I propoſed, while we had yet any Light, to turn out of the high Road, leſt we ſhould be preſſed to Death in the Dark, by the Crowd that followed.

" We had ſcarce ſtepped out of the Path, when a Darkneſs over-ſpread us, not like that of a cloudy Night, or when there is no Moon, but of a Room when it is ſhut up, and all the Lights extinct. Nothing then was to be heard but the Shrieks of Women, the Screams of Children, and the Cries of Men; ſome calling for their Children; others for their Parents; others for their Huſbands; and only diſtinguiſhing each other by their Voices; one lamenting his own Fate, another that of his Family; ſome wiſhing to die, from the very Fear of dying; ſome lifting up their Hands to the Gods; but the greater Part imagining that the laſt and eternal Night was come, which was to deſtroy both the Gods and the World together. Among theſe, there were ſome who augmented the real Terrors by imaginary ones; and made the frighted Multitude falſly believe that *Miſenum* was actually in Flames. At length, a glimmering Light appeared, which we imagined to be rather the Fore-runner of an approaching Burſt of Flames, (as in Truth it was) than the Return of Day: However, the Fire fell at a Diſtance from us: then again we were immerſed in thick Darkneſs, and a heavy Shower of Aſhes rained upon us; which we were obliged every now and then to ſhake off; for otherwiſe we ſhould have been cruſhed and buried in the Heap. I might boaſt, that during all this Scene of Horror, not a Sigh, or Expreſſion of Fear eſcaped from me, had not my Support been founded in that miſerable, tho' ſtrong Conſolation, that all Mankind were involved in the ſame Calamity, and that I imagined I was periſhing with the World itſelf.

" At laſt, this dreadful Darkneſs was diſſipated by Degrees, like a Cloud, or Smoke; the real Day returned, and even the Sun appeared, tho' very faintly, and as when an Eclipſe is coming on. Every Object that preſented itſelf to our Eyes (which were extremely weakened) ſeemed changed, being covered over with white Aſhes, as with a deep Snow. We returned to *Miſenum*, where we refreſhed ourſelves as well as we could,

could, and paſſed an anxious Night between Hope and Fear; tho' indeed, with a much larger Share of the latter: For the Earthquake ſtill continued, while ſeveral enthuſiaſtic People ran up and down heightening their own and their Friends Calamities by terrible Predictions. However, my Mother and I, notwithſtanding the Danger we had paſſed, and that which ſtill threatened us, had no Thoughts of leaving the Place, 'till we ſhould receive ſome Account of my Uncle."

CLAUDIUS PTOLEMÆUS.

CLAUDIUS Ptolemæus, commonly called *Ptolemy*, a celebrated Philoſopher and Mathematician, was born at *Peluſium*, and taught Aſtronomy at *Alexandria* in *Ægypt*. He flouriſhed in the Time of the Emperor *Antoninus*. He is ſaid to be of royal Extraction. He has always been reckoned the Prince of Aſtronomers among the Antients, and in his Works has left us an entire Body of that Science. His Book, called *Almageſtum Magnum*, or, *The great Conſtruction of mathematical Aſtronomy*, will perpetuate his Name to lateſt Poſterity. Notwithſtanding the Principles of his Syſtem are erroneous, yet his Works will be always uſeful to the Studious in this Science. This Work was originally wrote in *Greek*, and has been tranſlated into *Latin* by ſeveral Hands; the laſt of which was by *Trapezuntius*, and was publiſhed by his Son at *Baſil*, with a Dedication to Pope *Sixtus*.

This Work is founded upon the Hypotheſis of the Earth's being at Reſt, and that the heavenly Bodies, the Stars and Planets, all move about it in ſolid Orbs, whoſe Motions are all directed by one, which he called the *Primum Mobile*, or, *Firſt Mover*; of which he diſcourſes at large.

This great Work is divided into 13 Books; in the Firſt, he ſhews, that the Earth is in the Center of thoſe Orbs, and of the Univerſe itſelf, as he underſtood it: He always repreſented the Earth to be a ſpherical Figure, and that it is but a Point in Compariſon of the Reſt of the heavenly Bodies. He likewiſe diſ-

diſcourſes concerning the ſeveral Circles of the Earth, and their Diſtances from the *Equator*; as alſo, of right and oblique Aſcenſion of the heavenly Bodies in a right Sphere.

In the 2d Book, he treats of the habitable Parts of the Earth; of the Elevation of the Pole in an oblique Sphere, and the various Angles which the ſeveral Circles make with the Horizon, according to the different Latitude of Places; alſo of the Phænomena of heavenly Bodies depending thereon.

In the 3d Book, he treats of the Magnitude of the Year, and of the unequal Motion of the Sun thro' the Zodiac. In the ſame Book, he gives the Method of computing the mean Motion of the Sun, and has calculated Tables thereof, and likewiſe treats of the Inequality of Days and Nights.

In the 4th Book, he treats of Lunar Motions, and their various *Phænomena:* He gives Tables for finding the mean Motions of the Moon; as alſo, of her Latitude and Longitude. In this Book, likewiſe, he diſcourſes largely concerning Lunar *Epicycles*; and by comparing the Times of a great Number of Eclipſes, mentioned by *Hipparchus*, *Calippus*, and others, he has computed the Places of the Sun and Moon, according to their mean Motions from the firſt Year of *Nabonazar*, King of *Ægypt*, to his own Time.

In the 5th Book, he treats of the Conſtruction of an Inſtrument, which he calls an *Aſtrolabium*; and he alſo treats of the Excentricity of the Lunar Orbit, and the Inequality of the Moon's Motion, according to its Diſtance from the Sun. He alſo gives Tables, and an univerſal Canon of the Inequality of the Lunar Motions; with a general Calculation relating thereto; of the different Aſpects, or Phaſes of the Moon, and a Computation of the Diſtance of the Moon, of the Diameter of the Sun and Moon, and of the Magnitude of the Sun, Moon, and Earth, compared together; which the Reader will find to be very different from what they are now known to be: And he treats of the different Meaſures of the Diſtance of the Sun and Moon, according as they were determined by antient Mathematicians and Philoſophers.

In the 6th Book, he treats of the Conjunctions and Oppoſitions of the Sun and Moon, with Tables for computing the mean Time when they happen; —— Of the Boundaries of

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Solar and Lunar Eclipſes, of the Tables and Methods of computing the Eclipſes of the Sun and Moon; with many other Particulars relating thereto.

In the Seventh, he treats of the fixed Stars; and ſhews the Methods of deſcribing them, in their various Conſtellations, on the Surface of an artificial Sphere or Globe. He rectifies the Places of the Stars to his own Time, and ſhews how different they were from what they were in the Times of *Timocharis*, *Hipparchus*, *Ariſtillus*, *Calippus*, and others. Then he gives us a Catalogue of the Number of Stars in each of the northern Conſtellations, and their Latitude and Longitude in the Ecliptic, and the Number of Stars of each Magnitude in the ſeveral Conſtellations.

In the 8th Book, he proceeds to give a Catalogue of the fixed Stars, and the Number in each Conſtellation in the ſouthern Hemiſphere; as alſo, of the 12 Conſtellations of the *Zodiac*. This Catalogue of Stars is the firſt that we have extant, and is the moſt valuable Part of his Works. After this, he treats of the *Galaxy*, or *Milky-way*, and of the Aſpect of the ſeveral Planets; of the Riſing and Setting of the Sun, and of the fixed Stars.

In the 9th Book, he treats of the Order of the Sun, Moon, and Planets; and of the periodical Revolution of the five Planets; after this, he gives us the Tables of the mean Motions of the five Planets, and begins with the Theory of *Mercury*, ſhewing its various Phænomena with reſpect to the Earth.

Book the 10th begins with the Theory of the Planet *Venus*, and its greateſt Diſtance from the Sun; of its Epicycle, Excentricity, and periodical Motions; after this, he treats of the ſame Particulars in the Theory of the Planet *Mars*.

The 11th Book begins with the Theory of *Jupiter*, and ends with that of the Planet *Saturn*. He corrects all the planetary Motions from Obſervations made from the Times of *Nabonazar* to his own.

The 12th Book treats of the retrogreſſive Motion of the ſeveral Planets; and therein he gives Tables of their Stations, with a Table of the greateſt Diſtances of *Mercury* and *Venus* from the *Sun*.

The 13th Book treats of the ſeveral Hypotheſes of the Latitude of the five Planets. The Quantity of the Latitude, or Inclination of the Orbits of the five Planets, computed and diſpoſed in Tables; the Riſing and Setting of the Planets; and Tables of the Times thereof, reſpectively: Then follows a Concluſion of the whole Work.

We have thought proper to give this particular Account of a Work that is of the greateſt Conſequence to the Republic of Learning, and now become very ſcarce, and but little known. It will always be valuable on Account of the Obſervations he gives us of the Places of the Stars and Planets in former Times, according to the antient Philoſophers and Aſtronomers that were then extant, but principally on Account of the large and curious Catalogue of the Stars, by which we can eaſily compare their Places in the preſent Age, and be thence aſſured of the true Quantity of their ſlow, progreſſive Motion, according to the Order of the Signs; and upon theſe, and many other Reſpects, the *Almageſt* of *Ptolemy* will always be found of the utmoſt Service to Aſtronomy.

His Hypotheſis of the *Immobility* of the *Earth* was ſhewn to be an Error by *Copernicus*, who wrote ſix Books (as we ſhall hereafter ſhew) to prove, the Motion of the Earth in common with the Reſt of the Planets about the Sun; which Books were dedicated to Pope *Paul* the IIId, and printed in the Year 1543, which was but eight Years before the *Latin* Edition of *Ptolemy*'s *Almageſt* was printed, and dedicated to Pope *Sixtus*: This we mention only for the Sake of obſerving, that Two of the moſt famous Syſtems of Aſtronomy, and as oppoſite to each other as *Truth and Error* can be, were notwithſtanding dedicated, in ſo ſhort a Time, to two Popes, as Patrons of their reſpective Hypotheſes; by which the Reader will eaſily judge, there is little Reaſon to believe any Thing concerning the Pope's Infallibility; ſince Pope *Sixtus* was as highly pleaſed with the Compliments paid him by *Ptolemy*'s Tranſlator, as Pope *Paul* had juſt before been with the ſanguine Addreſs of *Copernicus* for the Patronage of his Syſtem.

This Treatiſe of Aſtronomy was his great Work; beſides which he wrote ſome others; particularly, a Volume of *Geography*, which was eſteemed a Work of great Merit for ſeveral

Ages

Ages after. Alſo, a Treatiſe on the *Planiſphere*: Another, concerning judicial Aſtrology, and Prognoſtications, which in that dark Period made no ſmall Part of their conjectural Learning; with an Abridgment of his large aſtronomical Work, in *one hundred Sentences*. Beſides theſe, he wrote three Books of *Harmonics*; publiſhed, at *Oxford*, by *J. Wallis*, in the Year 1682.

We have no more to add concerning this celebrated Perſon, but that he died in the 78th Year of his Age, in the Year of our Lord 147, as we learn from his Commentator *Caurcus*, a *Neopolitan* Writer.

DIOPHANTUS.

DIOPHANTUS, of *Alexandria*, in *Ægypt*, was a famous Mathematician, and reputed the Inventor of Algebra.

As to the Age *Diophantus* lived in, we have nothing certain; all that his learned, and beſt Commentator, Monſieur *Bachet*, could collect concerning this Point, is as follows.

The famous Geometrician *Apollonius*, flouriſhed in the Time of *Ptolemæus Euergetes*, King of *Ægypt*, and conſequently, above 200 Years before *Chriſt*. *Hypſicles*, who is ſuppoſed to be the Author of the 14th and 15th Books, annexed to *Euclid*'s *Elements*, tells us, in his Preface to thoſe two Books, that he had ſeen two Copies of a Treatiſe of *Apollonius*, concerning the regular Bodies; whereof the former was very imperfect, but the latter came from *Apollonius* himſelf. Whence it plainly appears, that *Hypſicles* muſt have lived not long after *Apollonius*. *Diophantus*, in his Treatiſe of multangular Numbers, quotes *Hypſicles*; and therefore muſt have lived ſome Time after him. On the other Hand, the learned Lady *Hypatia*, who was Daughter of *Theon* the Mathematician, and lived in the Time of *Arcadius* and *Honorius*, that is, about 400 Years after *Chriſt*, wrote a Comment upon *Diophantus*; and therefore *Diophantus* muſt have lived a conſiderable Time before her; ſince it is not uſual to write Comments upon modern Productions. All then that can be

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reaſonably conjectured, from this Account, is, that *Diophantus* flouriſhed in, or about the third Century.

His *Arithmetics* conſiſted of 13 Books; whereof only the firſt ſix Books are now extant. The beſt Edition of *Diophantus*'s Works is that publiſhed at *Paris* by Monſieur *Bachet*, in the Year 1621. He has certainly beſt explained *Diophantus*'s Meaning, and made the beſt Obſervations upon him of any Commentator before him; beſides that, he has reſtored, and cleared up the Text in innumerable Places, which by the Ignorance, or Negligence of Tranſcribers, was in almoſt every Problem, moſt miſerably corrupted. Beſides the above-mentioned, there is another Edition of *Bachet*'s *Diophantus*, publiſhed in the Year 1670, with *Fermat*'s Obſervations upon ſome few of the Queſtions.

We ſhall here give the learned Dr. *Saunderſon*'s Opinion, concerning his *Arithmetics*, and his being the Inventor of *Algebra*, in his own Words, as we find them in the Doctor's Treatiſe of *Algebra*, p. 363.

" *Diophantus*, of *Alexandria*, in *Ægypt*, is the firſt Writer of Algebra we meet with among the Antients: Not that the Invention of that Art is particularly to be aſcribed to him; for beſides that we meet with ſome few Sketches of it in Authors of greater Antiquity, *Diophantus* has no where, that I know of, taught the fundamental Principles and Rules of *Algebra:* He treats it every where as an Art already known, and ſeems to intend not ſo much to teach, as to cultivate and improve it, by applying it to certain indeterminate Arithmetical Problems concerning ſquare and cube Numbers, right angled Triangles, *&c.* which, till that Time, ſeemed to be eirher not at all conſidered, or at leaſt not regularly treated of. Theſe Problems are very curious and entertaining; but yet in the Reſolution of them there frequently occur Difficulties, which nothing leſs than the niceſt and moſt refined Algebra, applied with the utmoſt Skill and Judgment, could ever ſurmount: And moſt certain it is, that, in this Way, no Man ever extended the Limits of the analytic Art further than *Diophantus* has done, or diſcovered greater Penetration; whether we conſider his wonderful Sagacity, and peculiar Artifice in forming ſuch proper Poſitions as the Nature of the Queſtions under Conſideration required, or the more than ordinary Subtilty of his Reaſoning upon them. Every particular

lar Problem puts us upon a new Way of thinking, and furniſhes us with a freſh Vein of analytical Treaſure; which, conſidering the vaſt Variety there is of them, cannot but be very inſtructive to the Mind, in conducting itſelf through almoſt all Difficulties of this Kind, where-ever they occur.

The Doctor farther ſays, that the Way of ſubſtituting Letters for Quantities given in a Problem, as well as for thoſe that are ſought, was either not known, or not in Uſe in *Diophantus*'s Time; nor the Way of introducing more Letters than one into a Problem, where more unknown Quantities were to be repreſented. And (to confeſs the Truth) the intolerable Liberty ſome modern Analyſts have taken this Way, makes *Diophantus*'s Method appear much the more elegant of the two: Though it muſt not be denied, but that it ſometimes occaſions Perplexity and Confuſion, when the ſame Letter, in one and the ſame Problem, is made to ſignify two, or three different Things, as it is employed by *Diophantus* in ſo many different Operations.

THEON.

THEON, of *Alexandria*, was a celebrated Philoſopher and Mathematician; he flouriſhed in the fourth Century, about the Year 380, in the Time of *Theodocius* the Great. His Genius and Diſpoſition for the Study of Philoſophy were very early improved by cloſe Application to Study; ſo that he acquired ſuch a Proficiency in theſe Sciences, as to render his Name venerable in Hiſtory, by his *Commentary* on the *Works* of *Ptolemy*; the Pleaſure he took in the Study, and the Advantages which he apprehended might ariſe there-from, incited him to communicate his Thoughts thereon to others; but more particularly to imprint thoſe noble Sentiments on the Mind of his Daughter *Hypatia*, who probably inherited her Father's Genius; for *Syniſius* calls her his *Miſtreſs in Philoſophy*, as mentioned in the Writings of *Voſſius*. It is likewiſe ſaid, ſhe wrote Commentaries on the Arithmetics of *Diophantus*.

The Study of Nature led *Theon* to many juſt Conceptions concerning GOD, and to many uſeful Reflections in the Science of *Moral Philoſophy*; hence he is mentioned as having wrote with great Accuracy on the divine Providence. And he ſeems to have made it his ſtanding Rule to judge the Truth of certain Principles, or Sentiments, from their natural, or neceſſary Tendency. Thus, he ſays, That a full Perſuaſion that the Gods ſee every Thing we do is the ſtrongeſt Incentive to Virtue; for he inſiſts, that the moſt Profligate have Power to refrain their Hands, and hold their Tongues, when they think they are obſerved, or over-heard by ſome Perſon, or Perſons whom they fear or reſpect. With how much more Reaſon then, ſays he, ſhould the Apprehenſion, and Belief that God ſees all Things reſtrain Men from Sin, and conſtantly excite them to their Duty? He alſo repreſents this Belief, concerning the Deity, as productive of the greateſt Pleaſure imaginable, eſpecially to the Virtuous, who might depend with greater Confidence on the Protection and Favour of Providence. For this Reaſon, he recommends nothing ſo much as Meditation on God's Preſence; and recommended it to the Civil Magiſtrate, as a Reſtraint on ſuch as were notoriouſly prophane and wicked, to have the following Inſcription wrote, in large Characters, at the Corner of every Street; GOD SEES THEE, O SINNER!

He wrote a Book, entituled PROGYMNASMATA, a Rhetorical Work, wrote with great Politeneſs and Judgment, and criticized on the Writings of ſome illuſtrious Orators and Hiſtorians; wherein he pointed out, with great Propriety and Juſtneſs, their Beauties and Imperfections; as alſo, ſome proper Rules for Decoration and Propriety of Style. He recommends Conciſeneſs of Expreſſion, and Perſpicuity, as the principall Ornaments; and acquits himſelf in moſt of his Diſquiſitions with Candour and Ingenuity.

This Book was printed at *Baſil*, in the Year 1541; but the beſt Edition is that of *Leyden*, in 1626, in Octavo. Hiſtorians have not mentioned the Manner or Time of his *Death*, but aſſure us, that *Theon* was illuſtrious in his *Life*.

LONGINUS.

LOnginus, or *Dionyſius Caſſius Longinus*, lived in the third Century, in great Reputation for his Knowlege. He was *Porphyry*'s Preceptor, who highly commends him in the Life of *Plotinus*. He wrote a great many Books, of which we have only left his Book *De ſublimi Dicendi Genere.** He was likewiſe Preceptor of *Zinobia*, Queen of the *Palmyrians*: *Vopiſcus* tells us, that the Emperor *Aurelian* cauſed him to be put to Death, taking him to be the Author of the Letter that Queen writ to him in *Syriac*, which appeared to him too bold and daring: This was in the Year 273. *Zoſimus* ſpeaks highly in Commendation of his Learning, his Writings, and his Courage in enduring Death. That he was a *Grecian* by Birth is plain, from his calling *Demoſthenes* his Countryman. Tho' we have no particular Account of his Parents, a Remnant of his own Writing informs us, that his Youth was ſpent in travelling with them; which gave him an Opportunity to increaſe his Knowlege, and open his Mind with that generous Enlargement, which Men of Senſe and Judgment will naturally receive from Variety of Objects and Diverſity of Converſation. The Improvement of his Mind was always uppermoſt in his Thoughts, and his Thirſt after Knowledge led him to thoſe Channels by which it is conveyed. Where-ever Men of Learning were to be found, he was preſent, and loſt no Opportunity of forming a Familiarity and Intimacy with them. *Ammonius* and *Origen*, Philoſophers of no ſmall Reputation in that Age, were two of thoſe whom he viſited, and heard with the greateſt Attention. As he was not deficient in Vivacity of Parts, Quickneſs of Apprehenſion, and Strength of Underſtanding, the Progreſs of his Improvement muſt needs have been equal to his Induſtry and Diligence in ſeeking after it.

The Travels of *Longinus* ended with his Arrival at *Athens*, where he fixed his Reſidence. This City was then, and had been for ſome Ages, the Univerſity of the World. Here he wrote his Book of the *Sublime*.

It is this Work which intitules *Longinus* to a Place among the Philoſophers in our Claſs; for the *Sublime*, it muſt be allowed, is

* The *Greek* Title is Περὶ ὕψους *De Sublimitate*, concerning SUBLIMITY, in the Abſtract.

is the principal Part of *Metaphyſics*, and, conſequently, a Part of *Natural Philoſophy*; for we look upon it as the higheſt Part of natural Knowledge to be acquainted with the Nature, Faculties, and Powers of the Mind and Genius of a Man: And without a true Knowledge of Nature in general, no Man can pretend to underſtand, or make any Compariſon concerning what is high or low; for the *Sublime* has relation to the greateſt Things which Nature affords, as the Object of the human Underſtanding. To be able, therefore, to diſtinguiſh the Sublimity of an Author's Genius, preſuppoſes, that he has a very capacious Mind, and underſtands, and takes in all the great Ideas that flow from the higheſt Subjects of Nature; for beyond the Nature of material Things we cannot pretend to aſpire: And if we take a View of the Sentiments of the celebrated *Longinus* on this lofty Subject, we ſhall ſee that his Genius was equal to it.

Longinus ſays, that "The *Sublime* is an Image reflected from the inward Greatneſs of the Soul." And if the Sentiments of this Piece be regarded as Reflections from his own Mind, the Features are ſo graceful, the Air ſo noble, and the Colouring ſo lively, as to ſhew, that thoſe Qualifications neceſſary to form the Character of a Critic with Dignity and Applauſe centered in him.

Elevation of Thought, another great Qualification in an Orator, or Poet, is equally neceſſary to a Critic, and is the moſt ſhining Talent in *Longinus*.

As his Sentiments are noble and lofty, ſo his Stile is maſterly, enlivened by Variety, and flexible with Eaſe; there is no Beauty pointed out by him, in any other, which he does not imitate, and frequently excel.

His Judgment is exact and impartial, both in what he blames and in what he commends; every where founded upon, and ſupported by Reaſon.

His Candour is as extenſive as his Judgment. The Penetration of the One obliged him to reprove what was amiſs; the ſecret Workings of the Other bias him to excuſe, or extenuate it in the beſt Manner he is able. Whenever he lays open the Faults of a Writer, he forgets not to mention the Qualities he had which were deſerving of Praiſe.

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The good Nature of *Longinus* ought not to be omitted. He bore an Averſion to the Sneers and Cavils of thoſe who were unequal to the Province of Criticiſm, and frequently took Pains to defend the Injured, from unjuſt Aſperſion.

The Judgment, Candour, and Impartiality with which *Longinus* declares his Sentiments of the Writings of others, will, ſays our Author *, riſe in our Eſteem, when we reflect on that exemplary Piece of Juſtice he has done to *Moſes*. The Manner of his quoting that celebrated Paſſage from him, is as honourable to the Critic, as to the *Jewiſh* Legiſlator.

Longinus ſays, The *Jewiſh* Legiſlator, having conceived a juſt, Idea of the Power of God, has nobly expreſſed it in the Beginning of his Law; "*And God ſaid*,——What?——*Let there be* "*Light, and there was Light. Let the Earth be, and the Earth* "*was.*"

There is alſo ſtrong Probability, that *Longinus* was not only acquainted with the Writings of the *Old Teſtament*, but with thoſe alſo of the *New*; ſince, to a Manuſcript in the *Vatican* Library, there is prefixed a Fragment of this Author's Writings, as an Inſtance of his Judgement, wherein he is drawing up a Liſt of the greateſt Orators. At the Cloſe he ſays, There was alſo one *Paul* of *Tarſus*, the chief Supporter of an Opinion not yet eſtabliſhed.

Having conſidered *Longinus* as a Critic, we may view him likewiſe as a Philoſopher; in him, theſe are not different, but mutually depending, to judge in a worthy Manner of the Performances of Men. We muſt know the Dignity of human Nature, the Reach of human Underſtanding, the Ends for which we were created, and the Means of their Attainment; in theſe Speculations *Longinus* made no contemptible Figure. And as the proper Knowledge of the Nature of Man leads to juſt, and worthy Notions of the Supreme Being; ſo *Longinus* cenſures *Homer*, for exalting his Heroes at the Expence of his Deities; Whereby he ſunk the Divine Nature far below the Human. And as the Diſcourſes of *Socrates*, and the Writings of *Plato* were his Study, it is plain, he cultivated the Knowledge and

* Wm. Smith, *M. A. in his Preface to the Tranſlation of* Dionyſius Longinus.

Reverence of the Supreme Being.——We ſhall conclude this Account with the following Lines of Mr. *Pope*.

Thee, great Longinus! *all the* Nine *inſpire,*
And fill their Critic with a Poet's Fire;
An ardent Judge, who, zealous in his Truſt,
With Warmth, gives Sentence, and is always juſt;
Whoſe own Example ſtrengthens all his Laws,
And is himſelf the great Sublime *he draws.*

PAPPUS.

PAPPUS of *Alexandria* flouriſhed at the latter End of the 4th Century, in the Time of *Theodoſius the Great*. Tho' we meet with no particular Account of his Education, or the Philoſophers under whom he ſtudied, his Writings indicate, that he enjoyed the Advantages of ſtrong natural Abilities, improved by Application and Induſtry in the Study of Philoſophy; having attained to a great Proficience therein, ſo as to acquire Eſteem and Reputation, not only in that, but in many ſucceeding Ages of the World. The moſt conſiderable of theſe were Eight Books of Mathematical Collections, of which the two firſt are loſt. This Work appeared in *Latin* at *Peſanzo*, in 1588, and is ſaid alſo to be found in *Greek* in ſome Libraries. He wrote beſides a Comment upon the *Almageſt of Ptolomy*; *An Univerſal Chorography*; *A Deſcription of the Rivers of Libya*; *A Treatiſe of Military Engines*, &c. There are alſo extant his Commentaries upon *Ariſtarchus* of *Samos*, concerning the Magnitude and Diſtance of the Sun and Moon; *Suidas*, and *Voſſius de Scientiis Mathematicis*. The Propoſitions therein are of excellent Uſe, and are quoted and illuſtrated by many of our modern Writers. A new Edition of this Work was publiſhed by Dr. *Edmund Halley*, at the End of his *Apollonius*, if I remember aright, for I cannot now meet with the Book; and tho' ſome of his Works are buried in the Ruins of Time, thoſe which are extant render him honourable with Philoſophers, and perpetuate his Memory with Eſteem to Poſterity.

BOETIUS.

BOETIUS.

BOETIUS descended from the antient Families of the *Anicii* and *Torquatii*; he lived in the 5th Century: He was educated, from his Infancy, in all Manner of Science; so that he excelled as a Statesman, and as a Philosopher. He was a Consul in 510, and was made principal Minister of State by *Theodoric*, King of the *Goths*. *Cassiodorus* commends *Boetius*, in a Letter which he wrote to him, for enriching himself at *Athens* with the Spoils of *Greece*; and for having made the Books of *Pythagoras*, the Musician of *Ptolomy* the Astronomer, of *Nichomachus* the Arithmetician, of *Euclid*, *Plato*, *Aristotle*, and *Archimedes*, well known in *Italy*, by Translations as good as the Originals. It might perhaps have been happy for him, if improving and extending the Knowledge of these Sciences had engrossed his Time and Thoughts, so as to have hindered him from having any Transactions with the State: For afterwards, the same *Theodoric*, upon a Suspicion conceived against the Senate, of some Intelligence with *Justin* the Emperor, caused *Boetius* to be arrested and conducted to *Pavia*; where, after six Months, he was beheaded, 23 *Oct.* 524. He composed, during this Imprisonment, Five Books of *the Consolation of Philosophy*. Several other philosophical Works are ascribed to him. *Henricus Laricus Glareanus* of *Basle* recollected all his Works, and printed them in 1546. See more of his Life in *Bayle*, *Vossius*, &c.

ALBUMAZAR.

ALBUMAZAR is commonly included in the Chronological Table of Philosophers, tho' we meet with no Particulars of his Works, extant, only his Treatise of the Revolution of Years, *Blaneanus*, *Vossius*, *&c.* speak of him as a learned *Arabian*, and one of the greatest Astrologers of the Age in which he lived; which some mention to be in the 9th Century, but others, much earlier.

ALBATEGNI.

ALBATEGNI, a *Syrian* Prince, and famous Aſtronomer, lived in the 9th Century: He was a famous Adept in that Science, and wrote very curious Obſervations on the Sun, the Moon, the fixed Stars, and the oblique Figure of the Zodiac: He was alſo known by the Name of *Mahomet* of *Araeti* which is a City of *Chaldea*, where he ſpent the greateſt Part of his Time, in the Study and Improvement of the Aſtronomical Science. *Venebrarad*, *Voſſius*.

AVICENNA.

AVICENNA was one of thoſe learned *Arabs* with whom this Age abounded. He was a Native of *Bochara*, a Town in *Aſia*, within the Dominions of *Perſia*, in the Year of the *Hegira* 370.

At *Bochara*, he was inſtructed in the *Koran*, and polite Literature, and in the *Indian* Methods of *Arithmetic*, and, by an Itinerant Philoſopher, was taught the Elements of *Geometry* and *Logic*: At ſixteen Years of Age, he applied himſelf to the Study of *Phyſic*, as intending to make that his Profeſſion; but, at the ſame Time, did not neglect the Study of *Logic*, *Natural Philoſophy*, and the *Mathematics*; all which, he purſued with incredible Induſtry, and Application, ſo as to attain to a very high Perfection therein, and merit an extenſive Fame; and when a very young Man, was recommended to the King of *Choraſſan*, whom, by his Preſcription, he recovered from a dangerous Illneſs. The King kept him, ſome Time, near his Perſon, and gave him free Acceſs to his Library, ſaid to be well ſtored with the moſt curious Books, which, however, was by ſome Accident, ſet on Fire, and all deſtroyed: *Avicennas*'s Enemies laying the Blame on him, he retired to his own Country. At about 22 Years of Age, his Father died, and he was appointed Intendant of the Revenues of the adjacent Provinces, in his Father's

Place

Place, but his Sovereign's Affairs taking an unhappy Turn, he left *Bochara*. He now retires to *Dageſtan* to the Study of Phyſic, where he compoſed the firſt Book of his Canon, being a *Compendium* of the *Almageſt*, and other Treatiſes. After this, he was Phyſician to the King of *Perſia*'s Mother, from whence he was removed to *Hamadan*, and was there preferred by its Sovereign to the Head of his Miniſtry; but he not proving a Friend to the military People, they by Violence forced him from that Prince's Protection, and put him in Priſon; at the ſame Time ſoliciting the Prince to put him to death. However, to give them ſome Satisfaction, the Prince ſeemed to conſent to his Baniſhment; but after a Concealment of 40 Days, and puniſhing the Leaders of the Sedition, *Avicenna* was again reinſtated, and held his Place until the Death of his Sovereign. His Succeſſor not employing him, he returned to the Houſe of an Apothecary, and there finiſhed his *Altheta*, ſo much of his Works as treats of Phyſics and Metaphyſics, except the two Books of Animals and Plants.

During this Receſs, he carried on a Correſpondence with the *Sultan* of *Perſia*, not on good Terms with the Sovereign of *Hamadan*, which being diſcovered, he was impriſoned in the Caſtle of *Berdawen*, where he lay four Months, and was then carried back to, and impriſoned at *Hamadan*, from whence he made his Eſcape in the Habit of a *Jûſi*, and got to *Iſpahan*, where he was by the Sultan honourably received.

In this City, he wrote many of his Works, which were almoſt an incredible Number. That, named the Canon, acquired him the greateſt Repute, being epitomiſed, and commented upon by many learned *Arabian* Writers in the 12th and 13th Centuries: And long before prevailed ſo greatly in *Europe*, that no other Doctrine was taught in the Schools of Phyſic till the Reſtoration of Learning, and a new Mode of Medicine. He likewiſe wrote of the liberal Arts in general, and died of the Cholic at *Hamadan*, whither he attended the *Sultan* of *Perſia* in the Year of the *Hejira* 428, aged 58. He was naturally of a good Conſtitution, but was not the ſame Philoſopher in Practice as in Theory, having, it is ſaid, ſhortened his Days by a much too free uſe of Wine and Women.

ALBERTUS MAGNUS,

A *Dominican* Biſhop of *Ratiſbon*, of the 13th Century. *Moreri* gives us a large Detail of the Employs conferred upon him, and the Succeſs of his Lectures in ſeveral Towns, *&c.* But we ſhall not render our Account of him tedious by theſe Particulars. That his Diſquiſitions were an Argument of his Abilities and Inclination to inveſtigate the Nature and Properties of many Things is apparent, and particularly of ſome Things, which were concealed from the Penetration of the Vulgar. It is ſaid of him, that he was extremely inquiſitive in his Temper, which probably occaſioned ſome Reflections to be caſt on him; ſuch as, that he was in Search of the Philoſopher's Stone; that he was a Magician, *&c.* the Occaſion of which was, that from his Skill in the Mathematics, and uncommon Ingenuity in Mechanics, he had made a Head, which, by the help of Strings, would form articulate Sounds. He is ſaid to be a very great Writer, his Works amounting to 21 Volumes in Folio, in the Edition of *Lions* 1651. It is great Pity there is ſo much of incredible Romance interſperſed in this Philoſopher's Life, which, if not intended to eclipſe his Character, has this Tendency at leaſt to obſcure it.

ROGER BACON.

ROGER BACON was a learned *Engliſh* Monk, of the Franciſcan Order, who flouriſhed in the 13th Century. He was born near *Ilcheſter* in *Somerſetſhire*, which is held to be the *Iſcalis* of *Ptolomy*, ſome Time in the Year 1214, and was deſcended of a very antient and honourable Family. He received the firſt Tincture of Learning at *Oxford*, where having gone through Grammar and Logic, the ſuperior Strength of his Genius was ſo conſpicuous, that it gained him the Favour and Patronage of the greateſt Lovers of Learning, and ſuch as were equally diſtinguiſhed by their high Rank, and the Excellence of

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their Knowledge, of which, even in that Age, there were not a few. When he arrived at Years ſufficient to qualify himſelf for academical Learning, he went over to *Paris*, where he made ſtill greater Progreſs in all Sorts of Learning; inſomuch, that he was looked upon as the Glory of that Univerſity, and an Honour to his Country. It was the Faſhion then for ſuch as deſired to diſtinguiſh themſelves by an early and effectual Application to their Studies, to reſort to that City, where, at this Time, not only many of the greateſt Men in *Europe* reſided and taught, but many of the *Engliſh* Nation, by whom *Bacon* was highly encouraged and careſſed; particularly by *Robert Grouthead*, afterward Biſhop of *Lincoln*, and ſince his Patron. While he remained here, he did not confine his Studies to any particular Branch of Literature, but endeavoured to acquaint himſelf with Sciences in general, not in a ſuperficial, but in the moſt perfect Manner, that the moſt conſtant Application, in the Uſe of right Methods, would enable him to do. When he had attained the Degree of Doctor, he returned again to his own Country, and took on him the Habit of the *Franciſcan* Order, in 1240, when he was about 26 Years of Age. Others aſſert, that he became a Monk in *France*. However that be, on his Return to *Oxford*, he was conſidered as the greateſt Man of the Univerſity, and the moſt aſſiduous and indefatigable in his Studies to acquire Knowledge, by which he gained the proportionable Eſteem and Honour which his Abilities merited; but likewiſe perceiving, that the Courſe he took of improving and advancing the Sciences, by Experiments, required other Aſſiſtance than that of Books or Favour, they generouſly contributed out of their Purſes; ſo that, as he tells us himſelf, within the Compaſs of twenty Years, he ſpent no leſs than 2000*l.* in collecting curious Authors, in making Trials of various Kinds, and in the Conſtruction of different Inſtruments for the Improvement of uſeful Knowledge. But if this aſſiduous Application to his Studies, and the ſurprizing Progreſs he made in them raiſed his Credit with the more ingenious Part of Mankind, it excited Envy in ſome, and afforded plauſible Pretences for covering the malicious Deſigns of others. It is very eaſy to conceive, that the Experiments he made in all Parts of natural Philoſophy and the Mathematics muſt have made a great Noiſe in an ignorant Age, when very few Men were in any tolerable Meaſure

ſure acquainted with thoſe Studies; and when many Pretenders to Knowledge affected to cover their Ignorance by aſperſing thoſe Branches of Science which they wanted Genius to underſtand. They gave out, therefore, that mathematical Studies were in ſome Meaſure allied to the magical Arts, which the Church had condemned, and therefore brought ſufficient Suſpicions on thoſe, whoſe Learning ought to have defended them from ſuch Imputations. It was under Colour of ſuch kind of Suſpicion, that *Bacon*'s firſt Troubles began, which iſſued in reſtraining him from reading Lectures to the young Students in the Univerſity; and at Length, ended in a cloſe Confinement, in which he was almoſt ſtarved; and under a Prohibition not to ſend his Writings beyond the Limits of his Convent, except to the Pope. But there is alſo great Reaſon to believe, that though his Application to the occult Sciences was pretended; yet the other Cauſe of his ill Uſage was the Freedom with which he had treated the Clergy in his Writings, in which he had ſpared neither their Ignorance, nor their Want of Morals. Beſides, his great Intimacy with Biſhop *Grouthead* might add not a little to the Power, as well as Spirit of Perſecution; for that Prelate had gone ſo far as to reprove Pope *Innocent* IV. by Letter, and is ſaid to make no Scruple of declaring, that the *Pope* was *Antichriſt*. Our Author, being his Boſom Friend, incurred on him the Hatred of a great Part of the Clergy; more eſpecially, ſince his Zeal led him to follow the Practice as well as the Opinion of his Patron, by writing freely to the Pope about the Neceſſity of a Reformation; and it appears clearly, that the great Motive which induced *Roger Bacon* to embrace a monaſtic Life was, that he might have greater Leiſure to attend his Studies, and that he was deſirous, that all his Diſcoveries ſhould tend to the Advancement of uſeful Knowledge, which he thought of the higheſt Conſequence to the Honour and Peace of the Church; and in his Writings, he takes great Pains to ſhew, that the perfecting natural Philoſophy was the ſureſt Method of extirpating all Hereſies and Superſtition, and deſtroying the Kingdom of *Antichriſt*; as the perfecting moral Philoſophy was the moſt effectual Means of eſtabliſhing true Religion in the Hearts of Men; and ſhewing the Correſpondence between the Laws of Nature and the Doctrines of the Goſpel.

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In his Addreſs to Pope *Clement* the IVth, he ſays, that "out "of a Reverence due to his high Dignity, which ought to en- "gage him in ſeeking to procure the Benefit of the whole "World, he was willing, as far as the Impediments he la- "boured under would permit, and his Memory would allow, "to deduce a regular Syſtem of true Philoſophy to the utmoſt "of his Power." This he always declared was his Study, in Subſervience to the Intereſt of true Religion. If his Society would have indulged him in the Education of Youth, that a new Turn might have been given to their Studies, we may eaſily conceive, what a new Face it would have given to the Affairs of Learning, and how advantageous it would have been to the whole Chriſtian World; ſince our Author, by Dint of his own Penetration, and a right Uſe of experimental Philoſophy, arrived at, and even perfected many of thoſe Diſcoveries which have done ſo much Honour to the Moderns; and which, by enquiring into, and publiſhing his Writings, it is unqueſtionably manifeſt, might have been long ago known. If our Author had not been treated as he was, or if there had not been ſuch a tyranical Power exerciſed in the Chriſtian Church, as put it out of the Power of private Men of Capacity to ſpread their Diſcoveries, and to render the Progreſs they made in the Knowledge of Sciences public as they now do; but, notwithſtanding this baſe and barbarous Uſage from thoſe, who, of all others, ought to have behaved towards him in a different Manner, his Reputation continued to ſpread itſelf over the Chriſtian World: Inſomuch, that Pope *Clement* IV. one of the wiſeſt and worthieſt Men of that Dignity, wrote him a Letter, deſiring he would ſend him his Works. This was in 1266, when our Author was in the Flower of his Age, and who, to gratify his Holineſs, collected together, enlarged, and ranged in ſome Order, and ſent them the next Year. This Collection is the ſame with that he himſelf intitles, *Opus Majus*; or his great Work; yet extant. This learned Book of his procured him the Favour of that Pontiff, and alſo ſome Encouragement in the Proſecution of his Studies; but this proved but a tranſient Pleaſure, the Pope dying not long after; and then we find our Author under new Difficulties from the ſame Cauſes as before; but the Storm now roſe higher, and the

General of his Order, *Jerome de Eſculo*, having heard his Cauſe, ordered him to be impriſoned; this is ſaid to be in the Year 1278, who likewiſe, to prevent his appealing to Pope *Nicholas*, procured a Confirmation of his Sentence from *Rome* immediately; but it is not very eaſy to ſay, upon what Pretences this Condemnation was founded. There have been various Accounts, and generally thought to be on Account of his *Alchimiſtical* Treatiſe. However obſcure the Nature and Circumſtances of his Troubles may be, thus much is certain, they endured for many Years, and muſt have brought him very low; ſince he was 64 Years of Age, when he was firſt put in Priſon; conſequently, leſs able to ſuſtain the Hardſhips he endured, which were encreaſed by his being deprived of the Opportunity of proſecuting his Studies; at leaſt, in the Way of Experiments; but that he was indulged the Uſe of his Books, at leaſt the latter Part of the Time, appears from the learned Works he compoſed even under his Impriſonment.

Pope *Nicholas* the 3d dying in the Year 1280, *Simon de Brie*, Cardinal of St. *Cecilia*, was elected Pope, who held that Dignity 4 Years, and was then ſucceeded by Cardinal *Savelli*, who aſſumed the Name of *Honorius* IV. in the Year 1285, whoſe Reign was very ſhort, and full of Trouble; ſo that it is not to be much wondered at, that in all this Time, our Author could not find an Opportunity of applying to the Holy See for the Mitigation, or Repeal of the Sentence; but when he had been ten Years in Priſon, *Jerome de Eſculo*, who had condemned his Doctrine, was choſen Pope, and aſſumed the Name of *Nicholas* IV; and as he was the Firſt of the *Franciſcan* Order that had ever arrived at this Dignity, he was reputed a Perſon of great Probity, and much Learning. Our Author, notwithſtanding what had before happened, reſolved to apply to him for his Diſcharge; and in order to pacify his Reſentment, and at the ſame Time to ſhew both the Innocence and Uſefulneſs of his Studies, he addreſſed to him a very learned and curious Treatiſe, on the Means of avoiding the Infirmities of old Age. It does not appear, however, that either his Application, or the Method he took to ſoften his Holineſs's Temper, had any great Effect; on the Contrary, ſome Writers ſay, he cauſed him to be more cloſely confined. But how-

however that be, towards the latter End of his Reign, Friar *Bacon*, by the Interpoſition of ſome Noblemen, obtained his Releaſe, and returned to *Oxford*, where, at the Requeſt of his Friends, and very probably of thoſe who were inſtrumental in obtaining his Liberty, he compoſed, old as he was, and after all the hard Uſage he had met with, *a Compendium* of *Theology*, which ſeems to have been his laſt Work. He ſpent the Remainder of his Days in Peace; and dying in the College of his Order, on the 11th of *June* 1292, he was interred in the Church of the *Franciſcans*. Theſe are all the remarkable Circumſtances, that with the utmoſt Care and Diligence we have been able to collect concerning the Life and Actions of this great Man, whoſe deep Science and vaſt Penetration enabled him to make ſuch a prodigious Progreſs in all uſeful Knowledge, that even the wiſeſt of Men in latter Times read his Works with Aſtoniſhment, and readily confeſſed, that he was well diſtinguiſhed by the Title the Monks gave him of *Doctor Mirabilis*, or the *wonderful Doctor*, which moſt certainly he deſerved in whatever Senſe the Phraſe is taken. But as this general Character of him is not anſwerable to his Merit, we ſhall enter on a more exact, authentic, and particular Diſplay of his Diſcoveries. If by doing this methodically, we can ſet his Merits in a clearer Light, we hope to add to the Pleaſure of the ingenious Reader.

To begin then with the Languages, which he thought the Foundation of all true Learning, as being abſolutely neceſſary to the Peruſal of the beſt Authors in ſeveral Sciences, in their Originals; he not only underſtood them ſufficiently for that Purpoſe; but was alſo a perfect Maſter of the *Latin*, *Greek*, and *Hebrew*. Of this he has given ſuch indubitable Proof in his Writings, as muſt of itſelf have ſecured him a very high Character, more eſpecially conſidering the Age in which he lived, if he had not diſtinguiſhed himſelf in any other Branch of Literature.

In all Branches of the *Mathematics* he was wonderfully well verſed, and there is ſcarce any Part of them on which he has not written with a Solidity and Clearneſs, which have been deſervedly admired by the greateſt Maſters in that Kind of Science.

In reſpect to *Mechanics* particularly, the learned *Doctor Freind* ſays

ſays very juſtly, that a greater Genius had not ariſen ſince the Days of *Archimedes*; the Truth of which the Reader will readily allow, when he has conſidered the Contents of a ſingle Page of one of his Treatiſes.

He underſtood likewiſe the whole Science of *Optics* to a ſurprizing Degree of Accuracy and Exactneſs, and is very juſtly allowed to have underſtood the Theory and Practice of thoſe Diſcoveries which have beſtowed ſuch high Reputation on thoſe of our own, and other Nations.

In reſpect to the Science of *Perſpective*, he took incredible Pains, and ſpent conſiderable Sums, that he might bring into ſome Method a Science, which was then underſtood but by very few; and he tells us, that no Lectures had been read upon it at *Paris*, and but twice at *Oxford*.

It will be proper here to obſerve, that the moſt conſpicuous Part of the Character of this great Man is, his being converſant chiefly about the uſeful Inventions of *Optical Glaſſes* and *Inſtruments*; a ſhort Account of which, we preſume, will be agreeable to the Reader, and which, therefore, we ſhall collect from the Writings of Mr. *Molyneux*. And, firſt, concerning *Optic Glaſſes* Mr. *Molyneux* has the following Paſſage, "That this "learned Friar *Bacon* did perfectly underſtand all Sorts of *Optic* "*Glaſſes*, ſhall be plainly made out from the natural and eaſy "Senſe of his own Words, in his Book of *Perſpective*, whereby we "ſhall find, that he not only underſtood the Effects of ſingle *Con*-"*vex*, and *Concave Glaſſes*, but knew, likewiſe, the Way of com-"bining them ſo as to compoſe ſome ſuch Inſtrument, as our Te-"leſcope." This perhaps will be looked upon as a great Paradox, and as great Partiality in an *Engliſh* Author to his Countryman; eſpecially, conſidering how univerſally the Contrary has prevailed, the Votes of moſt learned Men having conferred the Honour of this Invention on other Pretenders; but if, from the unconſtrained Words of his Book, we plainly make out this Aſſertion, I hope the Attempt may not be thought unreaſonable, or partial.

And firſt, in this Book of *Perſpective* he has theſe Words, *Si vero corpora non ſunt plana* (having treated of them before) *per quæ viſus videt, ſed ſphærica; tunc eſt magna diverſitas, nam vel concavi-*

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tas Corporis eſt verſus Oculum, vel Convexitas, &c. by which it is manifeſt, he knew what a *Concave* and *Convex Glaſs* was. Moreover, in the ſame Place he proceeds thus; *De Viſione fractâ majora ſunt; nam de facili patet maxima poſſe apparere minima, & è contra; & longe diſtantia videbuntur Propinquiſſimè, & è converſò. Sic etiam faceremus Solem & Lunam & Stellas deſcendere ſecundum Apparentiam hic inferias, &c.* Thus in *Engliſh*; greater Wonders than all theſe are performed by *refracted Viſion*; for thereby it is eaſily made appear, that the greateſt Object may be repreſented as very little, and contrarily; and ſo likewiſe the moſt diſtant Objects as juſt at hand, and contrarily. Hereby alſo wemay bring the Sun, Moon, and Stars, down here below, in Appearance, *&c.* This, I think, is ſo expreſs in the Point, that it leaves no Room to doubt, but that he had ſome admirable Secret in Optic Glaſſes. Add to this what he has, in his Epiſtle *ad Pariſienſem*, of the Secrets of Art and Nature. *Cap.* 5. *Poſſunt etiam ſic figurari perſpicua, ut longiſſimè poſita appareant propinquiſſima & è contrario. Ita quod ex incredibili Diſtantiâ legerimus literas minutiſſimas, & numeraremus res quantuncunque parvas, et Stellas faceremus apparare quò vellemus.* Glaſſes or Diaphonous Bodies, ſays he, may be ſo formed, that the moſt remote Objects may appear as juſt at hand, and contrarily, ſo that we may read the ſmalleſt Letters at an incredible Diſtance, and may number Things tho' ever ſo ſmall, and may make the Stars appear as near as we pleaſe. And that theſe Things may not appear incredible of this great Man, who, in that dark, and ignorant Age, could be Maſter of theſe admirable Inventions; I ſhall refer the Reader for a more compleat Account of him to Dr. *Plott*'s Natural Hiſtory of *Oxfordſhire*. Cap. 9. Sect. 2, 3. *&c.* and Sect. 39, 40, 41.

Concerning the forementioned Account of Mr. Molyneux *Dr.* Smith *has the following Remarks.*

Mr. *Molyneaux*'s Quotations from Friar *Bacon* being imperfect, by reaſon of his Abſence from Books, as he informs us, I will here ſupply this Defect. This Author having deſcribed ſeveral Canons, as he calls them, for ſhewing the viſual Angle under which an Object appears by Refractions through a Plane and ſpherical Surface, and alſo the Place of its Image, proceeds im-

mediately to apply them to the Solution of ſeveral Appearances. As why an Oar appears crooked in the Water; why a Piece of Money in the Bottom of a Baſon becomes viſible, by pouring in Water, when before that, it could not be ſeen over the Side of the Baſon; why the Sun and Moon appear larger than ordinary through denſe Vapours in the Horizon; and at laſt, he adds; *Si verò Homo aſpiciat literas, &c.* Which in *Engliſh* is thus; "If the Letters of a Book, or any minute Objects be viewed through a leſſer Segment of a Sphere of Glaſs, or Chryſtal, whoſe plain Baſe is laid upon them, they will appear far better and larger. Becauſe, by the fifth Canon about a ſpherical Medium, its Convexity is towards the Eye, and the Object is placed below it, and between the Convexity and its Centre, all Things concur to magnify it. For the Angle under which it is ſeen is greater, and its Image is alſo greater, and nearer to the Eye than the Object itſelf; becauſe the Object is between the Centre and the Eye; and therefore this Inſtrument is uſeful to old Men, and to thoſe that have weak Eyes; for they may ſee the ſmalleſt Letters ſufficiently magnified. But if the Medium be the longer Segment of a Sphere, or but Half a one, then, by the ſixth Canon, the apparent viſual Angle will be greater than the true one, and the Image alſo greater than the Object; but the Place of it will be beyond the Object; becauſe the Centre of the Sphere is between the Eye and the Object. And therefore this Inſtrument is not ſo powerful in magnifying, as a leſſer Segment of a Sphere. Alſo Inſtruments, made of chryſtal Bodies with plane Surfaces, by the firſt and ſecond Canons about ſpherical Surfaces, will perform the ſame Thing. But the leſſer of two Segments of a Sphere magnifies more manifeſtly than any of them all, by Reaſon of the Concurrence of all the three Cauſes, as I ſaid before."

To find an Author ſpeaking of a ſmall Segment; of its magnifying the Letters of a Book; of its being a proper Inſtrument for helping decayed Sight; and to ſay he was not poſſeſſed either of the Theory, or the Uſe of Spectacles, may appear to be a Paradox; but I hope to ſatisfy my Readers, that it is not a Miſtake. Firſt, then our Author plainly propoſed to lay the flat Baſe of his Segment upon the Letters. For the Word *Suppoſiti* muſt have been a Contraction in his Writing of the Word *Superpoſiti* or rather *Superimpoſiti*; as appears by the Sequel, and by the Ca-

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non he quotes. Beſides, he ſays not a Word of holding the Segment at a Diſtance from the Letters; nor could he indeed; becauſe he has not treated of a double Refraction at both its Surfaces; without which, he could conclude nothing at all about its Effects, when raiſed from the Book; for he argues from Nothing but Theory throughout the whole Chapter.

Here the Doctor obſerves, that *Bacon*'s Concluſions are juſt contrary to what the Theory of Optics dictates, and what is found true by Experiments: And having pointed out the ſame very particularly, then he proceeds.

Hence it is plain, ſays he, that our Author tried no Experiments with a greater and a leſſer Segment to compare their Effects together; for then he muſt have found out his Miſtake, and muſt rather have preferred the larger Segment for magnifying more, which is all he contends for. However, let us ſuppoſe him to have followed his own Doctrine, and to have tried a leſſer Segment only, it could not be a thin Segment of a large Sphere, like one of our Spectacle-Glaſſes. For this could not ſenſibly magnify the Letters underneath it, as he ſaid it did. The moſt convex Spectacles now made, when laid upon a Book, have not this Effect; becauſe they are too thin. It follows then, if he tried any Segment at all, that it muſt have been a Segment of a ſmall Sphere, ſufficiently thick to magnify the Letters underneath it; and therefore muſt have been thicker than our deepeſt Spectacles for the oldeſt Men's Eyes; and conſequently, when applied to their Eyes, it muſt have made the Letters appear confuſed, by too great a Quantity of the Refractions; and this Confuſion our Author could not correct by Theory and Reaſon, becauſe he knew not the Cauſe of it; and it is plain, he made not many Experiments. The Diſcovery of this Cauſe, together with the Manner of Viſion by Pictures upon the Retina, was firſt made by *Kepler*, about 300 Years after our Author's Time, and alſo after Spectacles were in common Uſe. It was impoſſible then for any Man before *Kepler*, ever to explain the Effect of Spectacles, (that is, how they correct the Confuſion in the Picture upon the Retina) and much more to invent them by Theory and Reaſon; and conſequently, they muſt have been the Reſult of ſome lucky Accident among a Multitude of Tryals and

Attempts, begun perhaps upon this Hint of our Authors; which is all the Honour that can juſtly be paid him.

As to his Theory and Applications above-mentioned, they are all taken from *Alhazen*, an *Arabic* Author, whom he frequently mentions upon other Occaſions. *Alhazen* is reckoned to have lived about the Year of our Lord, 1100. Among his Experiments, to explain his Theorems, he expreſsly mentions, that if an Object be applied cloſe to the Baſe of a larger Segment of a Sphere of Glaſs, it will appear magnified. He alſo treats about the Appearance of an Object through a Globe; and ſays, he is the firſt that found out the Refraction of Rays into the Eye.

Thus far concerning his Knowledge in Optical Glaſſes. After this, the Doctor proceeds to examine Friar *Bacon*'s Pretence to the Invention of Teleſcopes, which moſt People from his Writings ſuppoſe he was well acquainted with; and imagine, if he was not the firſt Author of it, he muſt certainly have had a conſiderable Share in the Improvement thereof: For thus Mr. William *Molyneux*, we have already obſerved, aſcribes the Invention of Teleſcopes expreſly to Friar *Bacon*; and his Son, the Honourable *Samuel Molyneux*, has declared his Opinion rather more expreſly; that the Invention of Teleſcopes, in its firſt Original, was certainly put in Practice by an *Engliſhman*, Friar *Bacon*; although its firſt Application to aſtronomical Purpoſes may be juſtly attributed to *Galileo*. To examine this Opinion of thoſe learned and judicious Perſons, (ſays Dr. *Smith*) it will be neceſſary to tranſlate one whole Chapter of our Author's upon Viſion by Refractions, which immediately follows after his Diſcourſe upon Viſion by Reflections, which is thus in Engliſh.

"Greater Things than theſe may be performed by refracted Viſion. For it is eaſy to obſerve, by the Canons above-mentioned, that the greateſt Things may appear exceeding ſmall, and on the contrary; alſo that the remote Objects may appear juſt at hand, and on the contrary. For we can give ſuch Figures to tranſparent Bodies, and diſpoſe them in ſuch Order, with reſpect to the Eye and the Objects, that the Rays ſhall be refracted and bent to any Place we pleaſe; and thus from an incredible Diſtance we may read the ſmalleſt Letters, and may number the ſmalleſt Particles of Duſt and Sand, by reaſon of the Greatneſs of the Angle under which we may ſee them; and on the con-

contrary, we may not be able to ſee the greateſt Bodies juſt by us, by Reaſon of the Smallneſs of the Angles under which they may appear. For Diſtance does not affect this Kind of Viſion, excepting by Accident, but the Quantity of the Angle. And thus a Boy may appear to be a Giant, and a Man as big as a Mountain; foraſmuch as we may ſee the Man under as great an Angle as the Mountain, and as near as we pleaſe. And thus a ſmall Army may appear a very great one, and tho' very far off, yet very near us, and on the contrary. Thus, alſo, the Sun, Moon, and Stars, may be made to deſcend hither, in Appearance, and to appear over the Heads of our Enemies; and many Things of the like Sort, which would aſtoniſh unſkilful Perſons."

The ſame Author has alſo told us, That by ſeveral *Speculums*, properly diſpoſed, a ſingle Soldier may be multiplied ſo as to appear like an Army; and one Army like many Armies, terrifying Infidels and Enemies; That *Speculums* may be raiſed up on high againſt oppoſite Armies, and ſo as to diſcover all the Enemy's hidden Tranſactions, and that this may be done from any Diſtance whatever. Becauſe, by the *Book* upon *Speculums*, one, and the ſame Thing may be ſeen by Reflection from as many *Speculums* as we pleaſe, if they be diſpoſed in proper Situations; and therefore, ſome may be placed nearer, and ſome farther off; ſo that the Object may be ſeen from any Diſtance whatever. *Ut videremus rem quantum à longè vellemus.*

We have added this Extract to the other Paſſage, to ſhew that his Thoughts about the Manner of executing theſe Deſigns, by Reflection and Refractions, are much alike, as is evident from the Paſſage laſt mentioned, compared with this; *Figurare perſpicua ſed longè magis quam hæc oporteret homines haberi; qui benè, immò optimè, ſcirent perſpectivam, & inſtrumenta ejus;* —— *quia inſtrumenta aſtronomica non vadunt, niſi per viſionem, ſecundum legis iſtius ſcientiæ:* To diſpoſe the Glaſſes in ſuch Order, with Reſpect to the Eye and Objects, *that the Rays ſhall be refracted, and bent to any Place we pleaſe.*

It ſeems, then, as if he did not think of performing theſe Problems by a ſingle, portable Inſtrument, like a Teleſcope; but by fixing up ſeveral Glaſſes at large Intervals from one another; which would certainly prove ineffectual. Becauſe no

Surfaces can be figured, and poliſhed ſo perfectly, as to reflect, and refract Light, at a very great Diſtance, without great Aberrations, or Straglings of the Rays, from the Places, or Points intended; and theſe Aberrations would be increaſed by the Interpoſition of more Glaſſes; to ſay nothing of the Loſs of Light at every Surface, and of Colours generated by Refractions, from ſuch great Diſtances; ſo that the Object muſt appear at laſt ſo faint, ſo deformed, and confuſed, as to excite no determinate Ideas.

What he mentions of *Julius Cæſar*, that he raiſed up *Speculums* to a great Height, upon the Coaſt of *France*, to diſcover the Diſpoſition of the Cities and Camps in *England*, when he was going to invade it, is therefore impracticable, and probably a Fiction, if there be not a Miſtake in the Interpretation of the Word *Specula*, for Glaſſes, inſtead of a *Watch-Tower*. The ſame is to be underſtood of the Story mentioned by *Parta*, that *Ptolomy*, by *Speculums*, could diſcern Ships at the Diſtance of 600 Miles; which could not poſſibly be done by our beſt Teleſcopes. Mr. *Waller* imagines, that he had his Intelligence by *Speculis*, or *Watch-Towers*, placed at ſeveral intermediate Diſtances; where ſeveral Signs might be given and received ſucceſſively from the firſt to the laſt.

But to return to our Author, conſidering the falſe Nations he had from the Antients about diſtinct and confuſed Viſion; the falſe Principle he maintains, that the apparent Magnitude of an Object is as the Angle ſubtended at the Eye by its Image, and reciprocally, as the Diſtance of the Image too; and laſtly, the falſe Concluſions he has drawn, and muſt always draw, from theſe Principles, as we have ſhewn in his Attempt upon making Spectacles; it was certainly next to impoſſible for him to have invented, by Theory, a much nicer, and more complex Inſtrument; I mean, a Teleſcope of any Sort. Indeed, Mr. *Molyneux* ſays, it is manifeſt, he knew what a concave and convex Glaſs was. But this does not appear from the Paſſage there cited, nor from any other that I have met with. Mr. *Molyneux* was miſled by the Inaccuracy of the Author's Language. *Si verè corpora non ſint plana per quæ viſus videt, ſed ſphærica, &c.* inſtead of this he ſhould have ſaid, *Si verè corporum ſuperficies non ſint plana, per quas viſas videt, ſed ſphærica, &c.* For in this whole

whole Chapter, he treats of nothing elſe but the Appearance of an Object thro' a ſingle concave or convex Surface of a large Body or Medium, the Object being placed within it, and not beyond it. Nor do I find, that he has ever conſidered the Appearance of an Object placed at a Diſtance, beyond a refracting Body of any Shape. Indeed, he mentions the Refractions of the Sun's Rays thro' a Sphere, to ſhew how they burn Things; but not a Word how an Object appears thro' it.

Beſides, we have ſhewn, that he never had handled a Convex-ſpectacle-glaſs, when he wrote a Paſſage in this ſame Treatiſe; and without a Variety of Lenſes, he could try but few Experiments, and could never have hit upon a proper Combination of them for a Teleſcope. Indeed, Dr. *Jebb*, the Editor of the laſt Edition of the *Opus Majus*, in his Dedication to Dr. *Mead*, produces a Paſſage from a Manuſcript to ſhew, that this Author actually applied Teleſcopes to aſtronomical Purpoſes. *Sed longè Magis, &c.* to this it may be anſwered, that the Antients had ſome Occaſion for Perſpective in plain Inſtruments, before the Invention of Teleſcopic Ones. But as this Paſſage ſtands alone, it is not eaſy to know the Intent of it; however, had there been any more to the like Purpoſe, no Doubt this Gentleman, ſo much verſed in this Author's Works, would have found them out, and obliged us with them.

In ſhort, this Author ſpeaks only hypothetically; ſaying, that Glaſſes may be figured, and Objects may be magnified ſo and ſo; but never aſſerts one ſingle Trial, or Obſervation upon the Sun or Moon, (or any Thing elſe) tho' he mentions them both. On the other Hand, he conceives ſome Effects of Teleſcopes, that cannot poſſibly be performed by them.

If it be aſked how he came by theſe Notions? I anſwer, from the common Doctrine of Refractions in his Canons, and from common Appearances by Refraction and Reflection; eſpecially from concave *Speculums*, whoſe Effects were well known to him, both by the Accounts of them in antient Authors, and by his own Experience. And this I take to be a ſufficient Ground for a Man of good Senſe and Fancy to produce all that he has ſaid. We may however conclude, that the Time of the Invention of Teleſcopes was not earlier than the ſeventeenth Century.

tury. But it may be thought high Time to proceed to other Inſtances of our Author's Genius and Improvements.

Geography alſo he was peculiarly well ſkilled in, as appears from a Variety of Paſſages in his Works, which ſhew, that he was far better acquainted with the Situation, Extent, and Inhabitants, even of the moſt diſtant Countries, than many who made that particular Science their Study, and wrote upon it in ſucceeding Times. This may be the Reaſon which induced the judicious *Hackluyt* to tranſcribe a large Diſcourſe out of his Writings into his Collection of Voyages and Travels.

But his Skill in *Aſtronomy* was ſtill more ſurprizing; ſince it plainly appears, that he not only pointed out that Error which occaſioned the Reformation of the Kalendar, that has given Riſe to the Diſtinction about the Old-ſtile and the New; but alſo afforded a much more effectual and perfect Reformation than this, which was made in the Time of Pope *Gregory* XIII. This is abundantly illuſtrated in his Book, intituled, *Opus Majus*, from whence we ſhall make only the following Extract. "*Julius Cæſar*, ſays he, p. 169, being well ſkilled in *Aſtronomy*, ſettled, as well as it was poſſible in his Time, the *Kalendar*; but *Julius*, however, did not diſcover the exact Length of the Year; for he has fixed it in our *Kalendar*, at 365 Days, and the Fourth of a Day, which fourth Part is collected once in four Years; ſo that in the *Biſſextile* Year, one Day more is reckoned, in every fourth Year, than in the common Years. It is, however, manifeſt, not only by the old and new Computations, but is alſo known from aſtronomical Obſervations, that the Solar Year is not of that Length, but ſomewhat ſhorter; and this ſmall Difference wiſe Men have computed to be the 130th Part of a Day; ſo that in the Space of 130 Years, there is a ſuperfluous Day taken in, which if it were taken away, our *Kalendar* would be corrected as to this Fault; and therefore, as all Things in our Computation depend upon the Quantity of the Solar Year, it is neceſſary to recede from this Poſition, when it thus appears to be a fundamental Error. From hence there ariſes ſtill a greater Error, that is, in fixing the *Equinoxes* and *Solſtices*; and this Error not only ariſes from the Quantity of the Year, but has alſo ſeveral miſchievous Conſequences; for the *Equinoxes* and *Solſtices* are thereby fixed to certain Days, as if they were really upon them, and

and were ſo to happen for ever. But it is certain from *Aſtronomy*, which cannot lie, that they aſcend in the *Kalendar*, as by the Help of Tables and Inſtruments may be unqueſtionably proved.

There are alſo remaining ſome Works of his relating to *Chronology*, which would have been thought worthy of very particular Notice, if his Skill in other Sciences had not made his Proficiency in this Branch of Knowledge the leſs remarkable. But it may not be amiſs to obſerve, that he was perfectly well verſed in the Hiſtory of the four great Empires of the World, of which he has treated very accurately tho' ſuccinctly, in his great Work addreſſed to Pope *Clement* IV.

Our Author was likewiſe well acquainted with *Chemiſtry*, at a Time too that it was ſcarcely known in *Europe*, tho' it had been long cultivated among the *Arabians*. Dr. *Freind* ſays truly, it is no more than doing Juſtice, to aſcribe the Honour of introducing it to this our Countryman, who, as he likewiſe ſays, ſpeaks in ſome Part or other of his Works, of almoſt every Operation now uſed in *Chemiſtry*, and deſcribes the Method of making *Tinctures* and *Elixirs*, *&c.**

But we muſt not ſo ſuperficially paſs over his Excellency in this Art, ſince there are no leſs than three capital Diſcoveries made by him, which deſerve to be particularly conſidered. The firſt is, the Invention of Gun-powder, which, however confidently aſcribed to Others, was unqueſtionably known to him, both in regard to its Ingredients and Effects. Thus, in his 6th Chapter *of the Secrets of Nature and Art*, he tells us, "That from *Salt-Petre*, and other Ingredients, we are able to make a Fire, that ſhall burn at what Diſtance we pleaſe. He likewiſe mentions other Methods of doing the ſame Thing; and then, ſpeaking of the Effects of theſe ſtrange Fires, he ſays, "That Sounds, like Thunder, and Coruſcations, may be formed in the Air, and even with greater Horror, than thoſe which happen naturally; for a little Matter, properly diſperſed, about the Bigneſs of a Man's Thumb, makes a dreadful Noiſe, and occaſions a prodigious Coruſcation, and this, ſays he, is done ſeveral ways; by which a City, or an Army, may be deſtroyed after the Manner of *Gideon*'s Stratagem, who having broke the

* See, *Freind*'s Hiſtory of Phyſic, *Vol.* 2. *p.* 234.

Pitchers and *Lamps*, and the Fire iſſuing out with an inexpreſſible Noiſe, killed an infinite Number of the *Midianites*." This very plainly proves, that he knew the Effects that ſuch a Compoſition as what we now call Gun-powder would produce.

Another remarkable Diſcovery we may mention is that, which commonly goes under the Name of *Alchemy*, or the *Art of tranſmuting Metals*, of which he has left many Treatiſes; ſome publiſhed, and ſome ſtill remaining in MS. which, whatever they may be thought of now, procured him the Reputation of an Adept, among the greateſt Maſters in that myſterious Branch of Learning, and in which Writings there are, without doubt, a Multitude of curious and uſeful Paſſages, which, independent of their principal Subject, will render them always valuable.

But that for which our Author was much more celebrated, was a Diſcovery in *Chemiſtry*, *viz.* a *Tincture* of *Gold*, for the Prolongation of Life, of which Dr. *Freind* ſays, he has given Hints in his Writings, and which it is very probable, he would have laid open more fully, if his Diſcourſes upon theſe, and other important Subjects, had been received with the Candor they deſerved. As it is, he has ſaid enough to ſhew, that he was no Pretender to this Art, but underſtood as much of it, in this reſpect at leaſt, as any who have lived ſince his Time.

That he was far from being unſkilled in the Art of Phyſic, we may rationally conclude, from his extenſive Knowledge in thoſe Sciences which have the neareſt Relation thereto; but beſides this, we have a particular and manifeſt Proof of his perfect Acquaintance with the moſt material and uſeful Branches of Phyſic, in his Treatiſe of *Old Age*, which, as Dr. *Freind*, whoſe Authority on that Subject cannot well be diſputed, obſerves, is very far from being ill wrote; and Dr. *Brown*, who publiſhed it in *Engliſh*, eſteemed it one of the beſt Peformances that ever was written. In this Work he has collected whatever he has met with upon the Subject, either in the *Greek* or *Arabian* Authors, and has added a great many Remarks of his own. The Whole, conſidering the Time in which it was wrote, is, in Reality, a very extraordinary Performance, both in Point of Learning and Judgment, and will appear the more curious and the more valuable, the oftener it is read, and the more it is conſidered.

In

In *Law* and *Metaphyſics* he was admirably well verſed, as appears by thoſe Parts of his Works, in which he has treated of theſe Subjects.

Neither was he unſkilful in *Philology*, and the politer Parts of Learning, as might be demonſtrated from his Writings; wherein he particularly complains, that in his Time, *Grammar* was at a very low Ebb; and as for the learned Languages, they were not underſtood, at leaſt to any tolerable Degree, but by very few; ſo that his own Acquirements in theſe Reſpects is ſo much the more remarkable.

In *Ethics*, or *Moral Philoſophy*, he was a great Maſter; and as he was a Man of diſtinguiſhed Senſe and unblemiſhed Probity, ſo he has laid down the nobleſt, and moſt generous Principles for the Conduct of human Life. In the Treatiſe he has left us upon that Subject, he deſcribes *Morality* in a peculiarly juſt, and rational Manner, and repreſents *Moral Philoſophy*, as the End and Perfection of all human Knowledge. He conſidered all ſpeculative Science as uſeful or uſeleſs, in Proportion as it contributed to the Advantage of Mankind. He declares, that, in his Judgment, the *Moral Philoſophy* of Chriſtians is the ſame with their *Divinity*; and that, tho' it is by far more perfect than the Philoſophy of the *Pagans*; yet it reſts upon, and takes in their Principles; ſo that, in ſhort, he makes *Natural Religion* the Ground-work, and *Revealed* the Structure, ſuppoſing each neceſſary to the other, and therefore not to be ſeparated or divided.

But as his Profeſſion and Courſe of Life required a particular Application to *Theology*, ſo it plainly appears, that he made all his other Studies ſubſervient thereto, and directed both his Actions and his Writings to the Glory of God, and the Good of his Fellow-Creatures. He had the higheſt Deference for the *Holy Scriptures*, and thought, that in them were contained the Principles of true Science, and of all uſeful Knowledge. He therefore earneſtly recommended the Study of them in their original Languages, and an aſſiduous Application to the ſeveral Branches of Learning, which he thought neceſſary for the thorough underſtanding them. To ſay the Truth, the impreſſing this ſtrongly on the Minds of Men, who made Religion their peculiar Profeſſion, is the great Aim and Deſign of his Works: More eſpecially of his laſt Treatiſe, which he left as a Kind of

Teſtament

Teſtament to thoſe of his Order, and is a very excellent Work in its Kind.

As to the vulgar Imputation on his Character, of his leaning to *Magic*,* and that he had an high Opinion of *Judicial Aſtrology*, has been more than ſufficiently confuted by the learned *Gabriel Nande*, and others; for, conſidering the Ignorance and Superſtition of the Age in which he lived, it required great Diſcernment, Confidence, and Reſolution, to oppoſe the common received Errors; and, as his whole Life was ſpent in Labour and Study, and as he was continually employ'd either in writing for the Information of the World, or in reading, or making ſuch Experiments as might enable him to write with greater Accuracy; ſo we need not wonder, that his Works were ſo exceedingly numerous; eſpecially, when it is conſidered, that, on the one Hand, his Studies took in the whole Circle of the Sciences, and that, on the Other, the numerous Treatiſes aſcribed to him are often, in Fact, but ſo many Chapters, Sections, or Diviſions; and ſometimes we have the ſame Pieces under two or three different Names; ſo that it is not at all ſtrange, before theſe Points were well examined, that the Accounts we have of his Writings appeared very perplexed and confuſed. But notwithſtanding this ſeeming Perplexity and Confuſion, it is not a very difficult Thing, from the Lights we now have, to give a fair and juſt Account of our Author's Works, the far greater Part of which are ſtill in Being; and it were to be wiſhed, that they were alſo made public. It will likewiſe appear, from a Summary of his Works, what great Service has been done to the learned World by ſuch as have made it their Buſineſs to collect, and preſerve ancient MSS. and to bring together the ſcattered Memorials of thoſe learned Men, who have flouriſhed in paſt Times, and who, until

* The infamous Character of a *Magician* was deſignedly, and induſtriouſly propagated amongſt the ignorant and credulous Vulgar, by his profeſſed and implacable Enemies. And it was not only the Fate of this great Man, but many others before, and ſince his Time, to be ſtigmatized with the opprobrious Titles of *Conjurors* and *Soothſayers*, by the Enemies of Science; when at the ſame Time, it may be obſerved, that no Sort of Men have held thoſe ridiculous Superſtitions in greater Deteſtation than themſelves; and BACON was ſo far from pretending to any infernal Arts, that he wrote a Book expreſly againſt them, under the Title of DE NULLITATE MAGIÆ; or the *Nullity* of *Magic*.

til this Care was taken, have been repreſented in very falſe Lights to Poſterity.

It will alſo appear, that this excellent Perſon was very far from being a haſty, incorrect Writer; but that, on the contrary, all his Works have a juſt Reference to one great and general Syſtem, which he has executed, in all its Parts, to a much greater Degree of Perfection than hitherto even the Learned themſelves have imagined.

The learned and induſtrious *Bayle*, by the Time he had finiſhed his uſeful Collection, had met with, and digeſted the Titles of upwards of fourſcore. *Pits* ſpeaks with Amazement of the Multitude of Books written by our Author, and increaſes them to near an hundred. The learned Dr. *Jebb* has corrected and digeſted theſe Titles under the proper Heads of the Sciences to which they belong; ſo that the Whole of what was either written by, or attributed to our Author, according to this Account, were as follow:

In Grammar, 5.	Chemiſtry, 9.
Mathematics, Phyſics, &c. 22.	Magic, 5.
Optics, 9.	Logic, Metaphyſics, and Ethics 8.
Geography, 6.	Phyſic, 9.
Aſtronomy, 7.	Theology, 6.
Chronology, 1.	Philology, and Miſcellany, 12.

Upon the whole, we may ſafely affirm, that the Hiſtory, Character, and Reputation of *Roger Bacon* is, in a great Meaſure reſtored; ſo that we may truly judge of them all, and determine, from the Light of Evidence, of the Uſage he has received from all Parties. We may now juſtly applaud thoſe learned Prelates of *Canterbury* and *Lincoln*, and all the great Men who were the Patrons of his junior Years, the Encouragers of his riper Studies, and the Protectors of his injured Innocence. We can plainly diſcern, how cruelly and unjuſtly he was perſecuted by the malicious Monks of his Order, who envied that Learning which they ought to have imitated, and hated that Reputation it became them to admire. We know now, with Certainty, to what Popes he addreſſed his Writings, what thoſe

Writings were, and why they were addreſſed to them. We can form a juſt Notion of the Reaſon, why he was honoured to ſo extraordinary a Degree by the moſt learned and moſt worthy Men of the Age in which he flouriſhed; and how his Writings have been, in ſome Sort, the Standard of a true Taſte for Science; that is to ſay, ſought for, and admired when it prevailed; neglected, and miſrepreſented when ever it was clouded or obſcured. We are now ſenſible of the Folly of thoſe Prejudices, the Falſhood of thoſe Calumnies, and the Cauſes of thoſe Miſtakes which have been ſpread concerning our Author and his Writings. Laſtly, we are enabled to diſcern, from the fulleſt and moſt authentic Evidence, the Juſtice and Sincerity of thoſe Praiſes, which, in the higheſt Degree, have been beſtow'd upon him by the ableſt Writers, and beſt Judges of true and uſeful Knowledge, in our own, and in foreign Countries. 'Tis true, a great deal of Time and Pains have been employ'd, as indeed they were moſt neceſſary, to bring theſe ſeveral Points, with the Authorities requiſite to ſupport them, to the View of the Public; but when the Deſign of this Work is conſidered, the Merit of the Man duly weighed, together with the Glory which reſults to this Nation from having produced, and that too in one of the darkeſt and unlettered Ages, the brighteſt and moſt univerſal Genius that perhaps the World ever ſaw, before Sir *Iſaac Newton*; it is hoped, that this Time and Pains, both with regard to the Reader and the Writer, will be eſteemed properly employ'd.

REGIOMONTANUS.

JOHN MULLER, called *Regiomontanus*, was born at *Mons Regius*, a Town in *France*, the 6th of *June*, 1436. His Parents, it is ſaid, were Perſons of good Repute, and in Circumſtances ſufficient, however, to bring him up to Learning.

The Seeds of Nature were planted in a happy Soil; for he had a ready and an acute Wit: But unleſs he had been inſpired by a Sort of divine Afflatus, he could not have made himſelf complete

complete Maſter of ſo many and ſuch various Arts, have learned ſuch a Number of Languages, undergone ſuch immenſe Labours in informing himſelf and inſtructing others, in framing Inſtruments, contemplating the Situation of the Stars, writing the moſt learned Lucubrations, unfolding ſo many Intricacies, publiſhing Tables of his own as well as others, beſides his *Ephemerides*, or *Journals*: I ſay, he could not have performed all theſe Things, in ſo ſhort a Courſe of Life, unleſs he had been inſpired with a Genius from Heaven. And indeed the Conſervation of Arts and Sciences to Mankind is the ſpecial Favour of divine Providence; yet it is the Pleaſure of the divine Being, that to his Liberality we ſhould add our own Diligence and Aſſiduity; for he will not have his Gifts rejected with Diſdain and Contempt, as is more fully intimated in the Parable of the Traders. Nor was it abſurdly ſaid by *Plato*, "That "GOD and *Occaſion* govern the Whole of the univerſal Work; "yet a Third may be allowed, namely, *Art*, which muſt be "joined with them." As in a Ship, tho' the Winds govern it, yet the Sailors are not idle; ſo we ſhould with Reverence poſſeſs the divine Gifts, and with all our Diligence preſerve and improve them.

Thus *Regiomontanus*, tho' he had ſufficient Strength both of Mind and Body for Learning; yet he did not neglect Aſſiſtances, nor, as many do, hunted after Riches and Pleaſures; but with all his Powers and Faculties applied himſelf to his Studies, ſought every-where for learned Men, by whoſe Wiſdom he might be improved, and laboured inceſſantly to illuſtrate the Arts. For, after he had learned Grammar in his own Country, he was admitted, while yet a Boy, into the Academy at *Leipſick*, where he greedily imbibed the Elements of the Doctrine of the Sphere. But, having a great Deſire of Inſtruction, required Directors for his Study, and Companions in ſo excellent a Labour; and hearing that at *Vienna* there was a College inſtituted on purpoſe for that Branch of Philoſophy, he, tho' very young, takes a Journey into *Auſtria*, where he finds *G. Purbachius Bavarus*, a moſt ingenious Man, and in the very Bloom of his Age and Authority. *Purbachius* no ſooner diſcovered the Strength of Nature, and the Willingneſs of the Youth, than he embraced him; and became, not only his Adviſer, but

his

his Guide into the moſt ſecret Receſſes of thoſe Arts. It was thus the *Egyptian* Prieſts inſtructed *Theletes*, *Meton*, and *Eudoxus*; and *Eudoxus*, *Plato*, &c.

For about ten Years there was the cloſeſt Intimacy and Interchange of Sentiments between *Regiomontanus* and *Purbachius*; many Obſcurities they elucidate; or obſerve, or diſcover the Motions of the celeſtial Bodies, and, in particular, that thoſe of *Mars* did not agree with the Tables, but that ſometimes there was a Variation of two Degrees; this induced them to begin a Correction of thoſe Tables.

While they were thus employ'd, Cardinal *Beſſarion*, a *Greek* by Nation, a Man of excellent Erudition, came Ambaſſador to the Emperor *Frederick*. Having queſtioned *Purbachius* in many Things relating to *Ptolemy*'s Syſtem, and admiring his Dexterity in explaining them, requeſted him to compoſe an Epitome of his Work, entitled *The Great Syntax*. That Work, interrupted by the Death of *Purbachius*, was finiſhed by *Regiomontanus*; becauſe, as he himſelf informs us, *Purbachius*, on his Death-bed, among his laſt Requeſts, recommended this to him.

In which Affair, it is greatly to be admired, that, tho' unacquainted with the *Greek* Fountains, they were able to extract Light out of the Darkneſs of the *Arabic* Verſion. This indeed would have been impracticable, if the Demonſtrations had not been obvious and eaſily comprehended by them, as they were, by being univerſally practiſed by the Learned in the Arts. Yet this very Work did *Regiomontanus* reviſe and perfect at *Rome*, when he had learned *Greek* and conferred with *Theon*. There is ſtill extant an Epiſtle of *Regiomontanus*, full of Piety, wherein he laments the Death of his Maſter *Purbachius*, and ſo extols his Ingenuity, as to prefer him to all the Mathematicians of that Age.

But both *Purbachius* and *Regiomontanus* were equally deſirous of viſiting *Italy*, as well to converſe with learned Men, as to ſtudy the *Greek* Tongue, in which they knew were contained the Fountains of thoſe Arts, and enable them to underſtand *Ptolemy*, ſpeaking in his own Language; to which *Beſſarion* adviſed them, and entreated they would bear him Company. *Regiomontanus* tells us, that he, being then very young, ſeeing two very ingenious Men, *Purbachius* and *Franciſcus Mantuanus*, much per-

perplexed in underſtanding the Verſion of *Ptolemy*, on Account of their Ignorance of the *Greek* Language, was greatly concerned that he could not inſpect thoſe Fountains, nor could have any Maſters to inſtruct him in that Language, and therefore determined, at ſome convenient Time, to go to *Italy*. But the immature Death of *Purbachius* prevented his Deſign of undertaking this Journey; and the Grief of *Regiomontanus*, on this Occaſion, was ſo great, that he quitted *Vienna* without any Regret.

He therefore accompanied *Beſſarion* in his Return to *Italy*, being then near thirty Years of Age. At *Rome*, he often converſed with *Trapezuntius*, and viewed the Libraries, which increaſed his Earneſtneſs to labour at the *Greek* Tongue. Warm with that Deſire, he deſcribed many Things with his own Hand, and by an aſſiduous Peruſal of *Ptolemy*'s Book, they became familiar to him. Then it was he wrote his Dialogue againſt the Theories of *Cremonenſis*. A little while after, he went to *Ferrara*, where then were *Blanchinus*, *Theodorus Gaza*, and *Guarinus*, who taught *Greek* there. Here, for upwards of a Year, he laboured with all his Might to make himſelf perfect in that Language, and made ſuch Progreſs therein, that he wrote Verſes in *Greek*, which are ſtill extant, and could readily converſe with the *Grecian* Philoſophers. Here he likewiſe began to compare *Ptolemy* and the Commentaries of *Theon*. Departing, not long after, from *Ferrara*, he came to the Academy at *Padua*; where, at the Requeſt of the Students in Philoſophy, he publickly pronounced his *Alfraganus*; the Preface to which is yet extant; in which he not only harangues on the Diſcipline, but celebrates, with great Candour, the Mathematicians who were then famous in *Italy*, and who were his Friends, as well for the Sake of Virtue, as the Fellowſhip of their common Studies.

Regiomontanus having finiſhed his *Alfraganus* about the Time that *Beſſarion* returned from *Greece*, in the Year 1466, repairs to *Venice*. Here he wrote, with great Accuracy, his Treatiſe of *Triangles*, and a Refutation of the Quadrature of the Circle, which was thought Cardinal *Cuſan* had demonſtrated. After which he came back to *Rome*, where he made ſome Stay, in order to Purchaſe the moſt curious Books; thoſe he could not buy, he took the Pains to tranſcribe, for he wrote with great Facility and Elegance; and others he got copied at a great Expence. For

as he was certain that none of these Books could be had in *Germany*, he thought on his Return thither, he would, at his Leisure, translate and publish some of the best of them. Mean while he had a fierce Contest with *Trapezuntius*, who had committed very gross Blunders in interpreting the Commentaries of *Theon*.

Having furnished himself with a sufficient Number of Books, and finding nothing more to detain him in *Italy*, he repairs to *Vienna*; where he again read Lectures in the Mathematics.

While he was thus employed, *Matthias*, King of *Hungary*, sends him an Invitation, which being accompanied with magnificent Presents, and the Promise of an annual Pension of 200 *Hungarian* Pieces of Gold, he was prevailed upon to go to him; not so much for the Sake of this Royal Munificence, as on account of the Reputation which this King had acquired by his military Virtues, but more especially for his Love of Letters; for he had bought up all the *Greek* Books that could be found in the sacking of *Constantinople*, and those that were brought from *Athens*, or wherever else he could meet with them thro' the whole *Turkish* Dominions, and collected them into a noble Library at *Buda*. In short, *Matthias* held him in the highest Esteem, frequently made him sit at his Table to hear his learned Discourses, and more than once declared, that to him he owed the Restoration of his Health. The Case was thus: The King had for some Time been extremely ill; the Physicians in vain sought for the Cause of the Disease in the Humours; and observed, that there was an unusual Languor of the Heart. *Regiomontanus* told them, that this great Imbecility of the vital Powers was caused by the ‖ *Eclipse of the Moon*, and therefore not to be found in the Humours; and to remove it, they had no more to do, than to strengthen the Heart with comfortable, and exhilerating Medicines. Upon which the King recovered, and rewarded *Regiomontanus* with a rich Vest, and other noble Gifts.

But it was not only the Kindness of the King, but the Friendship of the Archbishop of *Strigonia*, who was continually heaping Largesses upon him, that detained him in that Country. *Regiomontanus* celebrates the Praises of this Prelate in an Epistle, in

‖ This is a remarkable Instance of the Power of customary Error over the Minds of Men of the greatest Genius and Learning.

in which he dedicates to him his Tables of Directions, which he had wrote at his Inſtance. For he, alſo, was greatly delighted with judicial Aſtrology; to which nothing was a greater Help than Tables of Directions; yet nothing of that Kind was then extant, except the Tables of an Archdeacon of *Parma*, which were very imperfect.

At the ſame Time, *Matthias* made War againſt the *Bohemians*, which diſturbed the Tranquility of many neighbouring Countries. *Regiomontanus*, to avoid the impending Storm, looked out for ſome other Place to ſettle in, where he might purſue his Studies, and reſolved to retire to *Norimbergh*. Having for this Purpoſe obtained Leave of the King, and paid his laſt Reſpects to his Friend the Archbiſhop, to this City he goes, in the Year 1471. He himſelf tells us the Reaſons which induced him to reſide in this City the Remainder of his Life; namely, that the Artiſts there were dextrous in fabricating his Aſtronomical Machines; moreover, he could, from thence, eaſily tranſmit his Letters by the Merchants into foreign Countries. Being now well verſed in all Parts of Learning, and having thoroughly examined the Opinions of others, and had made as great a Proficiency in the Mathematics as he poſſibly could, he determined to publiſh the beſt of the antient Writers, as well as his own Lucubrations. For this Purpoſe he ſet up a Printing-houſe, and propoſes a Nomenclature of the Books he intended to publiſh, which ſtill remains.

Here that excellent Man, *Bernardus Waltherus*, one of the principal Citizens, in the Prime of his Age, rich, ſkilled in the Sciences, eſpecially Aſtronomy, cultivated an Intimacy with him; and, as ſoon as he underſtood his double Deſign, took upon himſelf the Expence of conſtructing the Aſtronomical Inſtruments, and erecting a Printing-houſe. Firſt he ordered Aſtronomical Rules to be made of Tin, for obſerving the Altitudes of the Sun, as likewiſe of the Moon, and the reſt of the Planets, but eſpecially of the Sun. In the next Place, he conſtructed a Rectangular, or Aſtronomical Radius, for taking the Diſtances of thoſe Planets. Then an Armillary Aſtrolabe, ſuch as was uſed by *Ptolemy*, and, before him, by *Hipparchus*, for obſerving the Places and Motions of the Stars. Laſtly, he made other leſſer Inſtruments, as the Torquet, ſuch

as

as *Regiomontanus* had deſcribed for the Uſe of the Archbiſhop of *Strigonia*; alſo *Ptolemy*'s Meteoroſcope, ſuch as he had formerly ſhewn to *Beſſarion*; and ſome others which had more of Curioſity than Utility in them. In theſe Works they were employed till the Beginning of the following Year.

From this Aſtronomical Apparatus, it evidently appears, that *Regiomontanus* was a moſt aſſiduous Obſerver of the Laws and Motions of the celeſtial Bodies. It will not, I imagine, be diſagreeable to the Reader, to give one Inſtance of his Accuracy and Exactneſs in the Obſervation he made on the Progreſs of a Comet that appeared in his Time.

In the Beginning of the Year 1472, a Comet was diſcovered on the Ides of *January*, and continued to the End of *February*. The Motions of this famous Comet, *Regiomontanus* has given us in the following Terms. "This Comet, ſays he, was ſeen by us under *Libra*, with the Stars of *Virgo*. The Head of it had a ſlow Motion, 'till it was near the *Spica*. It proceeded thro' the Legs of the *Bull*, towards the Left, from whence deſcending, in one natural Day it deſcribed the Portion of a great Circle of forty Degrees, where being in the Middle of *Cancer*, its greateſt Diſtance from the Orb of the Signs was ſeventy-ſeven Degrees. Then it went between the two Poles of the Zodiac, and of the Equinoctial, 'till it came between the Feet of *Cepheus*. Then thro' the Breaſt of *Caſſiopeia*, over the Belly of *Andromeda*. After going the Length of the *Northern Fiſh*, where its Motion was greatly retarded, it approached the Zodiac, paſſing it near the Middle of *Aries*, and coming up with the Star of *Cetus*, it was hid from us by the Sun-beams, at the latter End of *February*. By this, its proper Motion, it deſcribed a Portion of the Great Circle, by which it was carried into the North, and againſt the Succeſſion of the Signs, from *Libra* to *Aries*. In the End, and in the Beginning it moved ſlowly; in the Middle of its Appearance very ſwiftly, in one Day, almoſt thro' four Signs, from the End of *Virgo*, to the Beginning of *Gemini*. And according to its natural Tendency, ought to have continued its Motion, 'till it appeared again in *Libra*. And perhaps ſuch was its Motion; becauſe in its Setting, there was ſtill a great Quantity of it; yet becauſe of its Figure, in regard to the Sun, and eſpecially in the Regions of the North, it could ſcarce be ſeen in the End of its Ap-

Appearance, unleſs towards the Meridian in *April*, tho' it ſhould have preſerved the Regularity of its Motion. Its Tail, which was leſs moveable, by continually bearing towards the Stars of *Gemini*, turned round them, never deviating from them thro' the whole Time of its Appearance; and, therefore, in its firſt Emerſion to the Weſt, it ſtretched it out, becauſe the Stars of *Gemini* were thought to be there. But in the End, the Comet being placed under *Aries*, did not appear, except in the Weſt, becauſe of the Vicinity of the Sun; and with its Tail ſtretched towards the Eaſt, becauſe in this Poſition the Stars of *Gemini* were ſituated. But, in the Middle of its Appearance, it turned its Tail to the Meridian; then the Stars of *Gemini* were there; and it happened the ſame Night, that immediately after the Setting of the Sun, the Tail looked towards the Eaſt; about the Middle of the Night, it faced the Meridian; after Midnight, the Weſt; and before Sun-riſing, it pointed to the North. This Diverſity, in the Situation of the Tail, aroſe from its diurnal Motion, which neceſſarily proceeds from the *Primum Mobile*, from Eaſt to Weſt. But tho' the Extremity of the Tail, in its proper Motion, proceeded more ſlowly than the Head of the Comet; yet it always moved towards the Weſt, contrary to the Succeſſion of the Signs, deſcribing a Parallel from the Beginning of *Libra*, 'till it came to the Middle of *Taurus*, paſſing under the Feet of the *Wolf*, thro' the *Great Bear*, approaching *Perſeus*, thro' which it went round the *Pleiades*, to the Tail of *Aries*, 'till it came almoſt in the Middle of *Taurus*. Hence it is plain, that the Head as well as the Tail of the Comet, went towards the Weſt, never towards the Eaſt, and that not only by a diurnal, but by a proper Motion."

With regard to his Printing-houſe, which was the other Part of his Deſign in ſettling at *Norimbergh*, as ſoon as he had compleated it, he put to Preſs two foreign Books, and two Volumes of his own Works. The foreign Ones were, the *New Theories* of his Maſter *Purbachius*, and the Aſtronomics of *Manilius*. His own were, the *New Calendar*; "In which (as he ſays in the Index of the Books which he intended to publiſh) are diſcloſed the true Conjunctions and Oppoſitions of the Luminaries; alſo, their Eclipſes delineated; the true Places of the Luminaries every Day; the Difference of the Hours, as equinoctial as

temporal; and many other Things, the Knowledge of which is very delightful." His other Work was, his *Ephimerides*, of which he thus ſpeaks in the ſaid Index: "The *Ephimerides*, which they vulgarly call an *Almanack*, for 30 Years: Where you may every Day ſee the true Motion of all the Planets, of the Head of the Lunar *Dragon*, together with the Aſpects of the Moon to the Sun and Planets, and the Hours of thoſe Aſpects noted; laſtly, the Eclipſes of the Luminaries (if any ſhould hereafter happen) are deſcribed in their Places; and in the Fronts of the Pages are marked the Latitudes." And ſo acceptable was this Work at that Time, that every Copy was ſold for 12 *Hungarian* Pieces of Gold, and, indeed, were eagerly bought up by Perſons of all Nations. No *Italian*, *Frenchman*, *Briton*, *Pannonian*, *Sarmatian*, or *German*, had ever ſeen ſuch a Calendar. He publiſhed, likewiſe, moſt acute Commentaries on *Ptolemy*'s *Great Syntax*, or *Almageſt*: A Work, which Cardinal *Beſſarion* ſo highly valued, that he did not ſcruple to eſteem it worth a whole Province.

Great were the Deſigns of *Regiomontanus*. He prepared new Verſions of *Ptolemy*'s *Coſmography*; and, at his Leiſure-hours, examined and explained Works of another Nature. He enquired how high the Vapours are carried above the Earth; and, with admirable Sagacity, diſcovered, that they were not above 12 *German* Miles diſtant from the Horizon.

We read, that during the Years 1471, and 1472, two Comets were continually flaming; which was followed by ſo great a Drought, that the Sources of Rivers and Fountains were dried up; with many other Calamities, Conflagrations, and Wars, that happened at the ſame Time. *Regiomontanus* conſidering, that Comets were ſeldom ſeen burning for two Years ſucceſſively, and being greatly affected with the prodigious Event that followed, publiſhed his Treatiſe concerning the *true Place and Magnitude of Comets*.

At that Time, *M. Chriſtianus*, a Man extremely well verſed in this Sort of Learning, lived at *Erfurth*; how much he was valued by *Regiomontanus* appears from his Epiſtle, in which he writes, "That intending to publiſh Editions of uſeful Writers, he the more willingly came to *Norimbergh*, that he might be the nearer to him, whoſe Aſſiſtance, Judgment, and Cenſure he earneſtly

earneſtly deſired in many Things." Certainly, the Candour of this moſt excellent Artiſt deſerves the higheſt Praiſe, ſince he neither envied nor defamed the Profeſſors of his own Art.

Ramus, in the Account he gives of the admirable Works attempted and performed by *Regiomontanus*, tells us, that in his Work-ſhop at *Norimbergh*, was an *Automaton* in perpetual Motion; that he made an artificial Fly, which taking its Flight from his Hand, would fly round the Room, and at laſt, as if weary, would return to his Maſter's Hand; that he fabricated an Eagle, which, on the Emperor's Approach to the City, he ſent out, high in the Air, a great Way to meet him, and that it kept him Company to the Gate of the City. Let us no more wonder, adds *Ramus*, at the Dove of *Archytas*, ſince *Norimbergh* can ſhew a Fly, and an Eagle, armed with Geometrical Wings. Therefore, thoſe famous Artificers, who were formerly in *Greece*, and *Ægypt*, are no longer of any Account, ſince *Norimbergh* can boaſt of her *Regiomontanuſes*. For the Senate and People of this City, did all in their Power to have a continual Succeſſion of *Regiomontanuſes*. For *Wernerus* firſt, and then the *Schoneri*, Father and Son, afterwards, revived the Spirit of *Regiomontanus*.

Some Years had paſſed ſince *Regiomontanus* was at *Rome*, where he had left ſuch rare Specimens of his admirable Erudition, that his Name was highly venerated; but his Fame had been greatly increaſed by his *Ephimerides*; inſomuch, that the learned Men in that City were very deſirous of having his Company again. Pope *Sixtus* IV. wrote to him, inviting him to come; for having reſolved to ſet about a Reformation of the Calendar, and finding No-body at *Rome* equal to the Work, deſired his Aſſiſtance. Great Promiſes were made him, and as a farther Inducement, he was created Biſhop of *Ratiſbon*.

Regiomontanus was ſome Time in Suſpence, before he could prevail with himſelf to accept the Invitation. The Splendor of the Dignity offered him was very noble; but much dearer to him were the Delights of his Studies, which a juſt Diſcharge of the Duties of the paſtoral Office, muſt neceſſarily interrupt. He likewiſe conſidered, that he ſhould leave the Edition of ſo many valuable Authors imperfect, and which he had ſo much at Heart, that he could not eaſily be drawn from it. Neither ſhould he find at *Rome*, that excellent Patron, Cardinal *Beſſarion*, who,

about

about three Years before, died at *Ravenna*. For theſe Reaſons, it was with great Regret he undertook the Journey, preſaging, it is ſaid, his own Death; but the Pope's Authority prevailed. Another Motive was, the Cauſe propoſed, which would gratify his Deſire of being ſerviceable to the Public. For every one knows of what Conſequence it is, to have the Courſe of the Year rightly ordered and correct; and he would not withold his Hand from ſo great, and uſeful a Work.

To *Rome*, therefore, he went, where he had not been quite a Year, before he departed this Life, about the End of *July*, in the Year 1476; not without a ſtrong Suſpicion of being poiſoned by the Sons of *Trapezuntius*, becauſe he had cenſured their Father's Verſion of *Ptolemy*, refuted the Errors in the Commentary, and his Reprehenſions of *Theon*. He lived to the Age of forty Years, and one Month; and as it was Matter of Aſtoniſhment, that he could undertake ſo many, and ſuch prodigious Works in ſo ſhort a Space of Time; ſo his Death was attended with an univerſal Lamentation, for ſo great, and good a Man. He was buried in the *Pantheon*; and among other Verſes to the Honour of his Memory, *Latomus* wrote the following.

When Jove *beheld the ſhining Spheres increas'd,*
And a bright Tenth juſt added to the reſt,*
Began to dread his Palace wou'd be ſeen,
Naked, and open to the View of Men.

In

* The Reaſon of his alluding to the tenth Sphere is this: *Regiomontanus*, writing againſt *Thebit*, explains the Trepidation; upon which, a ninth Sphere was invented; for the ſimple Motion of the eighth Sphere towards its Riſing, being reſtored, the Ninth would render that unequal, and the Tenth would vary the Obliquity of the Ecliptic; and as by that Means the *Primum Mobile* would be carried farther, there was formed a Syſtem of the whole eleven Spheres. So that it was not ſo much a tenth, as an eleventh Sphere which he induced; which gave Occaſion not only to the Remark in the above Verſes, but likewiſe to that Eulogy which *Jovius* beſtows on *Regiomontanus*. "This one Man, ſays he, whom we honour for his admirable Induſtry, the Quickneſs of his Wit, and as the moſt excellent of all Aſtronomers, that ever flouriſhed before him, invented the *eleventh Sphere* of the whole celeſtial Globe, the reſt included in its daily Motion, with an unerring Certainty to himſelf, and to Poſterity: In this glorious Palm of Wiſdom, he was, in Truth, more noble than *Thales*, *Eudoxus*, *Callippus*, or even *Ptolemy* himſelf, that great Maſter of Science."

In vain, said he, we mov'd that Race from hence,
Since these high Battlements are no Defence.
Can none of us these bold Attempts oppose?
Or shall we sit content, invaded thus?
In vain, said Hermes, *you the Fates defy;*
'Tis their Decree, this Man shall never die.
If you'd restrain him, I advise you thus——
This Instant canonize him one of us.

POSTSCRIPT.

PURBACHIUS, who has been often mentioned in the foregoing Life, was not only the Master, but the Associate of *Regiomontanus* in all their arduous Labours after Knowledge in the Sciences. They equally endeavoured to improve every Branch of Learning, by all the Means in their Power, tho' Astronomy seems to have been the favourite Study of both. What Advances *Regiomontanus* made in that celestial Science, we have already seen; and had not the immature Death of *Purbachius* prevented his further Pursuits, there is no Doubt, but that, by their joint Industry, Astronomy would have been carried to the greatest Perfection. That this is not merely Surmise may be learnt from those Improvements which *Purbachius* actually made, to render the Study of it more easy and practicable. His first Essay was, to amend the *Latin* Translation of *Ptolemy*'s *Almegest*, which had been made from the *Arabic* Version; this he did, not by the Help of the *Greek* Text (for he was unacquainted with that Language) but by drawing the most probable Conjectures from a strict Attention to the Author's Sense. He then proceeded to other Works, and wrote a Tract, which he entitled, *An Introduction to Arithmetic*; then a Treatise on *Gnomonics*, or Dialling, with Tables suited to the Difference of Climates; likewise a small Tract concerning the Altitudes of the Sun, with a Table; also, Astrolabic Canons, with a Table of the Parallels, proportioned to every Degree of the Equinoctial. After that, he constructed solid Spheres, or celestial Globes, and composed a new Table of fixed Stars, adding the Longitude, by which every Star from *Ptolemy* to the Middle of that Age had increased. He likewise invented various other Instruments,

among which was the *Gnomon*, or geometrical Quadrate, with Canons, and a Table for the Uſe of it.

But farther; he not only collected the various Tables of the *primum Mobile*, but added new ones, and invented a new Table of Sines, which proceeded by ten Minutes (*Minuta Dena*) the whole Sine being ſuppoſed to conſiſt of 6000000 of Parts; which *Regiomontanus* afterwards extended to ſingle Minutes. *Purbachius* preſaced it with a Tract concerning Sines, and inſcribed with Chords, or parallel Lines; which though but ſhort, yet was the firſt that gave Occaſion gradually to introduce the Ratio of Trigonometrical Calculation.

When he had prepared the Tables of the fixed Stars, he ſet himſelf to reform the Tables of the Planets, and conſtructed ſome entirely new for Equations; becauſe in the *Alphonſine* Work they were too inaccurately drawn. Having finiſhed his Tables, he wrote a Kind of perpetual Almanac, but chiefly for the Moon, agreeing to the Periods of *Meton* and *Callippus*; likewiſe an Almanac for all the Planets, or, as *Regiomontanus* afterwards called it, an *Ephemeris*, for many Years. But obſerving there were other Planets in the Heavens at a great Diſtance from the Places where they were deſcribed to be in the Tables, particularly the Sun and Moon (whoſe Eclipſes were obſerved by all, and yet frequently not happening according to the Times foretold) he applied himſelf to conſtruct new Tables, particularly adapted to Eclipſes; which were famous afterwards, as none ever equalled them for Exactneſs. To the ſame Time may be referred his finiſhing that famous Work, entitled, *A new Theory of the Planets*, which *Regiomontanus*, after his Death, publiſhed the firſt of all his Works.

HENRY CORNELIUS AGRIPPA.

HENRY CORNELIUS AGRIPPA was born at *Cologne*, in *Germany*, on the 17th Day of *September*, in the Year 1486. He was a Deſcendant of that truly noble and antient Family, called the *Nettesheims*; and being very ambitious of treading in the Footſteps of his renowned Anceſtors (who had

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for many Years poſſeſſed ſome of the moſt honourable and important Poſts that the ſeveral Princes of the Houſe of *Auſtria* could confer upon them;) he entered himſelf, even during his Minority, into the Service of the Emperor *Maximilian*, who ſoon took Notice of him; for, as from his tender Years he had applied himſelf remarkably cloſe to the Study of the Languages, and had made himſelf, before his Arrival at ten Years of Age, a perfect Maſter of *Penmanſhip*, in all the various *Branches* of it, then principally practiſed in his native Country, he was ſoon advanced to a very conſiderable and advantageous *Clerkſhip* under the Government; but having ſtill more extenſive Views, and a Taſte for the Sword, he voluntarily laid down that ſedentary Life, in order to ſerve his Country in the Army; and for ſeven Years ſucceſſively, he acted as a Volunteer amongſt the Imperial Forces that were then employed in *Italy*; where, in divers Engagements, he ſo far diſtinguiſhed himſelf by his Intrepidity and good Conduct, that, as a Compenſation in ſome Meaſure for his extraordinary Merit, he was highly honoured, and diſtinguiſhed by the Title of *Knight of the military Order*. However, notwithſtanding this Preferment, he was as fond of ſhining in the literary World, as in the Field; and for that Reaſon, took up his Degrees in the Univerſity, and aſſumed the public Character, not only of a *Doctor* of *Laws*, but that of *Phyſic* likewiſe; in both which he was an able and experienced Practitioner.

It is allowed by all who had the Honour and Pleaſure of being perſonally acquainted with him, that he was a Gentleman of an incomparable Genius, and profound Penetration; that he was perfect Maſter of Eight ſeveral Languages, and well verſed in the Knowledge of moſt of the Arts and Sciences; inſomuch that, *Paulus Jovius* calls him a *portentous Wit*; and *Ludovicus Vives* ſtiles him the *Miracle* of the Age he lived in, and aſſures us, that of thoſe Few that were learned in that dark Age, he by far excelled them all. He was, in ſhort, ſuch an Adept in the Secrets of Nature and Art, that the illiterate Vulgar looked on him as a dangerous Perſon, and as one that had ſome illicit Communications with the Devil.

It muſt be acknowledged, however, that, though he was the Admiration of *Trithemius*, *Eraſmus*, and *Melancton*, and ſome others, who, in that Age, were ſhining Lights, and ſincere Lo-

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vers of Learning, yet, through his over-curious Enquiries, and the too great Liberties which he took of diſcloſing his Sentiments; particularly his interfering too far in Points relating to the Church, he expoſed himſelf to the high Diſpleaſure of the Clergy.

By ſeveral of his Letters it appears, that he reſided for ſome Time in *France* before the Year 1507; that he travelled into *Spain*, in the Year 1508, and that he read public Lectures at *Dola*, in the Year 1509; where, though ſome of the *Monks* looked upon many of his Tenets as heterodox and dangerous; yet he was ſo far admired by others, even by thoſe of the higheſt Rank and Quality, that they honoured him with their Attendance.

And in order to ingratiate himſelf with the Lady *Margaretta* of *Auſtria*, who was then *Governante* of the *Netherlands*, he ſignally diſtinguiſhed himſelf as an *Advocate* for the *Fair Sex*; and publiſhed a Treatiſe accordingly, wherein he endeavoured to demonſtrate, that, in Point of Excellency, the *Gentlemen* were by far inferior to the *Ladies*. In which the Sentiments he expreſſed were correſpondent with his Conduct; for he was twice married, had many Children by each of his Wives, and was laviſh in their Praiſes at their Deceaſe.

From *Dola*, in the Year 1510, he travelled to *England*, where he publiſhed his *Commentaries* on the *Epiſtles* of St. *Paul*.

Some Time after, he went back again to *Cologne*, where for ſeveral Months, he read Lectures of Divinity in Public, and then returned to the Emperor's Army in *Italy*; where he tarried till the Cardinal *de St. Croix* invited him to *Piſa*, where he would undoubtedly have ſhone amongſt the Doctors of the Council, had that Aſſembly continued their Seſſions. After that, he read ſeveral Divinity Lectures publicly both at *Pavia* and *Turin*.

His Lectures at the former were in 1515; and beſides thoſe of Divinity, he read one as an Apology for, or rather an Encomium on *Mercurius Triſmegiſtus*, otherwiſe called *Hermes*, a Philoſopher of great Reputation, who was generally allowed to be the firſt Naturaliſt that ever applied himſelf to the Study of the *Philoſopher's Stone*.

By his great Merit he had a Poſt, of conſiderable Profit and Reputation, conferred on him at *Metz*; but for eſpouſing the Cauſe of a young Country Laſs, who was charged with Witchcraft, he

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was obliged, not only to reſign his Place, but to abandon the City.

In the Year 1520, he repaired to *Cologne*, the Place of his Nativity, as before obſerved; but in the Year enſuing, he went to *Geneva*, and from thence to *Fribourg*, where he acted publicly as a Phyſician; and in 1524, he went to *Lyons*, and there made himſelf ſo conſpicuous, as to be appointed Phyſician in Ordinary to the Dutcheſs of *Savoy*, Mother to *Francis* I. King of *France*; but he is ſaid to be diſmiſſed from that honourable Service, thro' his Non-compliance with his Miſtreſs's Orders to find out, by the unerring Rules of *Aſtrology*, the true State of the Nation; and thro' an honeſt Freedom which he took in aſſuring her, that her Curioſity was vain and fruitleſs; and adviſing her, at the ſame Time, to apply her Mind to Matters of more real Importance.

Agrippa, being thereupon immediately diſcarded, indulged for ſome Time his Reſentment, and wrote ſeveral ſevere Invectives againſt her, as well as thoſe who were the principal Inſtruments of his Diſgrace; but, upon more mature Deliberation, he determined to retire to the *Netherlands*, and having procured a Paſſport for that Purpoſe, he arrived at *Antwerp* in *July* 1528, where he ſoon became eminent; and in 1529, was invited, at one and the ſame Time, to the Service of King *Henry* of *England*, of the Emperor *Charles* V. and to that of the Dutcheſs of *Auſtria*, in Compliment to whom he compoſed his *Vindication* of the *Fair Sex*, as before-mentioned.

He accepted the latter, and was conſtituted, thro' her Means, Hiſtoriographer to his Imperial Majeſty.

He publiſhed, by Way of Introduction, the Hiſtory of the *Coronation* of *Charles* V. and ſoon after, he was appointed to draw up, and pronounce in Public a *Dirge*, or *Funeral Eulogium*, on his Patroneſs the *Governante*, then lately deceaſed, whoſe *Death* proved, in a great Meaſure, (if we may be indulged the Expreſſion) the *Life* of our *Agrippa*; for his Enemies had endeavoured greatly, to leſſen his Reputation with the Emperor.

Being greatly chagrined, thro' the ill Treatment that he had met with at Court; he ſoon after publiſhed his Treatiſe on the Vanity and Imperfection of all the Arts and Sciences in general; which was penned with remarkable Keenneſs; wherein he en-

deavoured to demonſtrate, that they rather tended to the Corruption of Mens Manners, than to their Reformation; and it is highly probable, that the ſatyrical Reflections that are plentifully interſperſed throughout that Work gave great Diſguſt to his Adverſaries, and were the principal Means of its not meeting with that Succeſs, which it really deſerved.

Tho' the preceding Diſſertation gave his Enemies great Diſguſt; yet another, which he publiſhed ſoon after at *Antwerp*, entituled, *The Occult Philoſopher*; *or*, *a new Diſplay of the Secrets of Magic*, proved ſtill more offenſive than the former, and provoked them beyond all Meaſure. Cardinal *Campegio*, it is true, the Pope's Legate, and the Cardinal *de la Marc*, then Biſhop of *Liege*, were his ſincere Friends, and uſed their utmoſt Endeavours to ſilence his outrageous Opponents; but their Intereſt proved of very little real Service; for with all their good Offices, neither of them could recover for him One ſingle Penny of his Penſion, as Hiſtoriographer in Ordinary to *Francis* I. then King of *France*; or as domeſtic Phyſician to the illuſtrious Lady *Margaretta*, his Majeſty's Mother, then *Governante* of the *Netherlands*; neither were they able, in ſhort, to prevent his Impriſonment at *Bruſſels*, in the Year 1531. All their Services amounted to no more than this; namely, the Accompliſhment of his Diſcharge ſoon afterwards.

In 1532, indeed, he paid a Viſit to the Archbiſhop of *Cologne*, to whom he dedicated his laſt mentioned *Occult*, *Magical Treatiſe*, and received from his Grace a complimental Letter on the Occaſion, with his free Permiſſion to publiſh it under the Shelter of his Patronage and Protection. The Dread of his Creditors, who were at that Time too numerous, and too highly exaſperated at his Conduct, obliged him to take up his Reſidence at *Cologne* ſomewhat longer than he intended: However, he very openly and warmly oppoſed the literary Cenſors of the Place, who uſed their utmoſt Endeavours to ſuppreſs the Publication of a *New Edition* of the laſt-mentioned Philoſophical Treatiſe, which was then in the Preſs, and had been carefully reviſed; with very conſiderable Additions and Amendments. This *New Edition*, however, notwithſtanding all the powerful Oppoſition it met with, made its public Appearance, in the Year 1533.

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After he had conquered this arduous Undertaking, he withdrew to *Bonn*, where he reſided till the Year 1535.

Fond of roving about, he there determined to reviſit *Lyons*; and went accordingly; but, before he was well ſettled, he was taken into Cuſtody by a *French* Meſſenger of State, for having wrote a ſevere Satyre on his late Patroneſs, the Mother of King *Francis* I. who had diſcarded him, as her Phyſician in Ordinary, without the leaſt Fee or Reward. Thro' the Intereſt of ſome of his Friends at Court, however, he was ſoon reſtored to his Liberty; whereupon, he immediately retired to *Grenoble*, and departed this Life there before the Expiration of the Year 1535.

Some ſay, he died in one of their public Hoſpitals; ſome again ſay, at the Houſe of the Receiver-General of the Province of *Dauphiny*; but others inſiſt, that he breathed his laſt, at an Abbot's Apartment, and was decently interred in the *Jacobine* Convent.

But be that as it will, it is manifeſt, that he was no richer in his latter Days, than he had ever been before. For, *Don Quixot* like, he was for ever wandering about, and hunting after new Adventures; had ever in his Eye ſome diſtant Proſpects of the laſt Importance; was always very unſucceſsful; and, in a Word, too often reduced to the very loweſt Ebb of Fortune, even to the Want of the common Neceſſaries of Life.

This is too often the Caſe, and the hard Lot of moſt of the Virtuoſi, and Men of real Merit, who, regardleſs of the Frowns of that capricious Miſtreſs, run indiſcreetly the Riſque of being utterly ruined and undone, in their eager Reſearches after new literary Acquiſitions: Acquiſitions, indeed, which are ineſtimable to thoſe who have a true Taſte for them; but ſeldom, very ſeldom, if ever, put it in their Power, to live independent, and to look down with an Eye of Contempt of ſuch worthleſs Mortals, who value themſelves, tho' without one Grain of Wiſdom, in Proportion to their Riches; and make Merit in Rags the daily Objects of their Ridicule.

But to return to our Memoirs. It is highly probable, that he lived and died in the Communion of the Church of *Rome*; notwithſtanding it is well known, that he was too partially fond of the Doctrines of *Luther*, and his Diſciples. There never appeared, as we have heard, any Treatiſe of *Agrippa*'s in Public, wherein

wherein he countenances the arbitrary Divorce of *Henry* VIII. from his lawful Queen.

As to his Practice of the *Black Art*, as well as that of *Phyſic*, our Hiſtorians are not perfectly agreed. And much may be ſaid on both Sides of the Queſtion. But, in ſhort, if ever he did publicly profeſs himſelf to be a Magician; he demonſtrated, beyond all Contradiction, the Weakneſs of his Art; for never did any *Adept* in *Occult Philoſophy* miſcarry oftener than he did; nor was any unfortunate Virtuoſo ever reduced ſo often as he, to the Want of a Morſel of Bread for his Subſiſtence.

To conclude; the Financiers, or Receivers-General of the Revenues of King *Francis* I. and thoſe of *Charles* V. were fully convinced of his Innocence, in that Particular, and never looked upon him as a Conjuror; for had they entertained the leaſt Notion of him as ſuch, they would never have attempted to baffle him, in the ſhameful Manner that they always did, whenever he formally petitioned for the Arrears of his Penſion.

The Subſtance of this Life was principally extracted from an anonymous *French* Author, who, it is plain, was not fully convinced of the Nullity of the *Magic Art*, than which, a more groſs and blaſphemous Impoſture never infeſted Mankind.

The LIFE *of* COPERNICUS.

NICHOLAS COPERNICUS was a Native of *Thorn*, a City of Note in *Pruſſia Royal*, where he was born *January* 19, 1473. His Father's Name was *Nicholas*, and his Mother was Siſter to *Lucas Watzelrode*, afterwards Biſhop of *Warmia*. He learnt the *Latin* and *Greek* Languages partly at Home, and partly at the Univerſity of *Cracow*, where he ſtudied Philoſophy, and ſometimes Medicine; at length he obtained the Degree of Doctor. Mean while, as he was always extreamly fond of the Mathematics, he attended the Lectures, private and public, of *Albertus Brudzevius*, a Profeſſor of that Science in the ſame Univerſity. Of him he learnt the Uſe of the Aſtrolabe, by which he got a good Inſight into Aſtronomy, and at length grew ſo emulous of the illuſtrious Fame of *Regiomontanus*, that he reſolved

ved to follow him in all his Steps. Among his Fellow-Students, who were equally ambitious of acquiring Fame in the ſame Way, was *Jacobus Coblinius*, who afterwards publiſhed an Explanation of the Aſtrolabe; alſo *Vapovius*, *Nicolaus*, *Schadekius*, and *Martinus Ilkuſius*, with whom he frequently conferred on the Obſervations they made on Eclipſes. He, however, cultivated every Part of the Mathematics, but applied himſelf more eſpecially to Perſpective, by which Means he became ſo complete a Maſter in Painting, that he drew his own Picture, with a ſurpriſing Likeneſs, before a Glaſs. His View in learning to paint was, that, in his Travels, eſpecially thro' *Italy*, he might be enabled, not only to copy, but delineate with his own Pencil whatever was worthy his Obſervation.

Being returned to *Thorn*, after a ſhort Stay, he ſet out for *Italy*, being then in the 23d Year of his Age. He ſtopped firſt at *Bononia*, to give himſelf the Pleaſure of converſing with *Dominicus Maria*, a Man of excellent Erudition, and who for twelve Years had taught Aſtronomy with great Applauſe. From thence he proceeded to *Rome*, where, in a ſhort Time, his Fame was little inferior to that of *Regiomontanus*. Here, in a full Aſſembly of Doctors and great Men, he was inſtituted Profeſſor of the Mathematicks.

After ſome Years ſpent at *Rome*, he returned to his own Country, where, on account of his high Attainments in Learning, and the Gentleneſs of his Manners, he was affectionately received by his Uncle, *Lucas Watzelrode*, Biſhop of *Warmia*; who, in order to give him the more Leiſure to purſue his mathematical Studies, ſettled him in the College of Canons at *Warmia*, appertaining to his Cathedral Church. However, he was not ſuffered at firſt to enjoy his Canonate in Peace, as he often complains in his Letters to his Uncle, who remained at Court, that he might be at Hand to defend the public Cauſe againſt the Croſs-bearers and *Teutonic* Knights; which ſo provoked them, that they libelled him publickly in the Dyet of *Poſnania*. But at length, his own Merit, together with that of his Uncle, prevailed, and he obtained a peaceable Poſſeſſion. Upon which he inſtantly applied himſelf to three Things in particular. One was, diligently to attend on divine Offices: Another, to attain ſo much Skill in Medicine, as to enable him to relieve the Poor

whenever they ſhould want his Aſſiſtance; thirdly, to employ the Reſidue of his Time in Study. For which Purpoſe he always choſe Solitude; and, except the Affairs of the See, or the Chapter required it, never, but with Reluctance, engaged in Buſineſs. But as this was ſometimes unavoidable, ſuch was his Sagacity, and the Solidity of his Judgment, that his Opinion was generally acquieſced in. For Inſtance; when the Aſſembly of the States was held at *Grodno*, he was unanimouſly choſen by the College of Canons to repreſent them there. Among other Affairs tranſacted in that Dyet, one was concerning Money, the Value of which had been very much diminiſhed by the late Wars. A Committee of *Pruſſian* and *Polonian* Senators were appointed to examine the Matter. They accordingly deliberated frequently upon it, but could come to no Reſolution, and broke up without ſettling any Thing. Upon which, *Copernicus* drew up a Canon, or Rule, for computing all Sorts of Money then current through all the Provinces of the Kingdom, and for reducing them to a certain Standard; with which the Senate were ſo well ſatisfied, that they cauſed it to be inſerted among their public Acts.

But as he never ſought Occaſion to engage in Buſineſs, ſo he never declined it when fairly offered. But our principal Regard will be to that Part of his Life, which he devoted to Contemplation and Study; and as he affected nothing ſo much as the Knowledge of the Heavens and Celeſtial Bodies, for which his Name is ſo highly celebrated, we ſhall relate in what Order he began, and by what Steps he proceeded to thoſe Attainments he acquired in this Science.

In the firſt Place, he obſerved, that Aſtronomers, while they would maintain an equal Motion in the celeſtial Circumvolutions, took for it, or meaſured from, not a proper, but a wrong Center; namely, that of a Circle called the Equant. Nor could they collect the principal Thing, that is, the Form of the World, and its fine Diſpoſition, from that Heap of Hypotheſes which they were forced to uſe. Wherefore he reſolved to peruſe as many of the Books of Philoſophers and Aſtronomers as he could lay Hands on, examine their ſeveral Syſtems, and ſearch out what was probable in them, that, from the Whole, he might form a more exquiſite Harmony of the celeſtial Motions, and

and Symmetry of the Parts of the World, than that which had been univerſally admitted.

As he knew that the *Pythagoreans* had removed the Earth from the Center, and had placed therein the Sun, the moſt noble of all Bodies, he imagined he perceived ſomewhat of a beautiful Order, if he might only be allowed to make a Change, that is, to place the Sun in the Center, and make the Earth move round the Sun. For *Nicetas*, *Echphantus*, *Heraclides*, and others, aimed well, who, though they detained the Earth in the Center, yet gave it a Motion, by which it turned on its own Axis, like a Sphere in a Wheel, and daily perfecting a Circuit from the Weſt to the Eaſt, made the Viciſſitude of Day and Night, and aſſuming the Office of the *Primum Mobile*, diſcharged the Sphere of the fixed Stars, and all the Planets from their rapid Motion; ſo that the Earth being turned to the Eaſt, all the Stars muſt neceſſarily appear turned to the Weſt, which nevertheleſs would appear very diſproportionate. Wherefore *Philolaus* did much better, when, removing the Earth from the Center, he gave it not only a diurnal Motion round its own Axis, but an annual Circuit round the Sun; by which Means it happens, that in traverſing the Zodiac, under whatever Sign it is, the Sun appears in oppoſition; ſo that the Earth itſelf, *Mercury*, *Venus*, and the reſt of the Planets, muſt acknowledge the Sun as their Center. But it ſeemed abſurd to pluck the Earth from the Center, and to give it ſuch Kind of Motions. *Copernicus*, therefore, having variouſly canvaſſed the Matter, and aſcribed a triple Motion to the Earth, he thus writes: "By "a cloſe and long Obſervation, I have at length found, that "if the Motions of the reſt of the Planets be compared with "the Circulation of the Earth, and be computed for the "Revolution of each, not only their Phenomena will follow, "but it will ſo connect the Orders and Magnitudes of the "Planets, and all the Orbs, and even Heaven itſelf, that No-"thing in any Part of it could be tranſpoſed, without the Con-"fuſion of the Reſt of the Parts, and of the whole Uni-"verſe."

This was about the Year 1507. But he did not think it enough to eſtabliſh a general Ratio of Hypotheſis only, and according to it to ſolve Phenomena in general; but he wanted likewiſe

likewiſe to conclude upon ſome ſpecial Hypotheſes, ſo as to define the Periods of all Motions, that from thence he might be able to erect Tables for the Heavens, preferable to the *Ptolemaic* and *Alphonſine*; for which Purpoſe, he judged it neceſſary to make Obſervations, and by comparing them with thoſe more antient, he might attain to a greater Preciſion. To this End he fabricated a Quadrant, to be erected and applied to the Meridian Line above the Plane of the Horizon, that by the Help of a Shadow, from a cylindrical Gnomon fixed at the Center, might be obſerved the greateſt and leaſt Meridian Altitude of the Sun, in the Summer and Winter Solſtice; likewiſe for taking the Diſtance of the Tropics, and the Altitude of either; alſo the Altitude of the Equator in the Middle; likewiſe the Altitude of the Pole might thereupon be known, by eſtimating the Altitude of the Equator. He likewiſe conſtructed a parallactical Inſtrument of Fir Wood, whoſe Limb was divided into 1414 ſmall Parts, or Portions, marked with Ink, to the End it might ſubtend the right Angle of a Quadrant, whoſe Legs were four Cubits long, conſiſting of 1000 of the ſame Parts. The Uſe of this was, for obſerving the Altitudes of any of the Stars, particularly of the Sun, not only when he is about the Tropics, but alſo about the Æquinoctial; but eſpecially in the Spring, to obſerve his Entrance into *Aries*. Likewiſe of the Moon, but chiefly when ſhe is in the northern Limit, and that Limit in *Cancer*, to find out her greateſt Latitude; alſo of *Regulus*, or of any other remarkable fixed Star, in order to obtain its Diſtance from the Æquinoctial Point.

Being by theſe Inſtruments furniſhed with many curious Obſervations, he began to digeſt them in Order, and undertook a Work, which he finiſhed, and divided into ſix Books, entituled, *The Revolutions of the Celeſtial Orbs*, which, in a geometrical Method, included the whole Science of Aſtronomy.

The firſt Book is divided into two Parts; in the latter, he handles the Doctrine of Sines, or Chords, which he judged neceſſary in ſolving Triangles, both plain and ſpherical: But in the former he has exhibited a general Idea, or Deſcription of the World, agreeable to his own Hypotheſis, in which Motion is attributed to the Earth. In the firſt Place, he teaches that

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the World is of a ſpherical Form, and aſſigns this Reaſon for it; becauſe the Sphere is the moſt perfect of all Figures, and contains a greater Quantity of Space within it, than any other. He obſerves farther likewiſe, that fluid Bodies naturally put on the Figure of a Sphere; that the Sun, the Moon, the Planets, and all the heavenly Bodies, are of that Figure, and therefore, he concludes at once, that the Figure of the viſible World muſt be ſuch likewiſe; though he is in all this plainly miſtaken; becauſe, properly ſpeaking, the World has no Figure at all, as it is not circumſcribed, or bounded by any Limits; and what we call the Firmament is a mere *Ens Rationis*, or Idea of the Mind, and its ſpherical Form is eaſily accounted for on the Principles of Optics; as we ſhall hereafter ſee. In this Book, our Author very much inſiſts on the ſpherical Figure of the Earth, and its circular Motion about the Sun. He conſiders the Reaſons alledged by the Antients for placing the Earth immoveably in the Center of the Syſtem, and very learnedly and rationally confutes them; and having ſettled this Point, and plainly proved the Sun to poſſeſs the Center of the Syſtem, he then treats of the celeſtial Orbits, as thoſe which the Planets deſcribe about the Sun, and illuſtrates the ſame by a Diagram, which ſince this Time has been uſually called the *Copernican Syſtem* of the World. He then treats of the twofold Motion of the Earth, *viz.* the diurnal Motion about its Axis, and its annual Motion about the Sun; and having diſpatched the Doctrine of plain and ſpherical *Trigonometry*, he proceeds to

The SECOND BOOK. In this he conſiders the Doctrine of the Sphere, with a Deſcription of the various Circles, great and ſmall, that compoſe the ſame, with their various Interſections and Inclinations, one with another, in regard to the different Inhabitants of the Globe. He conſiders the Doctrine of right and oblique Aſcenſions, the Riſing and Setting of the Sun and Stars, the Parts of Time, and particularly of Days and Nights; after this, he gives an Account of the Inſtruments made uſe of for obſerving and correcting the Places of the Stars. He then proceeds to give us a new Catalogue of the Stars, found in the ſeveral Signs and Conſtellations, with the Latitude, Longitude, and Magnitude of each particularly ſpecified.

In the THIRD BOOK, he treats of the *Equinoxes*, and *Solſtices*, and gives you a Hiſtory of Obſervations, proving the Inequality and Preceſſion of the ſame. He then treats of the Variation of the Obliquity of the *Ecliptic*, and ſhews, that it has been continually changing, and how it proceeds from the Libration of the Earth's Axis. The Quantity of this Motion is then computed and digeſted, in *Tables*. The Times of the *Equinoxes* are more particularly enquired into, and inveſtigated, the Magnitude of the Solar Year, and the Difference obſerved in the ſame; and *Tables* of the equal and mean Motion of the Earth are computed for Years, Days, and ſexageſimal Parts. He then accounts for the apparent Inequality of the Sun's Motion, with all the Variety obſerved in the ſame. He then treats of the various *Epochas*, or Times, from whence the antient Aſtronomers began to compute the mean Motion of the Sun; and having largely conſidered the Nature and Anomaly of the Sun's Motion, he gives us a *Table* of the *Proſthaphæreſis* or Equation; ſo that, the Difference between the true and mean *Anomaly* is known for every Part of the Orbit, and, conſequently, when one was given, the other might be from thence known. After this, he diſcourſes on the *Nychthemeron*, or the Nature and Difference of the natural Day of 24 Hours, which concludes this Book.

In the FOURTH BOOK, he treats of the Lunar Motions, and conſiders the various Hypotheſis of the Antients concerning them: He corrects the Errors of their groſſer Obſervations, and gives us a more particular and correct Account of thoſe Motions, together with *new Tables* of the ſame. After this, he very particularly enquires into the various Differences and Inequalities of the Lunar Motion. He further ſhews how they are to be accounted for, according to the Hypotheſis of *Cycles* and *Epicycles*, which in thoſe Times they were obliged to make uſe of, for Want of knowing the true Theory of Gravity, of which the firſt Hints, however, were found in the Books of this excellent Writer. He expounds the Doctrine of the Lunar *Proſthaphæreſis*, and gives us *Tables* of the ſame; by which the apparent Motion, or Place of the Moon, is found from the mean, or equal Motion given. He conſiders then the Motion of the Moon, in Latitude, of the Quantity of the Angle which

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the Moon's Orbit makes with the *Ecliptic*. After this, we have a particular Account of the Conſtruction of his *Parallatic* Inſtrument, by which the *Horizontal Parallax* and Diſtance of the Moon from the Earth, were much more accurately determined, than had been done before. From hence too, he was able to meaſure the Diameter of the Moon, and of the Shadow of the Earth at the Moon's Orb: Alſo, he was hereby enabled to treat, in ſome Meaſure, of the Diſtance of the Sun, as alſo, of the comparative Magnitude of the Sun, the Moon, and the Earth; which, tho' very inaccurate, were ſtill much nearer the Truth than any thing that had before this Time been advanced upon the Subject. Having inſiſted largely on theſe Subjects, he proceeds to his Obſervations on the apparent Diameters of the Sun and Moon, with the various Changes they underwent at different Times. After this, he conſiders the different Dimenſions of the Shadow of the Earth, according to the *Apogee*, or *Perigee*, of the Luminaries, and illuſtrates the ſame by proper *Diagrams*. Then he inſiſts largely on the Doctrine of *Parallaxes* of the Sun and Moon, both in Latitude and Longitude, and gives us *Tables* of the ſame. He then treats of the Conjunctions and Oppoſitions of the Sun and Moon, with regard to their mean and true Times and Places. Then the Doctrine of *Eclipſes*, both of the Sun and Moon, is learnedly explained, in regard to the Manner in which they are produced, the Times in which they happen, the Quantity of Duration, and the Prognoſtics of the ſame; which cloſes the Fourth Book.

The FIFTH BOOK conſiders the planetary Motions, and their various Affections. He gives us the Number, their Diſtances from the Sun, and the Times of their Revolution, together with *Tables* of their mean Motions for Years, Days, Hours, and Minutes. After this, the particular Theories of each Planet are taught and illuſtrated by proper Figures. He then gives an Account of the Diſtance of thoſe Planets from the Earth, the Apſides and Excentricities of their Orbits, the mean Motions and Anomalies, with the Times or Epochas from whence they have been computed for each Planet, with the Quantity of the ſame, in proper Tables of the *Proſthaphæreſis*, peculiar to the Orbit of each; and having accounted for

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the various Appearances and Inequalities of their Motions, in regard to their direct and retrograde Motions and Stations, he puts an End to the Fifth Book.

The SIXTH BOOK is wholly ſpent in enquiring into, and aſcertaining the Latitude of the planetary Orbits, or the Inclination which they make with the Ecliptic, their Excentricities, the Places of their Nodes, *&c.* and then the Whole is concluded with Tables of the Latitude of each Planet.

His Book was printed at *Norimberg*, in the Year 1543, and till then, the World had never ſeen any Thing that looked like a true Syſtem of Aſtronomy. For what *Ptolemy* had done in his *Almageſtum Magnum*, was entirely upon a falſe Hypotheſis, as we have already obſerved in the Life of that celebrated Author; and what had been performed by *Regiomontanus* and *Purbachius*, could be deemed no other than rude Sketches, and Outlines of the Science; and though their Writings were in great Repute, we do not find *Copernicus* made the leaſt Uſe of them, ſince we find no Mention of their Names, or of their Writings in the Introduction to the preſent Work, tho' *Copernicus* wrote many Years after the *Ephemerides* of *Regiomontanus*, and the Theories of *Purbachius* were publiſhed.

It appears from the Writings of *Gaſſendus*, in the Life of this Author, that he finiſhed this Work about the Year 1530; what he did afterwards, was only by Way of Correction, or Amendment of what he had before written.

About the Year 1516, he applied himſelf to find out and reduce to Numbers, the various Motion of the Moon, in compliance with the *Lateran* Council, in which the Reformation of the Calendar was again agitated, which had been before debated in the Councils of *Conſtance* and *Baſil*; and on which Account *Sixtus* IV. afterwards ſent for *Regiomontanus* to *Rome*, as before mentioned in his Life, p. 155. Thus it was: When the *Lateran* Fathers had appointed a Committee for this Purpoſe, they made *Paul* of *Middleburgh*, Biſhop of *Sempronia*, their Preſident; he, by Letters, conſults *Copernicus*, and earneſtly entreats him to aſſiſt them with his Skill and Knowledge in this arduous Affair; *Scultetus*, his Friend and Colleague, joined in this Requeſt. But *Copernicus* would offer nothing precipitately, but promiſed all poſſible Diligence in inveſtigating a Matter of

of ſuch Moment. The Buſineſs therefore remained unfiniſhed, and *Copernicus* applied himſelf ſo cloſely to the taking and defining the Motions of the Sun and Moon, that in the Dedication of his Work to the Pontiff, he foretels, that his Labours would not be unuſeful to the Eccleſiaſtical State. And it is certain, that the Mathematicians, who were afterwards appointed by *Gregory* XIII. purſuant to the Decree of the Council of *Trent*, for the Emendation of the Calendar, made uſe of his Works; as is evident from that Chapter, to which *Chriſtopher Clavius*, in his Explanation of the Calendar, gives the Title, *Of the Period of the Anomaly of the Equinoxes, and Inequality of the Years, according to the Doctrine of* Nicholaus Copernicus. And altho' they thought, that the *Alphonſine* Form of the Year ought to be retained; yet they found that it was, as it were, the Middle between the Greateſt and the Leaſt, as *Copernicus* had obſerved it at divers Times to agree.

To his Honour it is remembered, that *George Joachim Rheticus*, an ingenious and learned young Man, and Teacher of the Mathematics at *Wittemberg*, ſtruck with the Fame of *Copernicus* and his Hypotheſis, quitted his Profeſſion, went to him into *Pruſſia*, and profeſſed himſelf his Diſciple. This was in the Year 1539, with the Privacy of the famous *Schonerus*, Profeſſor of the Mathematics, at *Norimberg*, whom he promiſed to inform by Letters, whether the Report he had heard was anſwerable to his Expectations. In about two Months, he writes to him in the following Manner: "Believe "me, moſt learned *Schonerus*, that this Man, my Inſtructor, "in all Kinds of Learning, and in the Science of Aſtronomy, "is not inferior to *Regiomontanus*. I freely compare him to "*Ptolemy*; not that I think *Regiomontanus* leſs than *Ptolemy*, "but becauſe my Preceptor has a Felicity in common with "*Ptolemy*, that, by the Divine Aſſiſtance, he would finiſh the "Reformation of Aſtronomy; whereas *Regiomontanus*, O cruel "Fate! died before he had erected his Pillars."

It is further ſaid, to the Praiſe of *Copernicus*, that it was not from a Love of Novelty, or to make a Diſplay of his Wit, but from the Exigency of Things, that he travelled not in the ſame Road with the Antients, and particularly *Ptolemy*, whom

he highly honoured, calling him the moſt eminent of Mathematicians, and *Hipparchus*, a Man of wonderful Sagacity.

When *Rheticus* returned out of *Pruſſia*, he brought with him a Tract of *Copernicus*, concerning *the Sides and Angles of Triangles, Planes, and Spheres*, which he ordered to be printed, at *Norimberg*. This ſmall Piece was afterwards inſerted in his Work of *Revolutions*, at the End of the Firſt Book, after the Canon of Subtenſes, and is comprehended in two Chapters; the Firſt of which is contained in ſeven Theorems, the Other in fifteen; to this Tract was added a Canon of Half Subtenſes, or Sines, diſtinguiſhed from that in the Work of the *Revolutions*; here it is ſuppoſed only at a Radius of 100,000 Parts, and proceeds by * *ten Minutes* only; but that ſuppoſes it a Radius of 10,000,000 Parts, and proceeds by ſingle Minutes.

We ſhall now ſay ſomething of the Publication of the Work itſelf, which he could hardly be prevailed upon by the earneſt Entreaties of his Friends and learned Men, to permit, even in the laſt Days of his Life. Not that he envied Society any Benefit it might receive from his Labours; but as, on the one Hand, he never entertained any high Conceit of himſelf; ſo, on the other, he foreſaw that many would be offended with the Novelty of the Thing; and therefore held it better to impart it only to his Friends, and the Lovers of Truth and Right, and, like the *Pythagoreans*, deliver it, as it were, by Hand, rather than by making it public, to raiſe the Clamour of the Multitude. It is certain, that when he was convinced, that the Church would be benefited by a regular Adjuſtment of the celeſtial Motions, he did not refuſe to conſtruct Tables, which might perform the Thing deſired, and which afterwards came into the Hands of every Body.

Having therefore given his Aſſent, and put the Work in Order, he addreſſed it, in a Preface, to the Sovereign Pontiff; in which, he declared the Reaſons which made him ſo reluctant to the Requeſt of his Friends, and by what Arguments he was induced to attribute Motion to the Earth: Adding, that he did not doubt, but the ingenious and learned Mathematicians would

* *Dena Minuta.*

would join in his Opinion, if, as this Philoſophy firſt of all requires, they would not curſorily, but intenſely apply themſelves to know and conſider the Arguments he had brought in this Work, for the Demonſtration of theſe Things. He concludes in theſe Terms: "But that both the Learned and Unlearned "may ſee, that I do not avoid the Judgment of any Man, I "have choſe to dedicate theſe Lucubrations to your Holineſs, "rather than to any other Perſon; becauſe, even in the re-"moteſt Corner of the Earth, in which I live, you are in the "higheſt Eſteem, as well for the Dignity of your Order, and "univerſal Learning, as for your Love of the Mathematics; "that you can, by your Authority and Judgment, eaſily repreſs "the Stings of Calumny, tho', according to the Proverb, "there is no Remedy againſt the Backbiting of a Sycophant. "If there be ſome, who, tho' ignorant of all Mathematics, "take upon them to judge of theſe, and dare to reprove this "Inſtitute, becauſe of ſome Place of Scripture, which they "have miſerably warped to their Purpoſe, I regard them not, "and even deſpiſe their raſh Judgment. For it is not unknown, "that *Lactantius*, otherwiſe a celebrated Writer, but an indif-"ferent Mathematician, ſpeaks very fooliſhly of the Form of "the Earth, when he laughs at thoſe who hold it has the "Form of a Globe. Therefore it ought not to ſeem ſtrange "to the Studious, if, in our Turn, we laugh at ſuch. Ma-"thematics are written for Mathematicians, to whom our La-"bours, if I am not miſtaken, will ſeem of ſome Advantage "to the Eccleſiaſtical Republic, the Supremacy of which your "Sanctity now holds. For not long ſince, under *Leo* X, when "in the *Lateran* Council, the Queſtion about the Emendation "of the Eccleſiaſtical Calendar was debated, but not deter-"mined, it remained ſo for this only Reaſon, becauſe the "Magnitudes of the Years and Months, and the Motions of "the Sun and Moon, were not accurately meaſured. What I "have done in this Matter, I ſubmit principally to your Ho-"lineſs, and then to the Judgment of all learned Mathemati-"cians. And that I may not ſeem to promiſe your Holineſs "more concerning the Utility of this Work, than I am able "to perform, I paſs now to the Inſtitute itſelf."

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He then put the Work into the Hands of the learned *Gyſius*, and left it entirely to his Diſcretion. *Gyſius* committed it to *Rheticus*, whoſe Induſtry, and Affection to the Author he knew. He thinking the Edition could not be better executed than at *Norimberg*, where, tho' he could not be preſent himſelf, he had ſome Friends eminent for their Learning, particularly *Schonerus*, *Oſiander*, and others, who would willingly undertake the Charge of it, he therefore ſent it thither. *Oſiander* readily undertook the Office, and not only inſpected the Preſs, but wrote a ſhort Preface, in relation to the Hypotheſes of the Work. For he was of Opinion, that altho' *Copernicus* had aſcribed Motion to the Earth, not merely as an Hypotheſis, but as an undoubted Certainty; yet he thought ſomething ought to be ſaid by Way of Excuſe, to ſoften the Matter to thoſe who might be offended at it, and that he did not aſſert ſuch a Motion for an eſtabliſhed Opinion, but an Hypotheſis only. "It "is, ſays he, the Buſineſs of an Aſtronomer, by diligent and "acute Obſervation, to collect the Hiſtory of the celeſtial Mo- "tions, and when he cannot by his Reaſon inveſtigate the true "Cauſes or Hypotheſes of them, to invent and contrive ſuch, "as, being ſuppoſed, thoſe Motions might be rightly calcula- "ted, from the Principles of Geometry, as well for future, as "Time paſt. The Artificer has excellently performed both "theſe."

Mean while, the Edition being finiſhed, *Rheticus* ſent him a Copy of it; but, alas! The Man, who had enjoyed a perfect State of Health all his Life, was fallen into a Bloody-flux, which was ſoon followed by a Palſey in his Right-ſide; preſently after, his Memory failed him, and the Vigour of his Mind was much weakened. He had, nevertheleſs, Strength ſufficient to prepare himſelf for his great Change. It happened that the ſame Day, and a few Hours before he breathed his laſt, he received a Copy of his Work; but he had now other Cares upon his Mind, and compoſedly reſigned his Soul to God, the 23d of *May*, 1543, when he was ſeventy Years, three Months, and five Days old. Such was the Life, and ſuch the Death of *Copernicus*. As to his Perſon we can give no better Deſcription of it, than what is contained in the following Verſes, wrote by *Nicodemus Friſchlinus* on his Picture.

Such

Such did Copernicus *in Life appear;*
Such was his noble Form and graceful Air;
A ruddy Tinge his healthy Viſage dyes;
Comely his Hair, and beautiful his Eyes;
In ev'ry Limb a juſt Proportion ſee!
A Form completely made, and ſuch was He!
Like him, immerg'd in ſcrutinizing Thought;
Earneſt, like him, when he his Syſtem taught;
The vaſt Circumference of Heaven ſcann'd,
And ſhew'd its glorious Orbs in Order ſtand;
The ſluggiſh Earth, as in an Orbit, whirl'd,
And Phœbus *fix'd the Center of the World.*

I know not whether this Picture was like that which he drew with his own Hand, and was given to *Tycho Brahe*, who placed it in his *Muſeum* at *Uraniburgh*, and under-wrote the following Lines.

Phœbus *no more his bounding Courſers drives*
Sublime in Air; the Taſk to Earth he gives.
Amidſt the World enthron'd he ſits in State,
And bids the Heav'ns obey the Laws of Fate;
Yet thro' all Nature is his Aid the ſame,
And changing Seaſons ſtill his Guidance claim.
Erratic Stars have now their Courſes known,
By this rare Syſtem of the ſtation'd Sun;
They ſtand, go retrograde, are ſwift, or ſlow,
Juſt as the Earth directs them what to do.
The great Copernicus, (*the Man behold!*)
This heavy Orb in rapid Motion roll'd.
But why, you'll ſay, was not his Wit pourtray'd?
But that is partly in the Heav'n diſplay'd,
Partly in Earth; for neither can confine
The boundleſs Searches of his daring Mind.
Again you'll ſay —— * *But Half his Figure's ſhewn,*
A Man ſo worthy to be wholly known.

* This Picture was but a Half-length.

True; yet 'tis he who bore the Earth entire
Thro' Space immenſe around the Solar Fire;
The ſpacious Earth in vain would hold the Man,
Who meaſures Heaven with his ample Span.

The Life of *TYCHO BRAHE.*

TYCHO BRAHE, deſcended from a noble and illuſtrious Family, who were originally of *Sweden*, but afterward ſettled in *Denmark*, was born *December* 14, 1546, at *Knudſtorp*, in the County of *Schonen*, near *Helſimbourg*. His Father's Name was *Otho Brahe*, a brave, military Officer, and his Mother's Name was *Beata*, of the antient Family of the *Billes*. His Father dying when he was young, his Mother had the Care of his Education, who endeavoured in his early Years, to train him to Knowledge and Virtue; and his filial Obedience and remarkable Improvement recommended him to the Favour of his Uncle, *George Brahe*, who, having no Children, adopted him for his Son, took him Home, and placed him under the Care of ſkilful Tutors, 'till he was ſixteen Years of Age; he then put him to *Leipſick*, where, with the utmoſt Chearfulneſs, he entered into a Courſe of higher Literature; and, in a ſhort Time, made ſuch Progreſs therein, as gave manifeſt Indications of extraordinary Abilities. His natural Inclination was to the Study of the Heavens, to which he ſo aſſiduouſly applied himſelf, that notwithſtanding the Care of his Tutor, to keep him cloſe to the Study of the Law, he made uſe of every Method in his Power, for his Improvement in the Knowledge of all Aſtronomy; purchaſed whatever Books he could meet with on the Subject; read them with great Attention; procured Aſſiſtance in difficult Caſes from *Bartholomew Scultens*, his private Inſtructor, and having procured a ſmall, Celeſtial Globe, he took Opportunities, when his Tutor was in Bed, and when the Weather was ſerene, to examine the Conſtellations in the Heavens, to learn their Names from the Globe, and their Motions from Obſervation. And, as it was

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the Dignity of this Kind of Study to underſtand the Nature and Cauſes of Eclipſes, he looked upon it as a divine Study, and was animated by a laudable Ambition, to make himſelf acquainted with the Theory of the Planets, and other conſiderable Branches of this Science, during the three Years he reſided at *Leipſick*. But the Death of his Uncle, gave Occaſion to him to return Home in *May*, 1565, ſtaying no longer, after he heard of it, than was neceſſary to ſettle his Affairs. But here he was greatly diſguſted, to ſee the liberal Arts deſpiſed, and finding his own Relations and Friends uneaſy, that he applied himſelf to Aſtronomy, (which Study, they thought, was unſuitable to a Perſon of his Quality) he went to *Wirtemberg*, in *April*, 1566, where the Plague, breaking out, ſoon occaſioned his Removal to *Roſtock*, and in 1569, to *Augſburg*, where he was viſited by *Peter Ramus*, who was Profeſſor of Aſtronomy at *Paris*, and who greatly admired his uncommon Skill in this Science. At the End of the Year 1571, he returned to *Denmark*, where he had the Satisfaction of finding an agreeable Retirement at the Houſe of *Steno Bille*, his Mother's Brother, who was a great Lover of Learning, and one who had made no ſmall Progreſs in it. He gave his Nephew a convenient Place for making his Obſervations, and another for building a Laboratory for chymical Experiments, which had been his Study for ſome Time. It was in this Place, that he diſcovered, in 1573, a new Star, in the Conſtellation of *Caſſiopea*. But at this Time, his Marriage with a Country Girl of *Knudſtorp*, named *Chriſtiana*, produced ſuch a Quarrel between him and all his Family, that the King of *Denmark* was obliged to interpoſe to reconcile them.

In the Winter of the Year 1574, he read Lectures upon the Theory of Planets at *Copenhagen*. And, at the King's Command, he began his Travels into *Germany* in the Spring of the Year 1575, and proceeded as far as *Venice*, and reſolved to remove his Family, and ſettle at *Baſil*. But *Frederic* the IId, King of *Denmark*, being informed of his Deſign, and unwilling to loſe a Man, who was capable of doing ſo much Honour to his Country, promiſed to place him in ſuch a Situation, as

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* This Account is taken from *Gaſſendi*, *Paris* Edition, 1654.

to enable him to purſue his Studies with all the Tranquility which he could deſire, and beſtow upon him, for his Life, the Iſland of *Huen*, in the *Sound*, between the Iſle of *Seeland*, and the Province of *Schonen*, in *Sweden*, and that he would order an Obſervatory and Laboratory to be built there, and furniſh him with every Thing neceſſary for compleating his Deſigns; offered him a Penſion of 10,000 Crowns, *per Ann.* beſides other liberal Donations. *Tycho Brahe* readily embraced his Propoſal, and accordingly, the firſt Stone of this Obſervatory was laid, *Auguſt* 8, 1576. This Obſervatory, which had the Name of *Uranibourg* given it, with ſeveral other Buildings which belonged to it, and the Machines, which were neceſſary, coſt a prodigious Sum of Money. And tho' the King was liberal in furniſhing a neceſſary Apparatus; yet *Tycho Brahe* laid out of his own Eſtate, above an 100,000 Crowns, during the twenty Years which he continued there; for he ſpared nothing requiſite to carry on Aſtronomy to Perfection. He maintained generally in his Houſe ten or twelve young Men, who aſſiſted him in his Obſervations, and whom he inſtructed in Aſtronomy and the Mathematics. *James* VI. King of *Scotland*, (afterward raiſed to the Throne of *England)* coming to *Denmark*, in order to marry *Anne*, King *Frederic* the IId's Daughter, paid a Viſit to our Author, in his Retirement at *Uranibourg*, and made him ſeveral noble Preſents, and wrote a Copy of Verſes, in Honour of him with his own Hand, as follows.

Æthereis bis quinque globis, queis machina mundi
Vertitur, ut celſo eſt cruſtatus fonice olympus
Ignibus, & pictus fulgentibus undique lychnis:
Pellucent vitriis domibus, vaſtiſque planetæ
Orbibus, ut geminant curſus, vi & ſponte rotati,
Ut miti aut torvo adſpecta longe ante futura
Præmonſtrant, regniſque tonans quæ fata volutet:
His tellure cupis, quæ vis, quis motus, & ordo
Cernere: ſublimem deductumque æthera terræ
Tychonis pandunt operæ? lege, diſce, videbis
Mira; domi Mundum invenies, cœlumque libello.

Upon

Upon the Death of *Frederic*, in 1558, and the Succeſſion of *Chriſtian* the IVth, his Son, this much-beloved and envied Philoſopher began to feel the Effects of the Jealouſy which ſome Perſons had conceived againſt him. Some of the Nobles could not, without Regret, ſee him receive ſo many Favours, and that Foreigners of high Rank and Diſtinction ſo frequently viſited him: Beſides this, the Phyſicians were uneaſy, their Patients applying themſelves to him for Medicines, which he generouſly diſtributed to thoſe who had Occaſion for them, and that would aſk them of him; for by the Practice of Chemiſtry, he had diſcovered various Medicines, adapted to particular Diſorders. *Chriſtopher Valkendorf*, Chamberlain of the King's Houſehold, conceived a great Diſlike to him, and from the moſt trifling Circumſtances, endeavoured to ruin his Intereſt with the new Miniſters of the young King, and formed a Confederacy, with others, to ſupplant him. They pretended, that the Treaſury was exhauſted, and that, therefore, it was neceſſary to retrench a great Number of Penſions, which had been given for uſeleſs Purpoſes; and particularly, that of *Tycho Brahe:* That he had for a long while enjoyed it, and that it was now high Time it ſhould be diſpoſed of to Perſons, capable of doing greater Services to the Kingdom. Theſe Attempts, by Degrees, proved ſo effectual, that in the Year 1596, he was deprived of his Penſion, his Fee, and his Canonry; upon which, finding himſelf incapable of bearing the Expences of his Obſervatory, he reſolved to look out for ſome proper Retreat, in ſome other Country; in the mean while, he went to *Copenhagen*, whither he brought thoſe of his Inſtruments, which were the leaſt conſiderable, and continued his aſtronomical Obſervations, and chemical Experiments in that City, 'till *Valkendorf*, his inveterate Adverſary, obtained an Order from the King, for his diſcontinuing them. Upon this, he removed with his Family to *Roſtock*, and afterwards to *Holſtein*, in order to ſolicit *Henry Ranzou*, to uſe his Intereſt with the Elector of *Cologne*, to introduce him to the Court of the Emperor. *Brahe*, being ſenſible, at the ſame Time, that the Emperor was fond of Mechaniſm, and chemical Experiments, now publiſhed his Book, entitled, *Aſtronomia inſtaurata Mechanica*, adorned with Figures, and dedicated it to his Imperial

Majeſty; and having, by theſe Means, obtained Orders to come to his Majeſty, who was then in *Bohemia*, with a Promiſe, that nothing which he could deſire ſhould be wanting to him, he began his Journey in Autumn, 1598, with his Sons and Scholars, leaving his Wife and Daughters at *Ranzou*'s Caſtle, near *Hambourg*, and being arrived at the Emperor's Court at *Prague*, his Majeſty received him with the higheſt Marks of Reſpect, gave him a magnificent Houſe, till he could procure one for him more proper for aſtronomical Obſervations, and aſſigned him a Penſion of 3000 Crowns; and promiſed him, upon the firſt Opportunity, a Fee for him and his Deſcendants. *Brahe* then ſent his eldeſt Son to conduct his Family to him, who arrived agreeable to his Wiſhes; but ſuch is the Uncertainty of preſent Things, that he did not long enjoy this happy Situation; for upon the 24th of *October*, 1601, he died of a Retention of Urine, in the Fifty-fifth Year of his Age, leaving an affectionate Wife, two Sons, and four Daughters, and was interred in a very magnificent Manner, in the principal Church at *Prague*, where he had a noble Monument erected to him. His great Skill in Aſtronomy is univerſally known, and his Works afford us ample Proof of it. Speaking of them himſelf, he ſays, "Ever ſince he was 20 Years old, he was occupied either in acquiring the Knowledge of the celeſtial Bodies, or the Nature and Properties of Metals, Gems, Minerals, *&c.* by Study and Experiments; and that he had purſued his Studies, on worthy Motives, and communicated his Diſcoveries for general Uſefulneſs, appears from the inward Pleaſure he felt at the near Approaches to his laſt Moments, ſolacing himſelf principally from this Reflection, *That he had not lived in vain, and that he hoped his Labours would redound to the Glory of God.* He then enjoined his Son, and Son-in-law, to take Care, that none of his Works were loſt; and that they might ſafely rely on the Goodneſs and Protection of the Emperor, who, he did not doubt, would take Care of them. Exhorted the Students to attend cloſely to their Exerciſes, and to *Kepler* he recommended the finiſhing of the *Tables* he had conſtructed, for regulating the Motion of the Planets: Thanked the illuſtrious and noble *Eric Brahe*, a Counſellor to the King of *Sweden*, and his Kinſman, for his long and faithful Friendſhip,

Friendſhip, and then reſigned his Breath. The principal Part of his Writings, as the learned *Gaſſendus* informs us, are,

I. An Account of the new Star, which appeared *November* the 11th, 1572, in *Caſſiopea*. Publiſhed at *Copenhagen*, 1573, in 4to.

II. An Oration, concerning the mathematical Sciences, pronounced in the Univerſity of *Copenhagen*, in the Year 1574. Publiſhed by *Conrad Aſlac*, of *Bergen* in *Norway*.

III. A Treatiſe of the Comet, in the Year 1577, immediately after it diſappeared. Nine Years afterward, he reviſed it, and added a 10th Chapter. Printed at *Uranibourg*, 1589.

IV. Another Treatiſe on the new Phenomena of the Heavens. In the 1ſt Part of which, he treats of the Reſtitution, as he calls it, of the Sun, and of the fixed Stars: And, in the 2d Part, of a new Star, that then had made its Appearance.

V. A Collection of aſtronomical Epiſtles. Printed at *Uranibourg*, 1596, in 4to. *Nuremberg*, 1602, in 4to. and at *Franckfort*, in 1610; it was dedicated to *Maurice* Landgrave of *Heſſe*; becauſe there are in it a conſiderable Number of Letters of the Landgrave *William* his Father, and of *Chriſtopher Rothmann*, the Mathematician of that Prince, to *Tycho*, and of *Tycho* to them both.

VI. The mechanical Principles of Aſtronomy reſtored. Publiſhed at *Wandeſburg*, 1598, in Fol.

VII. An Anſwer to the Letter of a certain *Scotſman*, concerning the Comet, in the Year 1577.

VIII. Concerning the Compoſition of an Elixir for the Plague, addreſſed to the Emperor *Rodolphus*.

IX. An Elegy upon his Exile; publiſhed at *Roſtock*, in 1614, 4to.

X. The *Rudolphin Tables*, which he had not finiſhed when he died; but were reviſed, and publiſhed by *Kepler*, as *Tycho* had deſired. He gave them this Title, in Honour of his great Patron the Emperor *Rodolphus*.

XI. An accurate Enumeration of the fixed Stars. Addreſſed to the Emperor *Rodolphus*.

XII. A complete Catalogue of 1000 of the fixed Stars, which *Kepler* has inſerted in the *Rudolphin Tables*.

XIII. *Hiſtoria Cœleſtis:* Or, a Hiſtory of the Heavens. In two Parts. The 1ſt contains, the Obſervations he had made at *Uranibourg*. In 16 Books. The Latter contains, the Obſervations made at *Wandeſburg*, *Wittenberg*, *Prague*, *&c.* In 4 Books.

XIV. Is an Epiſtle to *Caſper Pucer*. Printed at *Copenhagen*, 1668.

Beſides theſe Works, we find, he was frequently employed in compoſing *Latin* Verſe, though not very fortunate in the Attempt, there being too frequent Faults in regard to Quantity; and tho' it may appear like drawing a Veil over the Luſtre of his Character, we cannot, as impartial Hiſtorians, but acknowledge, he was too credulous, with reſpect to judicial Aſtrology, and likewiſe very ſuperſtitious, with regard to Preſages,

ſages, Omens, &c. It was ſaid of him by *Gaſſendus*, if he met an old Woman, when he went out of Doors, he uſed to turn back immediately; being perſuaded, it was a bad Omen. And he did the ſame, upon a Journey, if he ſaw an Hare in the Road. While he lived at *Uranibourg*, he had, at his Houſe, a Mad-man, whoſe Name was *Lep*, whom he placed at his Feet when he was at Table, and fed him himſelf; and, as he imagined, that every Thing that mad Perſons ſaid, preſaged ſomething or other, he obſerved carefully, all that his own Man ſaid; and becauſe it happened ſometimes to prove true, he fancied he might depend upon all that he ſpoke. He was moreover cenſured as very poſitive, and impatient of Contradiction. He was born in the *Lutheran* Religion, which was the eſtabliſhed one of his Country, and continued in it till his Death. Nevertheleſs, his Character was always honoured and eſteemed by the Learned, whoſe Sentiments in general may fitly cloſe our Hiſtory of him. "*Kepler* ſtiles him the *Hipparchus* of our Age; *Voſſius*, in his Book *De Scientiis Mathematicis*, tells us, that he gained an immortal Reputation by his Works, being inferior to none of the preceding Aſtronomers; and that in his Obſervation of the Fix'd Stars, he did not implicitly acquieſce in what *Hipparchus* had done, but exceeded the Induſtry of *Ptolemy*, and the Followers of *Alphonſus*. And Mr. *Boyle*, in his *Phyſiological Eſſays*, obſerves, that the noble *Tycho*, as he ſtiles him, beſides his Time and Induſtry, laid out much greater Sums of Money on Inſtruments, for aſtronomical Obſervations, than any Man, whom we have heard of in later Times ——— It is well known, he was the Inventor of a new Syſtem of the World, which he endeavoured to eſtabliſh on the Ruins of the *Copernican* Syſtem, but it did not ſucceed; for as on the one Hand, nothing could be more elegant, ſimple and rational, than the *Copernican* Syſtem; ſo on the other, nothing could be more extravagant and abſurd, than that of *Tycho*'s Hypotheſis, which placed the Earth in the Center, and the Sun with the whole Syſtem of Planets about it, revolving about the Earth once in 24 Hours. This could only ſhew, how fond Mankind are of their own Inventions, and how ambitious of Reputation, which they endeavour ſometimes to attain, in Oppoſition to the cleareſt Truths, and even Demonſtration itſelf.

The LIFE of CHRISTOPHER COLUMBUS.

CHRISTOPHER COLUMBUS, Philoſopher and Mathematician, was born in the Dominions of *Genoa*, in 1442. Authors ſomewhat differ with reſpect to the Genealogy, but all in general allow, that he deſcended from an antient and reputable Family, from Parents, who took Care to inſtil into his Mind the Rudiments of Literature, and gave him a Taſte for further Improvement in Science, for which he very early diſcovered an uncommon Genius, and for the Attainment of which, when but a Youth, he applied himſelf with great Diligence; and to this End, put himſelf under the Care of proper Tutors at *Pavia*, for the Study of Arithmetic, Geography, Geometry, Philoſophy, Painting, and other Sciences: And it appears by his Letters to their Majeſties the King and Queen of *Spain*, that he was well verſed in Natural and Experimental Philoſophy, and was a curious Obſerver of whatever tended to his Improvement in Navigation; for the Reſult of his Enquiries led him to viſit foreign Nations; and to encreaſe his Knowledge by the Practice, as well as the Theory of this Art, his firſt Step to this End was, to viſit his elder Brother, then reſiding at *Liſbon*, to receive his Aſſiſtance in drawing Charts of the Coaſt, *&c.* and from thence proceeded on his firſt Voyages to the *Eaſt* and *Weſt Indies*.

After this enterpriſing Genius had made ſome Improvement in the Sciences, and had been a few Voyages to Sea, his Studies preſented to his Imagination (as it were) new Worlds; and that theſe were not the mere Fiction of the Brain, he aſſigns the following Reaſons.

1. He concluded, that all Sea and Land compoſed a Sphere, or Globe, which might be gone about from Eaſt to Weſt.

2. That a great Part of this Globe had been travelled over, and that then there only remained to diſcover that Space which lay between the Eaſtern Bounds of *India*, known to *Ptolemy* and *Marinus*, round about Eaſtward, till they came through our Weſtern Parts to the Iſlands *Azores* and *Cabo Verde*, the moſt Weſtern Parts yet diſcovered.

3. He conſidered, that this Space, lying between the Eaſtern Limits known to *Marinus*, and the aforeſaid Iſland of *Cabo Verde*, could not be above $\frac{1}{3}$ Part of the great Circumference of the Globe; ſince the ſaid *Marinus* was already gone 15 of the 24 Parts, into which the World is divided towards the Eaſt, and therefore to return to the ſaid Iſle of *Cabo Verde*, there wanted about 9 Parts; for the ſaid *Marinus* is ſaid to have begun his Diſcovery towards the Weſt.

4. He reckoned, that ſince *Marinus* had, in his *Coſmography*, given an Account of 15 Hours, or Parts, of the Globe towards the Eaſt, and yet was not come to the End of the Eaſtern Land, it followed of Courſe, that the ſaid End muſt be much beyond that; and conſequently, the farther it extended Eaſtward, the nearer it came to the Iſland *Cabo Verde* towards our Weſtern Parts; and that if ſuch Space was Sea, it might eaſily be ſailed in a few Days, and if Land, it would ſoon be diſcovered by ſailing Weſtward.*

Fully perſuaded of the Truths deduceable from his Reaſoning, and the Authority of ſome learned Men in Favour of it, he reſolved to try the Experiment, and to venture his Honour and Reputation, his Health, and even Life itſelf, in Queſt of thoſe other Worlds, or Parts, which yet remained undiſcovered; it is highly reaſonable to ſuppoſe, he was likewiſe animated, on the other Hand, from the Perſuaſion of the great Service it might be to the Public, the Intereſt that might accrue to himſelf, and the Honour and Reputation future Ages would juſtly pay to his Memory.

Accordingly he addreſſed himſelf to ſome Princes in *Europe*, who laughed at the Enterprize, and ſtiled it a Dream. But *Ferdinand* and *Iſabella*, who then reigned in *Spain*, received him more favourably, and agreed to furniſh him with three Ships, on the Conditions by him ſtipulated, *viz.* "That if he made "no Diſcoveries, he ſhould have no Reward; that if he did, "he ſhould be Viceroy by Land, and Admiral by Sea, and "have the Tenths of the Profits of all the Countries diſcovered "by him, and that theſe Privileges ſhould be hereditary to his "Family." This Agreement was made in *April* 1492, at the Siege

* *Churchill*'s Voyages; Life of *Columbus*, by his Son, Page 487.

Siege of *Granada*, and on the ſecond of *Auguſt* following, *Columbus* ſet out from *Port Palos de Moger* in *Spain*, and was then dignified with the Title of Admiral, with three Ships, and about 100 Men. On the 11th, they came to the *Canaries*, and ſtayed at *Gomera* 'till *September* 6, when they ſailed to proſecute their intended Diſcovery; but at length, when they were got out of Sight of Land, the Men grew very uneaſy, but he found Means to divert them, partly by Promiſes, and partly by Threats.

In this Voyage *Columbus* is ſaid to be the Firſt who obſerved the Variation of the Compaſs.

On the 11th of *October*, the Admiral perceived a Light, reſembling that of a Candle, and when it was full Day, he landed at *Guana Bay* in his Boat, with the Royal Standard, followed by the Captain, and other Officers. They kneeled on the Shore, kiſſed the Ground, and thanked God for their ſafe Arrival. Then the Admiral ſtood up, called the Iſland, which is one of the *Luccas*, *St. Salvador*, and took Poſſeſſion of it, in the Name of their Catholic Majeſties, with the uſual Formalities. The Natives, filled with Wonder and Joy, were fond of ingratiating themſelves into their Favour, and of getting Something from them by way of Exchange. He was at length kindly received by their Chiefs, and Some of them, who were moſt apprehenſive of his Language, became Interpreters to Others.

The next *Sunday*, being the 15th of *October*, the Admiral ran along the Coaſt of the Iſland towards the North-weſt in his Boats, to diſcover whatever might be curious or uſeful. He found a large Bay, or Harbour, capable of containing all the Ships in *Europe*. The People along Shore gathering, with great Admiration, to ſee how faſt the Boats paſſed the Shore, ſeveral ſwam out to them, to ſalute and carry them Preſents. At length *Columbus* came to a Part, where he ſaw ſix Houſes of the *Indians*, with Gardens about them, as pleaſant as thoſe in *Caſtile* in *May*; but as it became tireſome for his Men to row, on *Monday* the 16th, he returned by another Iſland that is ſeven Leagues from the other, called *St. Mary of the Conception*, on that Side of this Iſland next *St. Salvador*, extended North-weſt, five Leagues in Length, but the Admiral went on that

Side

Side which lies East and West, and being landed, the People of the Island ran together to see the Christians. The Admiral, perceiving this Island, as to its Produce and Inhabitants, were much the same as the last, sailed westward to another Island considerably bigger, and anchored upon the Coast of it, which was called *Fernandina*; but before he reached this Island, the Admiral found a Man in a small Canoe, who had some Water and a little Earth, like Vermilion, going to *Fernandina* to carry News of the Christians, but he was courteously received by the Admiral, and taken into his Ship, designing, as soon as he came to Land, to set him ashore to spread the News. The good Account he gave, caused the People of *Fernandina* to come aboard in their Canoes, and to bring their Curiosities, to present, or exchange. These People seemed to be wiser and discreeter than the Former, and were for having what they esteemed an Equivalent in Exchange. Among other notable Things which they saw in that Island, there were some Trees which appeared to be grafted; because they had Leaves and Branches of four or five Sorts, and yet were natural. They also saw Fishes of several Sorts, and fine Colours, but no Sort of Land-Animals, except Lizzards, and Snakes. The better to discover this Island, they sailed to another Part of it, but finding nothing more extraordinary, on *Friday* the 19th, they sailed away to another, called *Saomotto*, to which he gave the Name of *Isabella*.

The Admiral having learnt the principal Secrets of the Island *Isabella*, its Product and Manners of the People, he set sail for a large Country, much applauded by them, called *Cuba*, which lay towards the South, where he came to Anchor. Here the Trees were thick and tall, and adorned with Fruits and Blossoms, different from ours, and Abundance of Birds; but the People immediately fled for Fear. Here the Admiral sent two Christians with one of the *Indians*, brought from *St. Salvador*, to travel up into the Country, and make much of the Natives; and that he might lose no Time, he laid his Ship up a-shore to careen.

After they had tarried the limited Time, they returned, and acquainted the Admiral with the Products of the Country, and Manners of the People. They having the Consent of some *Indians* to go aboard the Ship, and sail with them, two were accepted

accepted of; but no Husband was to leave the Wife, or Wife the Husband; neither the Child the Parent.

About the 13th of *November*, he came about to the Eastward, to the Island of *Bohio*, and thence to *Hispaniola*. On *Sunday*, the 13th of *January*, being near the Cape, called *Enamorado*, the Admiral sent some of the *Christians* and *Indians* ashore, and found the Natives much more fierce, and prepared with Bows and Arrows. The Admiral called this Place *Golpho de Flechas*; or the *Gulph of Arrows*. The chief Produce of the Island was Cotton.——On the 16th of *January*, they sailed in Quest of other Islands, and for 15 Days met with such windy, tempestuous Weather, that they could not land any where. At length, they reached the Island of *St. Mary*, one of the *Azores*, and the People on this Island, as well as those in the Ship, were greatly astonished at the providential Escape of the Admiral; and understanding what the Admiral had discovered, seemed to rejoice, giving Praise to God; and three of them came on board with fresh Provisions, and many Compliments from the Commander of the Island. The Admiral and his Crew, remembering they had made a Vow on the *Thursday* before, to go bare-foot, and in their Shirts, the first Land they came to, to some Church of our *Lady*, they were all of Opinion, they ought to perform it here; especially, being a Place where the Governor and People expressed so much Affection and Tenderness for our Men, and belonging to a King, who was so great a Friend to him at *Castile*. Therefore the Admiral desired these three Men to repair to the Town, and cause the Chaplain to come, that had the Keys of the Hermitage, that he might say Mass there. These Men consenting, they went into the Caraval's Boat with half the Ship's Crew, that they might begin to perform their Vow, and on their Return, the Rest might do the same; but being landed, the Governor and Abundance of People from the Town, who lay in Ambush, on a sudden rushed out upon them, and made them Prisoners, taking their Boat, without which they thought they could never get away from them.

The Admiral, thinking they stayed too long, began to suspect some Misfortune had befallen them, either at Land or Sea; he resolved therefore with his Ship to sail about a Point. Being come

near, he ſaw Abundance of People on Horſe-back, many of whom diſmounted, and went into the Boat to attack the Caraval. The Admiral therefore miſtruſting what might happen, and perceiving that thro' their Treachery he was put under great Difficulties, began to conſider how he might extricate himſelf; and firſt he ordered his Men to be in Readineſs and armed, but to make no Shew of Reſiſtance, that the *Portugueſe* might come the nearer. When they were near the Admiral, the Captain of them, ſtood up, and deſired to parley, which the Admiral granted, thinking he would come on board, and might be ſecured without Breach of Faith; but the *Portugueſe* did not come nearer than to be heard. When the Admiral proceeded to repreſent their unreaſonable Conduct, and how much it would be diſapproved and reſented by their Catholic Majeſties; the Captain and his Men, diſregarding this, he ſuſpected ſome Breach had happened between the two Crowns ſince his Departure, and determined to return their ill Treatment, by making Repriſals; but the next Day, the Wind increaſing, he was obliged to put to Sea, and ſail towards the Iſland of *St. Michael*; but the Weather growing calmer, he reſolved to return to the Iſland of *St. Mary*, to recover his Men, and an Anchor that he had loſt; and on his Arrival there, there came off a Boat, with five Men and a Notary, who upon Security went aboard, and lay there that Night. The next Day, they requeſted him to produce his Commiſſion from the King of *Spain*, which the Admiral complied with, as thinking it better, at that Time, to ſuppreſs his Reſentment, and ſtipulated for the Return of his Seamen, which was ſoon after complied with.

On *Sunday* the 24th, the Admiral ſailed from the Iſland of *St. Mary* for *Spain*, but in the Voyage met with a great Storm, and was forced upon a Rock off *Liſbon*. The Admiral, however, with great Skill got into *Liſbon* River, to the great Aſtoniſhment of the People of that Country and their Seamen, who ran from all Parts to behold, as it were, ſome Wonder. After he had anchored, he preſently ſent one Expreſs to his Catholic Majeſty, with the News of his Arrival, and Another to the King of *Portugal*, aſking Leave to anchor before the City, as being more ſafe.

On

On *Tueſday* the 5th of *March*, the Maſter of a great Guard-ſhip, that lay in the *Harbour*, came with his Boat full of armed Men to the Admiral's Caraval, requiring him to come along, and give an Account of himſelf to the King's Officers. He anſwered, that as he was one of the King of *Spain*'s Admirals, he was not obliged to obey any ſuch Summons. He was then required to ſend his Boatſwain. The Admiral refuſed that alſo, and produced the King of *Spain*'s Commiſſion; upon which, he was ſatisfied, and went back to his Ship, and gave ſuch a ſurprizing Account to *Alvaro de Acunna*, his Captain, that he came immediately with Trumpets, Fifes, Drums, and great State aboard the Admiral, expreſſing much Kindneſs, and offered his Service. The next Day, it being known at *Liſbon*, that the Ship came from the *Indies*, great Numbers went on board to ſee the *Indians*, and hear News; ſome of them praiſing God for thoſe great Diſcoveries he had made, and Others upbraiding their King's Incredulity, whereby they had loſt the Advantage that might otherwiſe have accrued to that Nation. The next Day, the King ordered his Officers to preſent the Admiral with all Kinds of Proviſions, and Neceſſaries for himſelf and his Men, without aſking any Pay. At the ſame Time, he wrote to the Admiral, congratulating him on his happy Arrival, and inviting him to come and viſit him. He accepted the Invitation, and on *Saturday*, the 9th of *March*, the Time appointed, the King ordered all the Nobility of his Court to go out to meet him; and being come into his Preſence, the King did him great Honour, commanding him to put on his Cap, and ſit down; and having with a chearful Countenance heard the Particulars of his proſperous Voyage, offered him all he ſtood in need of, for the Service of their Catholic Majeſties, intimating, however, that he thought, that foraſmuch as he had been a Captain in *Portugal*, that Conqueſt belonged to him; to which the Admiral replied, he knew no ſuch Agreement, and that he had ſtrictly obſerved his Orders, which were not to go to the Mines of *Portugal*, nor to *Guinea*. The King ſaid all was well. The Admiral having ſtayed there all *Sunday* and *Monday*, and been at Maſs, took Leave of the King, with great Expreſſions of Kindneſs. On his Return, he paſſed by a Monaſtry, where the Queen then was, who ſent to deſire him

not

not to paſs without ſeeing her, and did him all the Favour and Honour due to the greateſt Lord. The Admiral had the Offer of being conducted to *Spain* by Land, but he thought it moſt expedient to return Home in his Caraval with his Men.

On *Wedneſday*, the 13th of *March*, the Admiral ſet ſail for *Seville*, and on the *Friday* following, at Noon, arrived at *Saltes*, and came to an Anchor in the Port of *Palos*, whence he had ſet out, on the 3d of *Auguſt*, 7 Months and 11 Days before his Return. He was there received by all the People in Proceſſion, giving Thanks to God for his proſperous Succeſs, which it was hoped would redound ſo much to the Propagation of Chriſtianity, and the Increaſe of their Catholic Majeſties Dominions; all the Inhabitants looking upon it as a great Matter, that the Admiral ſet out from thence. The Admiral ſoon after ſet out for *Barcelona*, where their Catholic Majeſties then were. He got thither the 15th Day of *April*, having before ſent their Majeſties an Account of the happy Succeſs of his Voyage, which was extraordinary pleaſing to them, and they ordered him a moſt ſolemn Reception, as to a Perſon, who had made ſuch ſingular Diſcoveries, and done ſuch eminent Service. The Court and City went out to meet him, and their Catholic Majeſties ſat in public, with great State, under a Canopy of a Cloth of Gold; and when he went to kiſs their Hands, they ſtood up to him as to a great Lord, and cauſed him to ſit down. Having given a brief Account of his Voyage, they gave him Leave to retire to his Apartment, whither he was attended by the Court, and when the King rode about *Barcelona*, the Admiral was permitted to ride on one Side of him, and the *Infante Fortuna* on the other; a Favour never granted to any before but the *Infante*.

Columbus having given theſe Proofs, not only of his uncommon Skill in Navigation, but of his great Abilities, Oeconomy, and Integrity; and having received many Marks of their Majeſties Favour, confirmed by Letters Patent, it was reſolved by their ſaid Majeſties in Council, that the Admiral ſhould proceed on another Voyage, in order to people the Iſland of *Hiſpaniola*, make other Diſcoveries, erect Colonies, and propagate Chriſtianity, *&c.* and in order to render the Title of their Catholic Majeſties more ſecure, as well to what had been already diſcovered,

diſcovered, as what might be afterward, it was reſolved, to apply to the Pope (then *Alexander* VI.) for his Approbation, which he was pleaſed to give under his Holineſs's Seal.

All Things neceſſary for his intended Voyage being prepared, the Admiral weighed Anchor in the Road of *Cadiz*, on the 25th of *September*, 1493, and ſteered S. W. for the *Canary* Iſlands. In this Voyage, he viſited the Iſland of *Dominica*, *St. Mary's*, *Guadalupe*, *Montſerrat*, *St. Maria*, *la Antigua*, *Hiſpaniola*, the City of the *Nativity*, eſtabliſhed a Colony at *Iſabella*, and diſcovered Gold-mines at *Ciboa*. Thence he ſailed to the Iſlands of *Jamaica* and *Cuba*, in many of which Iſlands, Provinces, *&c.* having taken the utmoſt Pains to eſtabliſh Chriſtianity, he concluded to return to *Spain*, to give their Catholic Majeſties an Account of the State and Condition of thoſe Iſlands. Accordingly, on the 10th of *March*, 1496, he ſet ſail, but meeting with adverſe Winds, was obliged to fall off towards the South to the *Caribbee* Iſlands, and came to an Anchor at *Marigalante*, on the 9th of *April*, where, after furniſhing himſelf with Bread, Water, Wood, *&c.* on the 20th of *April*, he ſailed for *Spain*.

Having made but little Way, and the Ships being full of People, on the 20th of *May*, they began to be very ſickly, and were reduced to Want of Proviſions; beſides which, a Difference of Opinion in the Pilots on board occaſioned very great Uneaſineſs. However, this afforded an Opportunity for the Admiral to diſcover ſuperior Knowledge, as well as Equanimity of Temper, aſſuring them he was but little Weſt of the *Azores*; for, according to his Journal, the *Dutch* Compaſſes varied, as they uſed to do, a Point; and thoſe of *Genoa*, that uſed to agree with them, varied but very little; but afterward, ſailing Eaſt, varied more; which he urged as a Reaſon of their being Weſt of the *Azores* 100 Leagues. He made other Obſervations and Remarks, according to his ſuperior Skill, and to the great Satisfaction of the whole Ship's Company. They had Sight of Land much ſooner than was apprehended poſſible, even by the Pilots, and landed at *Odemira*, between *Liſbon* and *St. Vincent*, on the 8th of *June*.

Columbus had but juſt arrived in *Spain*, and preſented ſome Curioſities to their Majeſties, and given a proper Account of

what had occurred of Importance in this Voyage, and alſo received ſome Marks of their Majeſties Favour, than he was requeſted (as abſolutely requiſite) to go to the *Indies* a third Time, which he complied with, tho', it is ſaid, not without Reluctance, ſome Perſons in his Abſence having found Means to depreciate his Diſcoveries.——

The Admiral ſet ſail on the 30th of *May*, 1498, from the Bay of *St. Lucar de Berrameda*, and on the 7th of *June* arrived at the Iſland of *Puerto-Santo*, where he took in ſome Proviſions; and thence ſailed to *Gomera*, where he arrived on the 19th; but making but ſhort Stay, he arrived, on the 25th of *June*, at the Iſland *de Sal*, one of thoſe of *Cabo Verde*, and on the 5th of *July*, ſailed from thence to diſcover the Continent, ſteering by S. W. till he came under the Equinoctial, about the Middle of *July*. He ſays, that having ſteered due Weſt for ſome Time, in order to find Land, he very carefully took the Latitude, and found a wonderful Difference between that and the Parallel of the *Azores*; for there, when the *Charles's Wain* was on the Right, that is, Eaſt, then the North Star was loweſt, and from that Time began to riſe; ſo that, when the *Charles's Wain* was over Head, the North Star was two Degrees and an Half higher, and being once paſt that, began again to deſcend the ſame five Degrees, it aſcended. This, he ſays, he obſerved ſeveral Times very carefully; but that where he was at this Time in the *Torrid Zone*, it happened quite contrary; for when the *Charles's Wain* was in its greateſt Elevation, he found the North Star ſix Degrees high, and when the *Charles's Wain* came to the Weſt, in ſix Hours Space, he found the North Star eleven Degrees high, and then in the Morning, when the *Charles's Wain* was quite depreſſed, tho' it could not be ſeen becauſe of the Inclination of the Pole, the North Star was ſix Degrees high; ſo that the Difference was ten Degrees, and it made a Circle, whoſe Diameter was ten Degrees; whereas, in the other Place, it made but five, lowering the Poſition; for there it is loweſt, when the other is Weſt, and here when in its Elevation. We might here proceed to take Notice of the Admiral's diſcovering the Iſland of the *Trinity*, and thence ſailing to the Cape, called *Puntal del Arenal*, and afterwards continued his Courſe to *Paria*, where he found Gold, and many

precious

precious Pearls. He was expoſed to many Dangers during this long Voyage; but as we have already been as particular as the Limits of our Hiſtory will permit, and theſe Particulars more properly belong to Naval Hiſtory, we ſhall bring this Account to a Cloſe, by ſome Particulars relating to his perſonal Character.

Hiſtory informs us, that he was a Perſon of great Evenneſs of Temper, ſeldom moved to Paſſion; but when moſt provoked, was never heard to ſwear, or utter any other Expreſſion than *God take you*. He was very careful to preſerve the ſame Abhorrence to Swearing in thoſe who ſailed with him, and as much as poſſible, to promote Peace and good Order, and was remarkably tender of his ſick Men. According to that Religion he profeſſed, he was cenſured as ſuperſtitious in many Obſervances, and too ready to regard ſome Phænomenas in Nature as Omens, or Preſages of ſome extraordinary Events, and generally conſtrued them in his own Favour.

One remarkable Uſe which he made of his Knowledge was ſo wiſely adapted to his particular Circumſtances at that Time, it deſerves our Notice. While he lay off *Hiſpaniola*, there aroſe ſome Difference between him and ſome of the *Indians*; and the Mutineers ſo far prevailed, that the Natives ſlacked their Hands in ſupplying him with Proviſions, which reduced him to great Diſtreſs; but he extricated himſelf by this lucky Stratagem. He knew there would be a Lunar Eclipſe, in three Days Time, at the Riſing of the Moon, at the Beginning of the Night, and ſent an *Indian* Interpreter for the chief *Indians* of the Place, to diſcourſe them about a Matter of Importance. When they came, he told them by the Interpreter, that the *Chriſtians* GOD, who lived in Heaven, took Care of the Good, and puniſhed the Bad; and that the ſame *God* would puniſh the *Indians* for not bringing Proviſions to him and his Men; and as a ſure Preſage of it, they ſhould ſee the Moon riſe, ſuch a Night, with an angry and bloody Aſpect. Some of the Natives were frighted at this Relation, and Others mocked him; but when they ſaw the Eclipſe, as he had foretold, they believed what he had ſaid, came and prayed him to intercede with his *God* on their Behalf, and promiſed to ſupply him with what Proviſions he needed. The Admiral replied, that he would; and as a

Proof

Proof of it, they ſhould ſoon ſee the Moon put off her angry Countenance by Degrees. The Eclipſe being over, they concluded the Admiral would not have known this, except it had been revealed to him from Heaven.

Upon the Admiral's Return from this third and laſt Voyage, he found his favourite Queen *Iſabella* dead, and the King not ſo hearty in his Favour as before, which increaſed the Indiſpoſition of Body under which he laboured, and he declined, and died piouſly, on *May* the 20th, 1506, at the City of *Valadolid*, aged 64. His Body was afterwards conveyed to *Seville*, and there, by the Catholic King's Order, magnificently buried in the Cathedral, and an Epitaph, in *Spaniſh*, cut on his Tomb, in Memory of his renowned Actions, and Diſcovery of the *Indies*.

A CASTILLA, *y a* LEON,
Nuevo Mundo dio COLON.

In *Engliſh*:

TO CASTILE and LEON, COLUMBUS has given a new World.

Yet this brave Adventurer had not the Honour of giving his own Name to this new World, but was robbed of it by *Americus Veſpucius*, a *Florentine*, who was ſent in 1497, by *Emanuel*, King of *Portugal*, to continue the Diſcoveries made by *Columbus*, as appears from the following Account.

Americus Veſpucius's Diſcoveries.

THIS Gentleman was a Native of *Florence*, and made the next conſiderable Diſcoveries, of which we ſhall give an Extract, from his own Account, to King *Ferdinand* of *Caſtile*, and the Duke of *Lorrain*, as we find it in *Grynæus*'s *Novus Orbis*, printed at *Baſil*, 1537. He made two Voyages towards the Weſt, at the Command of the ſaid King, and two to the South, by Order of *Emanuel*, King of *Portugal*.

He began his firſt Voyage, *May* 20, 1497, with four Ships from *Cadiz*; he refreſhed at the *Canaries*, and 27 Days after, he

he ſailed from thence, he arrived at a certain Land, about 1000 Leagues Weſt of the *Canaries*, in N. Lat. 16. 75 Deg. more Weſt than the *Canaries*, and upon their Landing in their Boats, they found Abundance of Inhabitants, all naked; and notwithſtanding they uſed ſeveral Methods to allure them, they would not come near the *Spaniards*. He left that Place in Queſt of a good Harbour, which he happily met with in a few Days, and found the People almoſt as ſhy as the Former; at length, however, they were prevailed upon by ſome trifling Preſents, as Glaſſes, Bells, *&c.* after which, Multitudes of the Natives came ſwimming to them; at which both the Men and Women were remarkably dexterous.

Americus ſays, the Situation of the Country was excellent, and he found ſome Signs of Gold in it; but being ignorant of the Language, he could get no Diſcoveries from the Inhabitants. Parting hence, he coaſted along the Shore, paſſing by many Shoals, and as he landed at ſeveral Places, where he found the Language differed more than the Manners of the People, ſometimes taking the *Indian* Natives on board with their Conſent, and at other Times making them Priſoners. They returned again to *Spain* with 222, on the firſt of *October*, 1499, where they were joyfully received, and ſold their Priſoners.

Americus began his ſecond Voyage from *Cadiz*, on *May* 11, in the following Year, and, after 19 Days ſail, came to a new Land, which he ſuppoſed to be a Continent, in S. Lat. 5, about 500 Leagues from the *Canaries*. This Country was almoſt covered with Marſhes, and had ſeveral great Rivers, which contributed to its Verdure; and there were many fine tall Trees, but he ſaw no Inhabitants, though he found many Signs of its being peopled. He tried to land at ſeveral Places, in order to make new Diſcoveries, but the Tides ran ſo ſtrong, that he could not; at length, however, he landed in an Iſland, where the People were of an uncommon Size, bold, vigorous and warlike, having Bows and Arrows, and when attacked, defended themſelves with great Intrepidity. This *Iſland*, therefore, was called the *Iſle* of *Giants*. Being now bound homewards, he came to another Country, where the People were friendly. Here he ſtayed 47 Days, from whence he ſailed for *Antigua*, formerly diſcovered by *Columbus*, and leaving that

Place, on *July* 22, he arrived at *Cadiz* the 8th of *September* following.

After this ſecond Voyage, whilſt *Americus* ſtayed at *Seville*, *Emanuel*, King of *Portugal*, invited him, by Letters, to come to *Liſbon*, and promiſed to do great Things for him. *Americus*, however, declined it, becauſe of his bad State of Health; but was prevailed on by a ſecond Meſſage, and ſet out from *Liſbon* with three Ships, on the 10th of *May*, 1501; ſailed from thence to the *Canaries* with a S. W. Wind, and arrived at that Part of *Ethiopia*, called *Beſilicca*, under the *Torrid Zone*, where taking in Wood and Water, he ſteered South through the *Atlantic* Sea, and after 67 Days Sail, thro' very dangerous Tempeſts, he arrived at an Iſland, 700 Leagues from the Coaſt of *Afric*. On the 17th of *Auguſt* following, he made a new Diſcovery, and anchored about a League and a Half from the Shore in S. Lat. 5. The Country looked very green and pleaſant, but meeting with no Inhabitants, he returned to his Ship, leaving ſome Glaſſes, Bells, *&c.* to entice the Natives to Friendſhip, if any ſhould come down; but they were too ſhy to correſpond, or ſuffer themſelves to be taken. They parted from thence, and ſailed along the Shore round a Point, called *Vincent's Field*, about 150 Leagues. Here they landed, and found the People more civilized. They met with great Numbers of Canes, and Trees, which were large, green Pipes, ſome of which were dry, on the Tops of the Trees. Three of the Inhabitants willingly came on board, to go along with *Americus* to *Portugal*. He ſailed thence to the South, 'till he came beyond the *Tropic* of *Capricorn*, in S. Lat. 32, where he governed his Courſe by the Stars of the South Pole, which, he ſays, were many more, greater and clearer, than thoſe of the North; all which he noted down in his *Journal*, with their Declination, *&c.* He reckoned himſelf then 700 Leagues from St. *Vincent's Field* before-mentioned, but found nothing very remarkable this Voyage, except Abundance of *Caſſia*-trees, without diſcovering any valuable Minerals; after the taking in Wood and Water for ſix Months, he ſteered his Courſe homeward, and, in 16 Months, arrived at *Liſbon*, in 1502.

He began his fourth Voyage from *Liſbon*, on the 10th of *May*, 1503, with ſix Ships, and after touching at the Iſlands of

Cape

Cape Verd, the Commodore, contrary to the Mind of *Americus*, and the Reſt, would needs ſail to *Sierra Leona*, on the South Coaſt of *Afric*, where they were ſhattered by a terrible Tempeſt, and obliged to return home, after an unſucceſsful Voyage, where they arrived on *June* 28, 1504.

This is the Subſtance of what *Americus* ſays of his own Voyages, which we have inſerted for the Satisfaction of the Curious. He ſays, he kept Journals, and deſigned to publiſh them with the Geography of the Places which he diſcovered; but if he did, they are not now to be come at. Upon the Whole, it is evident, that this was a Part of *Columbus*'s Diſcoveries, notwithſtanding this Country goes under *Americus*'s Name, as if he was the principal Diſcoverer.

About this Time, and in the ſixteenth Century, there were many Perſons who diſtinguiſhed themſelves, by making ſome important Diſcoveries; more eſpecially in North and South *America*; for which they were in ſome Meaſure qualified by ſuperior Attainments in the Aſtronomical Sciences, as well as by their Skill in Navigation: And to which they were animated by a Love of their Country; whoſe Names on theſe Accounts, as well as the ſignal Service they have done their Succeſſors in the Art of Navigation, deſerve to be remembered, and tranſmitted with Eſteem to lateſt Poſterity.

Among theſe were *John* and *Sebaſtian Cabot*, *John Ponce de Leon*, *Cortez*, *Saavedra Guzman*, *Mendoza*, *Solo*, *Gonſalvo Pizarro*, *&c.* Foreigners; and amongſt our own Countrymen, Sir *Martin Forbiſher*, Sir *Francis Drake*, Mr. *John Davis*, *&c.* and likewiſe of ſome others, whoſe Names will be as laſting, as our Commerce with thoſe Parts, *Hudſon's Bay*, *Virginia*, *&c.* But as the Hiſtory of thoſe Perſons are more properly the Subject of Naval Hiſtory, we ſhall return from this Digreſſion to the Life of thoſe more celebrated for mathematical and philoſophical Sciences.

The LIFE of CHRISTIANUS LONGOMONTANUS.

Chriſtianus Longomontanus, was born in 1652. His Father's Name was *Severinus*, and his Mother's *Marina*. (The Name of *Longomontanus*, is ſaid to be derived from an obſcure Village of *Cymbia*, where he reſided) and as they followed Huſbandry, *Chriſtianus* was trained up in great Meaſure to that Employ; and in his younger Years was only permitted to attend a School, as the Circumſtance of his Parents, and Leiſure from that Employ would permit. The early Proofs he gave of his Genius for the Study of the mathematical Science, ingratiated him into the Eſteem of his Relations, from whom he received Encouragement. Prompted, however, by an eager Thirſt after Learning, at 15 Years of Age, he withdrew from his Country, and entered himſelf in a School at *Vigurgh*, at the Diſtance of about 12 Miles from the Place of his Nativity; there purpoſing to ſubſiſt himſelf by his Induſtry; and yet make farther Proficience in his beloved Studies, to which he applied himſelf with great Aſſiduity; and having made a ſurpriſing Progreſs in the Mathematics, under that eminent Philoſopher *Matthias Hanſius*, he went to *Copenhagen*, where, by his ſingular Induſtry, he ſo well approved himſelf to his Profeſſors, that they gave the higheſt Commendation of him to *Tycho Brahe* who (having in the Year 1588, loſt his *Mecænas* King *Frederick* II.) reſided now at the Iſle *Huenna*, readily accepted of *Chriſtianus* as his Aſſiſtant, principally in his aſtronomical Labours, and in the Reformation of his Catalogue of the fixed Stars, and in the Theory of the Moon. During his Continuance here, his indefatigable Labour, Diligence and Fidelity, gained him the ſincere Affection and Eſteem of this great Man; and ſoon after *Tycho*'s Departure from *Denmark* in 1698, he came to him in *Bohemia*, where he proſecuted his Studies, and finiſhed his Theory of the Moon. In the Year 1600, having received his commendatory Letters, he took his Leave, and returned to his own Country, where, in the Univerſity of *Copenhagen*, he was honoured with a mathematical Profeſſorſhip, in which

which he acquitted himſelf with great Reputation, employing his Time and Thoughts in reviewing the Improvements of others; farther inveſtigating the Nature and Phænomena of the Heavens, and committing it to Writing for the Improvement of ſucceeding Generations. His principal Work now extant is his *Daniſh* Aſtronomy, which was highly eſteemed by the Learned at that Time, and contains all the great Diſcoveries of *Regiomontanus*, *Purbachus*, and *Tycho Brahe*. To which he added an Appendix, containing the new Phænomena of the Heavens. This Work was firſt publiſhed in the Year 1621, which, beſides many others, rendered him remarkable as a Philoſopher, while living, and much regretted at his Death. Hiſtory does not furniſh us with many other Particulars relating to it, but that he died in the Year 1647, in the 85th Year of his Age.

The LIFE of JOHANNES SCHONERUS.

JOHANNES SCHONERUS, Philoſopher and Mathematician, was born at *Carelſtat* in *Germany*, A.C. 1477; his early Propenſity to the Study of thoſe Sciences may be deemed a juſt Prognoſtication of the great Proficience which he afterward made in them. So that from his uncommon Acquirements, he was choſen Mathematical Profeſſor at *Nuremburg*, when but a young Man. He was very famous for his *Aſtronomical Tables*, which he publiſhed after thoſe of *Regiomontanus*, and to which he gives the Title of *Reſoluta*, becauſe of their Clearneſs, as *Voſſius* obſerves. But notwithſtanding his great Penetration, he was much inclined to Judicial Aſtrology, which he took great Pains to improve. His other principal Writings were, the Uſe of the Celeſtial and Terreſtrial Globes; his Aſtronomical Equator; his *Organum Uranicum*; but principally his Gnomonics, or large Treatiſe of Dialling, in Folio, publiſhed in 1551, render him more known in the learned World than all his other Works beſides; wherein he diſcovers a ſurprizing Genius and Fund of Learning of that Kind; This is the only Book of his Works that we have ſeen, and it is much to be regretted, that the Life of ſo great a Ma-

thematician has not been taken Notice of by the voluminous Biographers, who, notwithſtanding, employ whole Pages in the Lives of Perſons, whoſe Memory will be of no more Benefit to Mankind, than their Actions were while living. Hiſtory informs us, that he died in the Year 1547, in the 70th Year of his Age.

The LIFE *of* SEBASTIAN MUNSTER.

SEBASTIAN MUNSTER, was a *German* Monk, born at *Ingleſham*, in the Year 1489. He appears to be ſo extraordinary a Perſon, with reſpect to his Knowledge of the Mathematics, and various other Branches of Literature, that we are ſorry to find ſo little of his Birth, Education, *&c.* Some of the moſt eminent and diſtinguiſhing Characters and Events of his Life are, that from a diligent and impartial Study of the Holy Scriptures, in their original Languages, he diſcovered the Repugnancy of *Popiſh* Principles, to the Purity and Simplicity thereof, and therefore publicly renounced thoſe Errors, and embraced Proteſtantiſm in 1529. The Proofs he gave of his Accuracy in the *Hebrew* Tongue, and his Skill in the Mathematics, intituled him to public Regard, ſo that he was eſteemed as the *Strabo* and *Eſdras* of *Germany*; for he was called to the Profeſſorſhip of the *Hebrew* Language at *Baſil*, at the Time of his Converſion. He tranſlated the *Hebrew* Bible, and *Joſephus*'s Hiſtory of the *Jews* into *Latin*; he publiſhed a Grammar of the *Chaldee*, an *Hebrew* Dictionary, a large Treatiſe of Dialling in Folio, and a Treatiſe of Coſmography, which was equally learned and laborious. He died at *Baſil* of the Plague, in 1552, in the 23d Year of his Profeſſorſhip, and the 63d Year of his Age.

The LIFE *of* PETER NONIUS.

PETER NONIUS, was born at *Salutiæ*, a City and Marquiſate of *Piedmont*, A. C. 1492, (under the Government of the King of *Portugal.*) He was eſteemed one of the moſt

moſt learned Mathematicians of the 16th Century. He was Preceptor to Don *Henry*, Son of *Emanuel*, King of *Portugal*, and was called to the Profeſſorſhip of the Mathematics in the Univerſity of *Coimbra*, where he publiſhed ſome Pieces which procured him great Reputation. His Book *De Arte Navigandi*, was received ſo much the more favourably, as it ſerved the grand Deſigns projected at the Court of the King his Maſter; for carrying on his maritime Expeditions into the Eaſt. —— Concerning this Work, Father *Dechales* gives us the following Account. "In the Year 1530, *Petreus Nonius*, a celebrated *Portugueſe* Mathematician, upon occaſion of ſome Doubts propoſed to him by *Mortinus Alphonſus Sofa*, wrote a Treatiſe of Navigation, divided into two Books; in the firſt, he anſwers ſome of thoſe Doubts, and explains the Nature of *Loxodromic Lines*. In the ſecond Book, he treats of Rules and Inſtruments proper for Navigation, particularly Sea-Charts and Inſtruments, which ſerve to find the Elevation of the Pole, but ſays, this Author is ſomewhat obſcure in the Manner of his Writing."———*Furetiere*, in his Dictionary, takes Notice, that *Peter Nonius* was the firſt, who in 1530, invented the Angles which the *Loxodromic Curves* make with each Meridian, and which he calls Rhumbs in his Language, and which he calculated by ſpherical Triangles. *Simon Stevinus* acknowledges, that *Peter Nonius* was ſcarce inferior to the very greateſt Mathematicians of the Age. *Schottus* ſays, he explained a great many Problems, and particularly the mechanical Problem of *Ariſtotle*, on the Motion of Veſſels by Oars. His Notes upon *Purbachius*'s Theory of the Planets are very much to be eſteemed; for he there explains ſeveral Things which had either not been taken Notice of, or not been rightly underſtood.

He publiſhed in 1542, a Treatiſe on the Twilight, which he dedicated to *John* III. King of *Portugal*, and added to it what *Alhazen*, an *Arabic* Author, has compoſed on the ſame Subject. He likewiſe corrected ſeveral mathematical Miſtakes of *Orontius Finæus*.——But the moſt celebrated of all his Works, or that at leaſt he appeared moſt to value, was his Treatiſe of Algebra, which he had compoſed in *Portugueſe*, but tranſlated into *Caſtilian*, when he reſolved upon making it public;

public; for he conſidered, that the *Caſtilian* Language was more generally known than the *Portugueſe*, and that conſequently his Book would be of leſs Uſe, if he ſhould leave it in its original Form. This Work he dedicated to his former Pupil, Prince *Henry*, the Cardinal Infant. His Epiſtle Dedicatory is dated from *Liſbon*, the 1ſt of *December*, 1564; he was then principal Coſmographer to the King of *Portugal*, and mathematical Profeſſor in the Univerſity of *Coimbra*. This Work contains 341 Pages in the Edition of *Antwerp*, 1567, in *Octavo*.

There is a celebrated Invention, which goes by the Name of *Nonius*, and is ſuppoſed to be the Invention of this learned *Portugueſe*. But in ſuch Authors, as have given us a Sketch of his Works, they have never ſo much as mentioned this Article, which had it been really his Invention, they ſurely would never have omitted. The famous Aſtronomer *Ricciolus* frequently quotes this Author, but never mentions this Invention of his, though had it been known at that Time, it muſt certainly have anſwered a very good Purpoſe to him. But *Taquet* in his Geometry, Book I. takes Notice, that *Clavius* mentions this as the Contrivance of *Peter Nonius*, but repreſents him as delivering it in a Manner very difficult, and that it is hardly practicable. He likewiſe aſcribes the preſent eaſy Method of uſing this Invention to *Guidas Ubaldus*, which is to be ſeen in his aſtronomical Problems, from whom he ſuppoſes modern Writers have borrowed it. An Account of the Uſe of this Inſtrument may be ſeen in *The Young Gentleman and Lady's Philoſophy*, Page 336. *Nonius* died in the Year 1572, aged 80 Years, leaving behind him one Daughter. *Thuanus* mentions, that he was a PROFESSOR of PHYSIC, which we alſo find confirmed by other Authors.

The

The LIFE *of* PARACELSUS.

PAracelſus (*Philip Aureolus Theophraſtus, Bombant de Hohenheim*) was born in 1493, at *Emſtdeln*, near *Zurich*, in *Swiſſerland*. His Father's Name was *William*, who, being the natural Son of a Prince, was well ſkilled in the Sciences, and took great Care in the Education of his Son. *Paracelſus*, well anſwered his Expectation, as he had a good natural Genius; and as his Inclination led him to the Study of Phyſic, he made great Progreſs in the ſame in a ſhort Time. He travelled into *France*, *Spain*, and *Italy*, and the *Empire*, in order to be acquainted with the moſt celebrated Phyſicians there. After his Return into *Swiſſerland*, he reſided for a conſiderable Time at the City of *Baſil*, where he taught Phyſic in the *German* Tongue, (as *Ramus*, and ſome others inform us.) By his Aſſiduity in Study, and making ſuitable Experiments, he made great Improvement, and diſcovered new Methods of preparing Medicine, which was by chemical Operations, which, joined with the Succeſs that attended his Practice of Phyſic, acquired him great Reputation. One *John Litchtenfels*, a Canon, falling extremely ſick, applied to *Paracelſus*, and promiſed him a conſiderable Sum, if he could recover him. *Paracelſus* effected it; but the Other refuſing to pay, was ſued by him, which occaſioned the Caſe to be laid before the Council, who ordered the Canon to pay him the uſual Fee only. *Paracelſus*, enraged at this Treatment, forſook the City of *Baſil*, and retired into *Alſatia*; where he likewiſe obtained great Reputation, as an *Alchymiſt*. He took Pleaſure in exploding the common and ordinary Way of practiſing Phyſic, and gloried in having, in ſo great a Meaſure, overthrown the Method of *Galen*, which he ſaw was imperfect and doubtful. In Conſequence hereof, however, he incurred the Diſpleaſure of the Phyſicians in general; whom he is ſaid to have treated with too much Contempt; valuing himſelf much on his own Improvements, or new Methods of Practice; even boaſting, that he could, by his Remedies, keep a Man alive for ſeveral Ages; whereas he himſelf died, when but 48 Years of Age, in 1541, and was buried in the Hoſpital of St. *Sebaſtian*, where may be ſeen his Epitaph.

We have his Works in eleven Volumes, by the Title of *Opera Medico-Chymica; ſive Paradoxa.* He wrote ſeveral other Treatiſes, that have not been publiſhed, which are to be found in the Cloſets of the Curious.

The LIFE of CONRADE GESNER.

CONrade Geſner was born at *Zurich*, in *Swiſſerland.* In the Year 1516, his Travels and indefatigable Studies in the Science of Phyſic and Philoſophy rendered him famous; ſo that he was ſirnamed the *Pliny* of *Germany.* This great Man begun his Studies in *France*; and having finiſhed them, travelled into *Italy.* At his Return, being choſen Profeſſor, he applied himſelf particularly to explain what belonged to Nature, and Natural Hiſtory, and to find out a more compendious Way of learning the Sciences than is commonly practiſed in moſt Univerſities. *Thuanus*, and other Hiſtorians gives him an high Encomium for his laudable Attempts, and for his laborious Lucubrations in the Proſecution of them. He died in the Year 1565, in the 49th Year of his Age. His principal Writings were as follow: His *Univerſal Library*;——*A natural Hiſtory of Animals*, in 4 Vols.——*A Treatiſe of the Nature of Serpents*, in 5 Books;——*A Catalogue of Plants*;——*A Treatiſe of the Baths in* Germany *and* Helvætia;——*A Treatiſe of Foſſils, Stones and Gems*, illuſtrated with Figures;——*A* Greek *and* Latin *Lexicon*, with ſome other Pieces of leſs Note.

The LIFE of PETER RAMUS.

PEter Ramus was born at *Vermandois*, in the Year 1515. Hiſtory makes mention of the Meanneſs of his Birth, and diſtreſſing Viciſſitudes of his younger Years, as ſuch Obſtacles to his great Acquirements in Philoſophy and the Mathematics, as render him the more admirable. His ſtrong Propenſity to Learning, when but eight Years of Age, induced him to leave the Place of his Birth, and go to *Paris*; from whence he was driven

driven by the Violence of the Times, as *Banoſius* expreſſes it, and though Fortune ſeemed every Way his Enemy, yet he returned thither again; and being inflamed with a moſt ardent Deſire of Learning, that he might attain the liberal Arts, he contented himſelf with a very ſlender Subſiſtence for ſeveral Months, which he received from *Honoratus Charpentier*, his Uncle. He was afterwards reduced by Neceſſity to undergo a hard Service, for many Years, in the College of *Navarre*; nevertheleſs, as he diſcharged his Duty faithfully to his Maſters, in the Day-time; ſo, in the Night, after the Example of the Philoſopher *Cleanthes*, (by the Help of his Oil and his Lamp) he, in a ſhort Time, acquired ſuch Knowledge in the Sciences, as qualified him for an advantageous Attendance on a Courſe of Philoſophy in the Schools for three Years and an Half; ſo that he merited the Eſteem of the moſt Ingenious, and was admitted to take the Degree of Maſter of Arts. He engaged to maintain Sentiments, or Doctrines, quite contrary to thoſe of *Ariſtotle*, then taught in the Schools.

Fregius ſays, "when he was about to take his Degrees, according to the Cuſtom of the Schools, he was obliged to give the Examiners, or Profeſſors, an Opportunity to diſpute with him. He therefore advanced this Problem, that all that *Ariſtotle* had laid down was falſe. The Profeſſors were aſtoniſhed at ſuch a Problem, and treated him with ſome Contempt on account of it."

However, he anſwered very ſmartly, all the Objections that were made to him for a whole Day; and that he might do it with future Succeſs and Advantage, he reſolved to examine *Ariſtotle*'s Doctrine more narrowly; and that he might defend his own Hypotheſis, he ſet about perfecting himſelf in Logic; and made his Reading, and alſo his Lectures of Eloquence, ſubſervient to it. The two firſt Books which he publiſhed, *viz.* his Inſtitutions of Logic, and his Animadverſions on *Ariſtotle*, occaſioned great Troubles in the Univerſity of *Paris*. The Profeſſors at *Paris*, who admired *Ariſtotle*, ſhould have refuted *Ramus*'s Book in their Writings and Lectures; but inſtead of keeping within the Bounds of an Academical War, they fell to proſecuting that *Anti-peripatetic* before the civil Magiſtrate, as a Man, who undermined the Foundations of Religion.

They

They raiſed ſo many Clamours, that the Cauſe was brought before the Parliament of *Paris*; but as ſoon as they perceived that it would be examined equitably, they got it removed from that Tribunal by their Intrigues, and brought it before the King's Council; and it appeared highly neceſſary, that *Francis* I. ſhould concern himſelf with it, and bring the Cauſe before himſelf, which was depending in the Parliament of *Paris*, between *Ramus* and *Anthony Goeva*. Some Judges were aſſigned to the Parties, and to make Report, according to the Difference between them, after they had heard them diſpute; but it ſeemed as only intended to ſave Appearances, ſuch Partiality was conſpicuous in their Conduct. *Goeva* had all the Advantage he could deſire; and the Books of *Ramus* were cenſured, and even prohibited throughout the Kingdom; and the Author was forbidden to teach Philoſophy. This happened in the Year 1443, and occaſioned great Joy among ſome of *Goeva*'s Friends and Favourers of the *Ariſtotelian* Doctrines, which they expreſſed in a moſt public and unbecoming Manner. *Ramus* could not but behave with ſome Degree of Reſentment for ſuch Treatment, and ſaid; "He hoped he ſhould ſee the Time, when ſuch Judges would not reap the ſame Pleaſure from what they had done."———

The Year following, the Plague raged at *Paris*, and occaſioned the Diſperſion of the Scholars of the College of *Prele*; but *Ramus* being ſolicited by his Friends to teach there, had quickly a great many Hearers. The *Sorbonne* endeavoured to have him expelled from that College; but could not ſucceed in it. He was maintained in his Place of Principal, by a Decree of the Parliament, and the Cardinal of *Lorrain* proved ſo good a Patron to him, that he obtained from *Henry* II. the Liberty of writing and ſpeaking in the Year 1547, and the Royal Profeſſorſhip of Philoſophy and Eloquence, in *July*, 1551. The Parliament of *Paris* had before this, maintained him in the Liberty of reading philoſophical Lectures, as well as Lectures on Eloquence; and their Decree had likewiſe put a Stop to many Proceedings, that might otherwiſe have proved greatly injurious to him. He was no ſooner made *Regius Profeſſor*, but he ſhewed a new Deſire of inveſtigating, and perfecting the Sciences, and purſued it with indefatigable Induſtry, notwithſtanding

ſtanding the reſtleſs, inveterate Spirit, that appeared in his Enemies, in ſome Meaſure, obſtructed his public Uſefulneſs. Some endeavoured to bring a Perſecution againſt him and his Colleagues for a wrong Pronunciation of the Letter Q. They carried their Attempts ſo far, that he was obliged for a while to abſcond. He went to *Fontainbleau* with the King's Leave. *Fregius* ſays, " He would have inveſtigated many Myſteries in Geometry in a few Months, if his Career had not been ſtopped by a fatal Calamity; but having obtained the King's Letters, he retired to the Royal Library at *Fontainbleau*, where he more fully reviſed and examined the Mathematical Lectures he had formerly read :———But when it came to be known that he was there, he did not think himſelf ſafe, and was forced to abſcond. He therefore thought of going to *Italy*; whither *Bologna* had given him a moſt honourable Invitation. He often turned his Eyes towards *Germany*: That was moſt dear to him, from the Love he bore to Mathematical Studies, and the ſuperior Liberty which was enjoyed there with reſpect to Religion. But, on the other Hand, Nothing ſurrounded him but Terrors, and the Apprehenſions of Death. The Intelligence he received, that the College of *Prele* was cruelly ſacked, and that his Library was plundered, and ſtripped of every Thing valuable, brought him back to the Caſtle of *Vincennes*, nearer the Town. But in 1563, the Peace being concluded between *Charles* IX. and the *Proteſtants*, he was again reſtored to his Place; wherein, he maintained himſelf with great Vigour, and endeavoured chiefly to make mathematical Learning flouriſh; which he did 'till the ſecond Civil War, in the Year 1567. He was then obliged to leave *Paris*, and put himſelf under the Protection of the *Hugonots*.

He was in their Army at the Battle of *St. Denys*. The Peace was made in a little Time after, and he was again eſtabliſhed in his Profeſſorſhip; but foreſeeing that the War would ſoon break out again, and being unwilling to be expoſed to the ſame Difficulties, he aſked the King's Leave to go, and ſee the *German* Univerſities, which was granted him. He made that Journey in the Year 1568, where he was received, and treated with great Honour and Eſteem. He returned into *France*, after the third War, and met an untimely Fate, in the

general Maſſacre of the Proteſtants at *Paris*, on St. *Bartholomew's-day*, 1571, as may be ſeen in the Paſſage, which *Moreri* has tranſcribed from *Thuanus*.

He was, without Doubt, a great Orator, according to the Teſtimony of *Brantome*, in the following Words. "*Ramus* was a moſt eloquent Orator, and there have been few like him; for his Eloquence was attended with an extraordinary graceful Delivery, which he diſplayed on all Occaſions; eſpecially, in Defence of the *Hugonots*, as a Sect, and in favour of his peculiar Tenets in Religion or Philoſophy. He was free from Avarice, as is evident from his refuſing ſome Profeſſorſhips, which might have been very profitable to him; but choſe rather to be a Teacher in the College of *Prele*, where he had no public Salary. He would not accept the Preſents that his Pupils were deſirous to make him, and maintained ſome Scholars at his own Charge. Whenever he went into his own Country, it was his principal Delight to aſſiſt ſuch poor Children as appeared to him of a promiſing Genius: Some of them he placed in the College of *Prele*, where he inſtructed them, and provided for their further Improvement. He refuſed to go into *Poland*, though he was promiſed to be well rewarded for the Encomium he ſhould beſtow upon the Duke of *Anjou*. His Anſwer was, "That Eloquence ought not to be a mercenary Thing; and that an Orator ought to be a Man of Probity:—He was remarkably ſober, chaſte and temperate, habituating himſelf to an Auſterity of Conduct, rather than any Kinds of Indulgence. He roſe early, and ſtudied much; and though he lived a ſingle Life, was never ſo much as ſuſpected of the Breach of Chaſtity. He was conſcientiouſly zealous for the reformed Religion. Some cenſure him as obſtinate in this Particular; but he bore all the Misfortunes which he incurred on theſe Accounts with a remarkable Firmneſs and Magnanimity. ———About three Years before his Deceaſe, he made his laſt Will, wherein he ordered 500 Livres ſhould be applied for the Salary of a Profeſſor, for teaching the Aſtronomical, Optical, Mechanical, and Geographical Sciences, in the Royal College ———He diſcovered a great Deſire to alter and regulate the Diſcipline of the reformed Churches; but in this, his Deſign was fruſtrated, by the Proceedings of a national Synod. Theſe

are

are the moſt remarkable, authentic Circumſtances in his Character. His Writings farther illuſtrate his Merit; a Catalogue of which, according to Monſ. *Bayle*, may be ſeen in Mr. *Teiſſier's Addition to the Eulogies*, Tom. i. p. 273.

The LIFE *of* JOHN-ANTHONY MAGINUS.

JOHN-ANTHONY MAGINUS, Profeſſor of Mathematics in the Univerſity at *Bologna*, was born at *Padua*, a City in *Italy*, in the Year 1536. This Perſon, we find, was remarkable for his great Aſſiduity in the Acquirement and Improvement of Knowledge in the mathematical Sciences, and ſeveral new Inventions for theſe Purpoſes, and for the extraordinary Favour he obtained with all the Princes of his Time. He was addicted to making Horoſcopes, and ſuch like Inſtruments; and was invited by the Emperor *Rodolphus* to come to *Vienna*, where he promiſed him a Profeſſor's Chair, about the Year 1597; but not being able to prevail on him to ſettle there, he nevertheleſs honoured him with a generous Penſion.

It is ſaid, that he was ſo much addicted to aſtrological Predictions, that he not only foretold many good and evil Events relative to Others with Succeſs; but even foretold his own Death, which came to paſs that ſame Year: But whenever he foretold any Events, he flattered None. Whilſt he foretold to One a Cardinal's Cap, or an honourable Employ, he forewarned Others of Accidents, Baniſhment, and Afflictions: Theſe he always repreſented as under the Influence of the Stars. This, Authors have attempted to account for, in ſome Meaſure, as a Prepoſſeſſion generally attending that Age, that few could allow themſelves to queſtion the Truth of it, or had Courage to oppoſe it. With reſpect to this Author's foretelling his own Death, (in which he was not much miſtaken in Time, or Manner) 'tis obſerved, that he was very fat and burly, and therefore foretold his dying ſuddenly. *Tomaſini* ſays,

ſays, that *Maginus*, being advanced to his 61ſt Year, was ſtruck with an Apoplexy, which ended his Days; and that a long while before, he had told Him and Others, that he was afraid of that Year. But at the ſame Time acknowledges, that he lived near eight Months afterwards. It ought not therefore to have been alledged, as an Argument of the aſtrological Skill of *Maginus*, that he found ſuch Malignities in his Nativity, with regard to his 61ſt Year.——*John-Anthony Roſſenus*, taking more Care of his Maſter, only ſaid, that *Maginus* died under an Aſpect of the Planets, which, according to his own Prediction, would prove fatal to him, and mentions *Ricciolus*, as affirming, that he had ſaid, the Figure of his Nativity, and his climacterical Year condemned him to die about that Time, which happened in the 62d Year of his Age, 1618, he left behind him a Son and a Daughter.

His Writings do Honour to his Memory, as they were very conſiderable, and upon learned Subjects; the Principal were the following: Firſt, his *Ephemerides*, in 3 Vols. from the Year 1580, to 1630.——2d, His *Tables of ſecondary Motions*.——3d, *Aſtronomical, Gnomonical, and Geographical Problems*.——4th, *A Theory of the Planets, according to* Copernicus.——5th, *A Confutation of* Scaliger's *Diſſertation concerning the Proceſſion of the Equinox*.——6th, *A Primum Mobile*, in 12 Books.——7th, *A Treatiſe of Plain and Spherical Trigonometry*.——8th, *A Commentary on* Ptolemy's *Geography*.——9th, *A Chorographical Deſcription of the Regions and Cities of* Italy, illuſtrated with 60 Maps, with ſome other Writings on aſtrological Subjects, which by all Means ought to be buried in oblivion.

The LIFE *of* GERRARD MERCATOR.

GErrard *Mercator* was born at *Ruremond* in the Low Countries, A. C. 1512. Hiſtory remarks his indefatigable Induſtry in acquiring Knowledge in the Sciences of *Geography* and *Mathematics*; ſo that he neglected, to a Fault, Eating and Sleeping. He compoſed a *Chronology*, a greater and leſſer *Atlas*, and ſome *Geographical* Tables, beſides other Books in Philoſophy and Divinity; and was ſo curious as well as ingenious, that he coloured his Maps, and what is very conſiderable, that he engraved himſelf a celeſtial and terreſtrial Globe, and made many other mathematical Inſtruments for the Uſe of the Emperor *Charles* V; and gave the moſt ample Proofs of his uncommon Skill in what he profeſſed. He died in 1594, aged 82 Years.

The LIFE *of* JOHN DEE.

JOHN *DEE*, a very conſiderable Mathematician, was born about the Year 1522. He publiſhed many Things in the mathematical Way; among others, he wrote uſeful Comments on *Euclid*'s *Elements*, tranſlated by *Billingſley*; to which he prefixed a very large Preface, deſcribing the ſeveral Arts and Sciences, in which *Euclid*'s *Elements* are of neceſſary Uſe. He was ſomewhat addicted to *Aſtrology*, which is to be wondered at in ſo eminent a Mathematician. His Character was ſo great, from a general Knowledge of the Sciences, as occaſioned him a great Number of Enemies and Calumniators; of which he grievouſly complained in the above-mentioned Preface; for, having been ſpeaking of the great Things that had been done by the *Thaumaturgic* Art, he has theſe Words: ‘ *And for theſe, and ſuch like marvellous Acts and Feats, naturally, mechanically, and mathematically made and contrived, ought any honeſt Student and modeſt Chriſtian Philoſopher to be accounted and called a Conjurer? Shall the Folly of Idiots and the Malice of the Scornful ſo much prevail, that he, who ſeeketh no worldly Gain or Glory, be*

condemned as a Madman, and injurious to the Public, with a great Deal more to the ſame Purpoſe. The Concluſion of his Preface is; *Written at my poor Houſe, at* Mortlack, Feb. 9, 1570.

The LIFE of JOHN KEPLER.

JOHN KEPLER, born at *Wertemberg*, in *Germany*, about the Year 1530, was the Diſciple of *Mæſtlinus*, a very great Mathematician and Aſtronomer, and of whom he learned the mathematical Arts, and became Profeſſor of thoſe Sciences to three Emperors, *viz. Matthias*, *Rudolphus*, and *Ferdinand* II. He was a Man of a moſt acute Genius, and a moſt ſubtle Enquirer into aſtronomical Matters. To this ſagacious Philoſopher we owe the firſt Diſcovery of the great Laws of the planetary Motions, *viz. that the Planets deſcribe* Aries, *proportioned to the Times*; *and that the Squares of the periodical Times were proportioned to the Cubes of their Diſtances*: And theſe are univerſally now known by the Name of *Kepler*'s *Laws*. But as this Man makes the greateſt Figure, and ſtands at the Head of the aſtronomical Claſs, we think it highly worthy to give an Account of him at large, which we ſhall do in the Words of that great Mathematician Mr. *Maclaurin*.

KEPLER had a particular Paſſion for finding Analogies and Harmonies in Nature, after the Manner of the *Pythagoreans* and *Platoniſts*; and to this Diſpoſition we owe ſuch valuable Diſcoveries as are more than ſufficient to excuſe his Conceits. Three Things, he tells us, he anxiouſly ſought to find the Reaſon of, from his early Youth; why the Planets were ſix in Number, why the Dimenſions of their Orbits were ſuch as *Copernicus* had deſcribed from Obſervations, and what was the Analogy, or Law of their Revolutions. He ſought for the Reaſons of the firſt two of theſe in the Properties of Numbers and plane Figures, without Succeſs. But at length reflecting, that while the plane regular Figures may be infinite in Number, the ordinate and regular Solids are five only, as *Euclid* had long ago demonſtrated; he imagined, that certain Myſteries in Nature might correſpond with this remarkable Limitation inherent

rent in the Eſſences of Things; the rather, that he found the *Pythagoreans* had made great Uſe of thoſe five regular Solids in their Philoſophy. He therefore endeavoured to find ſome Relation between the Dimenſions of thoſe Solids and the Intervals of the planetary Spheres; and imagining that a Cube, inſcribed in the Sphere of *Saturn*, would touch by its ſix Planes the Sphere of *Jupiter*, and that the other four regular Solids in like Manner fitted the Intervals that are betwixt the Spheres of the other Planets, he became perſuaded that this was the true Reaſon why the primary Planets were preciſely ſix in Number, and that the Author of the World had determined their Diſtances from the Sun, the Center of the Syſtem, from a Regard to this Analogy. Being thus poſſeſſed, as he thought, of the grand Secret of the *Pythagoreans*, and being mightily pleaſed with his Diſcovery, he publiſhed it in 1596, under the Title of *Myſterium Coſmographicum*.

KEPLER ſent a Copy of this Book to *Tycho Brahe*, who did not approve of thoſe abſtracted Speculations concerning the Syſtem of the World, but wrote to *Kepler*, firſt to lay a ſolid Foundation in Obſervations, and then, by aſcending from them, to ſtrive to come at the Cauſes of Things. This excellent Advice, to which we owe the more ſolid Diſcoveries of *Kepler*, deſerves to be copied from his own Account of it. "*Argu-*
"*mentum literarum* Brachei (ſays he) *hoc erat; uti ſuſpenſis ſpecu-*
"*lationibus a priori deſcendentibus, animum potius ad obſervationes,*
"*quas ſimul offerebat, conſiderandas adjicerem. Inque iis primo*
"*gradu facto, poſt demum, ad cauſas aſcenderem.*" In this Judgment the great Men of different Times have frequently conſpired, but few have faithfully followed it.

TYCHO, however, pleaſed with his Genius, prevailed with *Kepler* to reſide with him near *Prague* (where he paſſed the laſt Years of his Life, after having left his native Country on ſome ill Uſage) and to aſſiſt him in his aſtronomical Labours. Soon after this *Tycho* died, but *Kepler* made many important Diſcoveries from his Obſervations: He found that Aſtronomers had erred, from the firſt Riſe of the Science, in aſcribing always circular Orbits and uniform Motions to the Planets; that each of them moves in an Ellipſis, which has one of its *Foci* in the Center of the Sun; that the Motion of each is really unequable;

ble; and varies ſo, that a Ray ſuppoſed to be always drawn from the Planet to the Sun deſcribes equal Areas in equal Times.

It was ſome Years later before he diſcovered the Analogy there is between the Diſtances of the ſeveral Planets from the Sun, and the Periods in which they compleat their Revolutions. He eaſily ſaw, that the higher Planets not only moved in greater Circles, but alſo more ſlowly than the nearer ones; ſo that, on a double Account, their periodic Times were greater; *Saturn*, for Example, revolves at a Diſtance from the Sun nine Times and a Half greater than the Earth's Diſtance from it; and the Circle deſcribed by *Saturn* is in the ſame Proportion; and as the Earth revolves in one Year, ſo, if their Velocities were equal, *Saturn* ought to revolve in nine Years and a Half; whereas the periodic Time of *Saturn* is above Twenty-nine Years. The periodic Times of the Planets increaſe, therefore, in a greater Proportion than their Diſtances from the Sun; but not in ſo great a Proportion as the Squares of thoſe Diſtances; for if that was the Law of the Motions (the Square of $9\frac{1}{2}$ being $90\frac{1}{4}$) the periodic Time of *Saturn* ought to be above 90 Years. A mean Proportion betwixt that of the Diſtances of the Planets, and that of the Squares of thoſe Diſtances, is the true Proportion of the periodic Times; as the Mean betwixt $9\frac{1}{2}$ and its Square $90\frac{1}{4}$ gives the periodic Time of *Saturn* in Years. *Kepler*, after having committed ſeveral Miſtakes in determining this Analogy, hit upon it at laſt in 1618, *May* 15th; for he is ſo exact as to mention the preciſe Day when he found, that "The Squares of the periodic Times were always in the ſame Proportion as the Cubes of their mean Diſtances from the Sun." This is only a very brief and ſummary Account of the Fruits of his great Labours for many Years on the Obſervations made by *Tycho*.

When *Kepler* ſaw that his Diſpoſition of the five regular Solids amongſt the planetary Spheres was not agreeable to the Intervals between their Orbits, according to better Obſervations, he endeavoured to diſcover other Schemes of Harmony. For this Purpoſe, he compared the Motions of the ſame Planet at its greateſt and leaſt Diſtances, and of the different Planets in their ſeveral Orbits, as they would appear viewed from the Sun;

and

and here he fancied that he found a Similitude to the Diviſions of the Octave in Muſic. Theſe were the Dreams of this ingenious Man, of which he was ſo fond, that, hearing of the Diſcovery of four new Planets (the Satellites of *Jupiter*) by *Galileo*, he owns that his firſt Reflexions were from a Concern how he could ſave his favourite Scheme, which was threatened by this Addition to the Number of the Planets. The ſame Attachment led him into a wrong Judgment of the Sphere of the fixed Stars: For being obliged, by his Doctrine, to allow a vaſt Superiority to the Sun in the Univerſe, he reſtrains the fixed Stars within very narrow Limits. Nor did he conſider them as Suns, placed in the Centers of their ſeveral Syſtems, having Planets revolving round them; as the other Followers of *Copernicus*, from their having Light in themſelves, their immenſe Diſtances, and from the Analogy of Nature, have concluded them to be. Not contented with theſe Harmonies, which he had learned from the Obſervations of *Tycho*, he gave himſelf the Liberty to imagine ſeveral other Analogies, that have no Foundation in Nature, and are overthrown by the beſt Obſervations. Thus from the Opinions of *Kepler*, tho' moſt juſtly admired, we are taught the Danger of eſpouſing Principles, or Hypotheſes, borrowed from abſtracted Sciences, and of applying them, with ſuch Liberty, to natural Enquiries.

A more recent Inſtance of this Fondneſs, for diſcovering Analogies between Matters of abſtracted Speculation and the Conſtitution of Nature, we find in *Huygens*, one of the greateſt Geometricians and Aſtronomers any Age has produced: When he had diſcovered that Satellite of *Saturn*, which, from him, is ſtill called the *Huygenian* Satellite, this, with our Moon, and the four Satellites of *Jupiter*, completed the Number of ſix ſecondary Planets then diſcovered in the Syſtem: And, becauſe the Number of the primary Planets is alſo ſix, and this Number is called by Mathematicians a perfect Number, (being equal to the Sum of its aliquot Parts, 1, 2, and 3,) *Huygens* was hence induced to believe that the Number of the Planets was complete, and that it was in vain to look for any more. We do not mention this to leſſen this great Man, who never perhaps reaſoned in ſuch a Manner on any other Occaſion; but only to ſhew, by another Inſtance, how ill-grounded Rea-

ſonings of this Kind have always proved: For, not long after, the celebrated *Caſſini* diſcovered four more Satellites about *Saturn*, ſo that the Number of ſecondary Planets now known in the Syſtem is ten. The ſame *Caſſini* having found that the Analogy, diſcovered by *Kepler*, between the periodic Times and the Diſtances from the Center, takes Place in the leſſer Syſtems of *Jupiter* and *Saturn*, as well as in the great ſolar Syſtem; his Obſervations overturned that groundleſs Analogy which had been imagined between the Number of the Planets, both primary and ſecondary, and the Number ſix; but eſtabliſhed, at the ſame Time, that Harmony in their Motions, which will, afterwards, appear to flow from one real Principle extended over the Univerſe.

But to return to *Kepler*, his great Sagacity, and continual Meditation on the planetary Motions, ſuggeſted to him ſome Views of the true Principles from which theſe Motions flow. In his Preface to the Commentaries concerning the Planet *Mars*, he ſpeaks of Gravity as of a Power that was mutual betwixt Bodies, and tells us, that the Earth and Moon tend towards each other, and would meet in a Point ſo many Times nearer to the Earth than to the Moon, as the Earth is greater than the Moon, if their Motions did not hinder it. He adds, that the Tides ariſe from the Gravity of the Waters towards the Moon. But not having juſt enough Notions of the Laws of Motion, he does not ſeem to have been able to make the beſt Uſe of theſe Thoughts; nor does he appear to have adhered to them ſteadily, ſince in his *Epitome* of Aſtronomy, publiſhed eleven Years after, he propoſes a phyſical Account of the planetary Motions, derived from different Principles.

He ſuppoſes, in that Treatiſe, that the Motion of the Sun on his Axis is preſerved by ſome inherent vital Principle; that a certain Virtue, or immaterial Image of the Sun, is diffuſed with his Rays into the ambient Spaces, and, revolving with the Body of the Sun on his Axis, takes hold of the Planets and carries them along with it in the ſame Direction; as a Loadſtone turned round in the Neighbourhood of a magnetic Needle makes it turn round at the ſame Time. The Planet, according to him, by its *Inertia* endeavours to continue in its Place, and the Action of the Sun's Image and this *Inertia* are in a perpetual

Struggle,

Struggle. He adds, that this Action of the Sun, like to his Light, decreaſes as the Diſtance increaſes; and therefore moves the ſame Planet with greater Celerity when nearer the Sun, than at a greater Diſtance. To account for the Planet's approaching towards the Sun as it deſcends from the *Aphelium* to the *Perihelium*, and receding from the Sun while it aſcends to the *Aphelium* again, he ſuppoſes that the Sun attracts one Part of each Planet, and repels the oppoſite Part; and that the Part which is attracted is turned towards the Sun in the Deſcent, and that the other Part is towards the Sun in the Aſcent. By Suppoſitions of this Kind, he endeavoured to account for all the other Varieties of the celeſtial Motions.

Now the Laws of Motion are better known than in *Kepler*'s Time, it is eaſy to ſhew the Fallacy of every Part of this Account of the planetary Revolutions. The Planet does not endeavour to ſtop in its Place in conſequence of its *Inertia*, but to perſevere in its Motion in a right Line. An attractive Force makes it deſcend from the *Aphelium* to the *Perihelium* in a Curve concave towards the Sun: But the repelling Force, which he ſuppoſed to begin at the *Perihelium*, would cauſe it to aſcend in a Figure convex towards the Sun. We ſhall have occaſion to ſhew afterwards, from Sir *Iſaac Newton*, how an Attraction or Gravitation towards the Sun, alone, produces the Effects, which, according to *Kepler*, required both an attractive and repelling Force; and that the Virtue which he aſcribed to the Sun's Image, propagated into the planetary Regions, is unneceſſary, as it could be of no Uſe for this Effect, tho' it were admitted. For now his own Prophecy, with which he concludes his Book, is verified; where he tells us, that "The Diſcovery of ſuch Things was reſerved for the ſucceeding Age, when the Author of Nature would be pleaſed to reveal thoſe Myſteries."

The Works of this celebrated Author are many and valuable; as

1. His *Coſmographical Myſtery*, in 1596.
2. *Optical Aſtronomy*, in 1604.
3. His Account of a new Star in *Sagittarius*, 1605.
4. His *New Aſtronomy*; or, *Cæleſtial Phyſics*, in Commentaries on the Planet *Mars*.

5. *Diſ-*

5. *Dissertations*; with his *Nuncius Siderius* of *Galileo*, in 1610.

6. His *New Ephemerides*, from 1617, to 1620.

7. His three first Books of the *Copernican Astronomy*, in 1618.

8. His *Harmony* of the *World*, and three Books of *Comets*, in 1619.

9. His *Cosmographical Mystery*, 2d Edition, with Notes, in 1621.

10. The three last Books of his *Copernican Astronomy*, in 1622.

11. His *Astronomical Tables* (called the *Rudolphine Tables*) in Honour of the Emperor *Rudolphus*, his great and learned Patron, in the Year 1627: Besides these, he wrote several Things in *Chronology*, the *Geometry* of *Solids*, *Trigonometry*, *Logarithms*, and an excellent Treatise of *Dioptrics* for that Time.

His Death was universally regretted by the learned World, but the Time of it is not certain.

The LIFE of CHRISTOPHER CLAVIUS.

CHRISTOPHER CLAVIUS, a *German* Jesuit, born A. C. 1537, at *Bamberg*, was famous for his Knowledge in the Mathematics; and one, who distinguished himself in the Correction of the Calendar, of which he afterwards undertook a Defence: But notwithstanding his being allowed by many to be an Adept in the Sciences of *Geometry* and *Astronomy*, his Works were differently represented, and his Merit, as an Author, set in very different Points of Light by his Cotemporaries and Successors. He is allowed by all, to have applied himself with great Assiduity to the Knowledge of those Sciences, and that for fifty Years; in which Time, he made it his Care to illustrate the most difficult and important Propositions in *Euclid*; which he published with large Annotations in two Volumes 8vo. But whether through an Ambiguity in the Manner of conveying his Ideas, or their peculiar Interest clashing with each other, we find *Scaliger* very forward to censure his Judgment and Skill in those very Branches of Literature. Others, in like Manner,

ner attribute a great Degree of Modeſty and Humility to *Clavius*; while others intimate, that he was ſo ſenſible of the Acquirements and Proficiency which he had made, as to value himſelf upon it, and be very tenacious of his Honour, on this Account. *Alegcombe* gives him this Character: "Though no Man, ſays he, was ever more remarkable for his Piety and Learning; yet his Modeſty was ſuch, that he preferred all Men before himſelf." The Manner of his Death is ſaid to be lingering; and it is mentioned by one Hiſtorian, that he died at *Rome*, laden with Years and Merit, on the 6th of *February*, in the Year 1612, aged 75 Years.

The LIFE of JOHN BAPTISTA PORTA.

Baptiſta de la Porta, known by the Name of *Giovan Baptiſta de la Porta*, of *Naples*, lived about the End of the 16th Century, famous not only for his Skill in Philoſophy, Mathematics, Phyſic, *&c.* but for his indefatigable Endeavours, to improve and propagate the Knowledge of thoſe Sciences, for which he not only eſtabliſhed private Schools for particular Sciences, but to the utmoſt of his Power, promoted public Academies. He had no ſmall Hand in eſtabliſhing the Academy at *Gli Ozioni*, at *Naples*, and had one in his Houſe, called *de Secreti*, whereunto none were admitted, but ſuch who had made ſome new Diſcoveries in Nature. His Works were many, and gave the fulleſt Proof of an extenſive Genius: The Principal of which are are as follow.

I. His *Natural Magic*, a Book abounding with curious Experiments; but contains nothing of Magic, in the common Acceptation of the Word, as he pretends to nothing above the Power of Nature.

II. *Elements of Curved Lines.*

III. *A Treatiſe of Diſtillation.*

IV. *A Treatiſe of Arithmetic.*

V. *Concerning the ſecret Notes, or Marks of Letters.*

VI. *Of optical Refractions.*

VII. *A Treatiſe of Fortification.*

VIII. *A Treatiſe of Phyſiognomy*; with other Pieces of leſs Note, and ſome Plays. He died at *Piſa*, in the Kingdom of *Naples*, in 1615; but we meet with no particular Account of the Manner of his Death.

The LIFE *of Sir* FRANCIS BACON.

FRANCIS BACON, Viſcount of St. *Alban*'s, and High-Chancellor of *England*, in the Reign of King *James* the Iſt, deſcended from Sir *Nicholas Bacon*, Lord-Keeper of the Great Seal, and his Mother *Anne*, one of the Daughters of Sir *Anthony Cook*, Tutor to King *Edward* VI. a Lady equally diſtinguiſhed by her Piety, Prudence and Learning. She was the ſecond Wife of Sir *Nicholas Bacon*; and this *Francis*, her ſecond Son, was born at *York-Houſe* in the *Strand*, on the 22d of *January*, 1561. His Infancy being paſt, and his noble Genius being cultivated and encouraged by his excellent Parents, gave early Proofs of its ſurpriſing Strength and Pregnancy; inſomuch that, we may juſtly ſay, his Fame commenced with his Childhood, and accompanied him to his Grave; for ſo remarkably conſpicuous were his Parts, even in his tender Years, that Perſons of great Worth and high Dignity delighted in converſing with him, while a Boy; and Queen *Elizabeth* herſelf was ſo charmed with the Solidity of his Senſe, and the Gravity of his Behaviour, that ſhe would often call him her *young Lord-Keeper*; a happy Preſage! which in the ſucceeding Reign was fully accompliſhed. When he had acquired the neceſſary Rudiments of Learning, to qualify him for academical Studies, he was ſent to the Univerſity of *Cambridge*, where, on the 16th of *June*, 1573, he was entered of *Trinity College*, under Dr. *John Whitgift*, afterwards Archbiſhop of *Canterbury*, being then in the 12th Year of his Age. The Quickneſs of his natural Parts, aſſiſted by an uncommon Diligence and Application, under the Direction of as able and careful a Tutor, as any that learned Age afforded, enabled our young Scholar to make a ſurpriſing Progreſs in his Studies, inſomuch that, before he was full 16 Years of Age, he had not only run through

through the whole Circle of the liberal Arts, as they were then taught, but began to perceive thoſe Imperfections in the reigning Philoſophy, which he afterwards ſo effectually expoſed, and thereby not only overturned that Tyranny, which prevented the Progreſs of true Knowledge, but laid the Foundation of that free and uſeful Philoſophy, which has ſince produced ſo many great and glorious Diſcoveries. His Father, the Lord-Keeper, diſcovering in his Son ſuch a Ripeneſs of Judgment and Diſcretion, reſolved to ſend him, young as he was, to *France*, that he might improve himſelf in the Knowledge of the World, under a Miniſter, as capable and as honeſt as that Age produced, Sir *Amias Powlet*, then the Queen's Ambaſſador at *Paris*. His Behaviour, while in the Houſe of that famous Stateſman, was ſo well conducted, that he gained the Eſteem and Confidence of Sir *Amias* to ſuch a Degree, as to be entruſted with a Commiſſion of Importance to the Queen, which required both Secrecy and Diſpatch, and was executed with great Applauſe. He afterwards returned to *Paris*, and viſited ſeveral Provinces, the better to acquaint himſelf with the Country, and to improve his Knowledge of Men and Things, for which he was ſo peculiarly qualified and diſpoſed. But it was not long before the Progreſs of his Travels and Improvements abroad received a ſudden Check by the Death of his Father, the Lord-Keeper, before any Proviſion was made for his Support in Life, ſuitable to his Character and Dignity, tho' it was evidently intended. He thereupon returned Home, and applied himſelf to the Study of the common Law, and for that Purpoſe entered himſelf of the Honourable Society of *Gray's-Inn*, where his ſuperior Talents rendered him the Ornament of the Houſe, and the Gentleneſs and Affability of his Deportment procured him the Affection of all its Members. He ſpent his Time, during the firſt Years of his Reſidence there, in very hard Study, not confining himſelf entirely to the Law, but indulging his extenſive Genius, in the free Contemplation of the whole Circle of Science. This appears clearly from hence, that he framed, (as he himſelf tells us) not long after his being ſettled here, the Plan of that great philoſophical Work, which will not only render his Name immortal, but do Honour to his Age and Country. 'Tis this Part of his Cha-

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racter and Writing, which falls under our Notice; nevertheleſs, that we may give a more impartial Hiſtory of him, we ſhall briefly enter upon the Memoirs of this noble Author, as a Stateſman and Politician, in which he diſcovered his ſuperior Talents, by his Speeches, Writings, *&c.* He was appointed one of the Queen's Council, when he was but 28 Years of Age. In the laſt ten Years of the Queen's Reign, he made a great Figure in the Houſe of Commons, and there he applied himſelf to Politics; for the Queen and Lord Treaſurer *Burleigh* employed his Head and Hands in Matters of State. He was then, in his younger Years, attached to the Intereſt of the Earl of *Eſſex*, whom he endeavoured to diſſuade from thoſe raſh Meaſures which proved his Ruin. Upon the Acceſſion of King *James*, he was ſoon raiſed to conſiderable Honours. In the firſt Year of his Reign, he was knighted at *Whitehall*, and next Year was made one of the King's Council learned in the Law, and wrote in favour of the *Union* of the two Kingdoms of *Scotland* and *England*, which the King ſo paſſionately deſired. In 1607, he was appointed Solicitor General. In 1611, he was made joint Judge with Sir *Thomas Vivaſor*, then Knight-Marſhal of the Knight-Marſhal's Court, then lately erected, within the Verge of the King's Houſe. And in 1613, he ſucceeded Sir *Henry Hobart*, as Attorney-General. In 1616, he was ſworn one of the Privy-Council. He then applied himſelf to the reducing and recompoſing the Laws of *England:* He diſtinguiſhed himſelf, when Attorney-General, by his Endeavours to reſtrain the Cuſtom of Duels, then very frequent. In 1617, he was appointed Keeper of the Great Seal. In 1618, he was made Lord Chancellor of *England*, and created Lord *Verulam*: But in the Midſt of theſe Honours and Applauſes, he forgot not his favourite Study of Philoſophy, as we learn from ſeveral of his Letters. In *January* 27, 1621, he was advanced to the Dignity of Viſcount St. *Alban*'s, and appeared with the greateſt Splendour at the Evening of the Seſſion of Parliament, in the 30th of that Month: But he was ſoon after ſurpriſed with a Reverſe of Fortune; for, about the 12th of *March* following, a Committee of the Houſe of Commons was appointed to inſpect the Abuſes of the Courts of Juſtice. The firſt Thing they fell upon was, Bribery and Corruption,

ruption, of which the Lord Chancellor was accuſed by *Aubery* and *Egerton*, who affirmed, that they had procured Money to be given him, to promote their Cauſes depending before him. On *Monday*, *April* 29, he ſent his Confeſſion and Submiſſion to the Houſe of Lords, in which he confeſſed ſome Facts, denyed ſome, and palliated others. The Lords agreed to ſequeſter the Seal; and on *May* the 3d, the Lords pronounced the following Sentence, "That the Lord Chancellor ſhould undergo "the Fine of 40,000 *l.* and be impriſoned in the Tower du-"ring the King's Pleaſure; that he ſhould be for ever incapa-"ble of any Office, Place, or Employment in the State, "and never ſit in Parliament, or come within the Verge of "the Court." There are various Opinions concerning his Guilt of the Points charged againſt him. However, he retired after a ſhort Confinement, from the Engagements of an active Life, to that of a contemplative one; and it appears from the Works he there wrote, that he ſpent the remaining Part of his Life, which was about five Years, in cloſe Study; when he wrote the greateſt Part of his *Latin* Works on Philoſophical and other Subjects; in ſome of which, he diſcovered an humble Conſciouſneſs of his own Weakneſs and Imperfection. The ſevere Winter, which followed the infectious Summer of 1625, brought him very low; but the Spring reviving his Spirits, he made a little Excurſion into the Country, in order to try ſome Experiments in Natural Philoſophy; in which Journey he was taken ſo ill, that he was obliged to ſtay at the Earl of *Arundel*'s Houſe, at *Highgate*, about a Week, and there he expired on the Ninth of *April*, 1626, being *Eaſter-day*, and was privately buried in the Chapel of St. *Michael*'s Church, within the Precincts of *Old Verulam*; in the Chancel of which Church, his faithful Friend and indefatigable Servant in his Troubles, Sir *Thomas Meautys*, cauſed a neat Monument of white Marble to be erected, with his Lordſhip's Effigies, ſitting in a contemplative Poſture; with an Inſcription, written by Sir *Henry Wotton*. The moſt eminent Scholars at the Univerſity ſhewed their Concern for his Death, and the juſt Senſe they had of the Honour reſulting to that noble Seminary of Learning, from his receiving his Education there, by compoſing Verſes in ſeveral Languages on that Occaſion, which

were afterwards printed. The ſame Juſtice Poſterity has alſo rendered to his Memory, inſomuch that, it may be truly ſaid, his own Prophecy has been fulfilled; and that, after flying through foreign Countries for a Time, his Reputation now ſtands fixed at Home, where all admire the Strength and Beauty of his Genius, and, in Favour of its Efforts, would willingly forget that a Man ſo endowed, was not altogether exempt from Failings.

The above is a ſhort hiſtorical Account of Sir *Francis Bacon*, as we find it in the general Writers of his Life; but the excellent Reflections of the judicious Mr. *Mac Laurin*, on this Author and his Writings, claim every curious Reader's Notice and Attention, which we ſhall therefore give in his own Words, as follows:

Sir *Francis Bacon* Lord *Verulam*, who was Cotemporary with *Galileo* and *Kepler*, is juſtly held amongſt the Reſtorers of true Learning, but more eſpecially the Founder of *experimental Philoſophy*. When he was but 16 Years old, he began to diſlike the vulgar Phyſics, and what was called *Ariſtotle*'s Philoſophy. He ſaw there was a Neceſſity for a thorough Reformation in the Way of treating natural Knowledge, and that all Theory was to be laid aſide that was not founded on Experiment. He propoſed his Plan in his *Inſtauratio Magna*, with ſo much Strength of Argument, and ſo juſt a Zeal, as renders that admirable Work the Delight of all who have a Taſte for ſolid Learning.

He conſiders natural Philoſophy as a vaſt Pyramid, that ought to have the Hiſtory of Nature for its Baſis; an Account of the Powers and Principles that operate in Nature, which he calls the phyſical Part, for its ſecond Stage; and the metaphyſical Part, that treats of the formal and final Cauſes of Things, for its third Stage. But as for the Summit of this Pyramid, the Supreme of Nature, *opus quod operatur Deus a principio uſque ad finem*, as he expreſſes it, he doubts if Men can ever attain to the full Knowledge of it. The Philoſophers who ſtrive to erect theſe by the Force of abſtract Speculation, he compares to the Giants of old, who, according to the Poets, endeavoured to throw Mount *Oſſa* upon *Pelion*, and *Olympus* upon *Oſſa*.

An

An Artiſt, ſays this noble Author, would expoſe himſelf to the juſteſt Ridicule, who, in order to raiſe ſome vaſt Obeliſk, ſhould attempt it by the Force of his Arms, inſtead of employing the proper Machines; or, if after finding himſelf unequal to the Taſk, he ſhould call for the Aid of more Workmen in the ſame Way. Would he appear leſs ridiculous, if he ſhould next ſet about chuſing his Men, and examining them carefully, that he might employ the Vigorous and Robuſt only? Or, if after he found this was to no Purpoſe, he ſhould then apply himſelf to ſtudy the athletic Art, and learn to compoſe curious Ointments for ſtrengthening their Limbs, or conſult learned Phyſicians, who, by proper Medicaments, ſhould promote their Health and Vigour? Nor are they leſs abſurd, in our noble Author's Judgment, who labour to interpret Nature by the Force and Subtlety of Genius only, tho' they ſhould aſſume the Aid of the acuteſt Men in the ſame Work, and carry the Dialectics, or the Art of Reaſoning, to the greateſt Height for this Purpoſe.

The *empirical* Philoſophers, thoſe who have no higher View, than to collect the Hiſtory of Nature, he compares to the Ants, who gather the Grain and lay it up as they find it; (unleſs it be true, as is reported of them, that they firſt take Care it ſhould not germinate or become fruitful;) the *Sophiſts* to the Spiders, who form their Webs from their own Bowels, to catch unwary Inſects in their aerial Flights; while the Bee that gathers the Matter from the Flowers of the Field, from which, with admirable Skill ſhe makes her Honey, is the Emblem of the true Philoſopher; who neither truſts wholly to his own Underſtanding, nor contents himſelf with recording the Matter with which he is furniſhed from natural Hiſtory or mechanical Experiments; but, by reaſoning ſkilfully from them, brings forth Truth and Science, the great and noble Production of the human Faculties. From the Neglect of Experiments it aroſe, that while Nature was infinite, natural Knowledge was at a Stand for many Ages, and that the various Sects wandered in the Dark, without kindling any Light to guide them, or finding any Path to conduct them in her Mazes. But, from a happy Conjunction of the experimental and rational Faculties, Lord *Verulam* conceived the higheſt Expectations. *Alexander*, he tells

tells us, and *Cæsar* performed Exploits that are truly greater than those reported of King *Arthur*, or *Amadis de Gaul*; tho' they acted by natural Means, without the Aid of Magic or Prodigy.

It was with great Justice, and very seasonably, he reprehended those *, who, "upon a weak Conceit of Sobriety, or "ill-applied Moderation, thought or maintained that a Man "can search too far, or be too well studied in the Book of "God's Word, or in the Book of God's Works. But rather, "he adds, let Men awake themselves, and chearfully endea-"vour and pursue an endless Progress and Proficiency in both; "only let them beware lest they apply Knowledge to Pride, "not to Charity, to Ostentation, not to Use." He observes, that a superficial Taste of Philosophy may perchance incline the Mind to Atheism; but a full Draught thereof brings it back again to Religion: In the Entrance of Philosophy, when the second Causes most obvious to the Senses offer themselves to the Mind, we are apt to cleave unto them, and dwell too much upon them, so as to forget what is superior in Nature. But when we pass further, and behold the Dependency, Continuation and Confederacy of Causes, and the Works of Providence, then, according to the Allegory of the Poets, we easily believe that the highest Link of Nature's Chain must needs be tied to the Foot of *Jupiter*'s Chair; or perceive, "That Philosophy, "like *Jacob*'s Vision, discovers to us a Ladder, whose Top "reaches up to the Footstool of the Throne of God."

The *Aristotelian* Philosophy appeared unsatisfactory to Lord *Bacon*, not from want of Esteem for its Author, whom he always used to extol; but because it seemed fit for Disputes only, and incapable of producing real Fruit. *Aristotle*, he said, had suited his Physics to his Logic, instead of giving such a Kind of Logic as might be of real Use in Physics. To supply this Defect, he composed his *Novum Organum*; where his chief Design is to shew how to make a good *Induction*, as *Aristotle*'s was to teach how to make a good *Syllogism*. Had the Philosophers, since Lord *Verulam*'s Time, adhered more closely to his Plan, their Success had been greater; and Sir *Isaac Newton*'s Philosophy

* *Bacon*'s Advancement of Learning, Lib. I.

ſophy had found the Learned ſo full of Prejudices againſt it, in favour of ſome Syſtems lately invented and mightily extolled by ſpeculative Men; that while all admired the ſublime Geometry which ſhone throughout his Work, few for ſome Time appeared to be diſpoſed to hearken to his Philoſophy, or in a Condition to judge of it impartially.

However, Lord *Bacon*'s Exhortations and Example had a good Effect; and experimental Philoſophy has been much more cultivated ſince his Time than in any preceding Period.

His Works were of a miſcellaneous Nature. Thoſe on philoſophical Subjects were chiefly wrote in *Latin*; the Principal of which are as follow:——The *Novum Organum*; —— his *Treatiſe De Augmentis Scientiarum*; or, *The Advancement and Proficiency of Learning*;——his *Natural Hiſtory of Winds*;—— *Of Life and Death*;——*Of Condenſation and Rarefaction*;—— the Tract *De Sapientiâ Veterum*; or, *The Wiſdom of the Antients*; ——*The Animated Aſtronomy*;——*The New Atlantis*;—— and *Sylva Sylvarum*; with many other particular Tracts, which are not at this Time of much Importance to mention.

The LIFE of Sir HENRY SAVILE.

HENRY SAVILE, was born at *Bradley*, near *Halifax*, in *Yorkſhire*, *November* 30, 1549, and was ſecond Son of *Henry Savile*, Eſq. He was firſt entered into the Univerſity of *Oxford*, in the Beginning of the Year 1561, and on *January* the Fourteenth, 1565, took the Degree of Bachelor of Arts, and afterwards, was elected Fellow of *Merton College*, *April* 30, 1570. He took the Degree of Maſter of Arts; and growing famous for his Skill in the *Greek* Language, and Mathematics, (in which Science he voluntarily read a Lecture for ſome Time) he was elected Proctor of the Univerſity, for the Years 1575 and 1576, with *John Underhill*, of *New College*, afterward Rector of *Lincoln College*, and Biſhop of *Oxford*, in 1578. He travelled into *France*, and other Countries, and improving himſelf in learning Languages and the Knowledge of Men, returned a moſt accompliſhed Perſon; and about that

Time became Tutor to Queen *Elizabeth*, in the *Greek* Tongue, who had a great Eſteem for him. In 1585, he was made Warden of *Merton College*, and in 1596, Provoſt of *Eaton College*, in which Character he made it his great Care to promote Perſons diſtinguiſhed for Learning. When King *James* the Iſt came to the Crown, he would have advanced him to greater Dignity in the Church or State, but our Author accepted only the Honour of Knighthood from his Majeſty at *Windſor*, *Sept.* 21, 1604; about which Time, his Son and Heir, *Henry*, dying, he beſtowed great Part of his Eſtate in the Publication of Books, which obtained him the higheſt Character among all Perſons of diſtinguiſhed Learning in that Age. Dr. *William Biſhop* ſtiles him a Man of admirable Skill in the *Greek* and *Latin* Languages, and a laborious Searcher, and generous Publiſher of the Remains of venerable Antiquity. This Character was confirmed by *Iſaac Caſaubon*, *John Boyle*, *Joſeph Scaliger*, Dr. *Richard Montague*, and Others, who were Cotemporaries with him, and well acquainted with his Writings. — But that which ſtill more inhances his Character is, that in the Year 1619, he founded both an Aſtronomical and Geometrical Lecture in *Oxford*, and gave the Former to Dr. *Bambridge*, and the Latter to Mr. *Briggs*, and liberally endowed the Profeſſorſhips. ——— Sir *Henry* had himſelf for ſome Time diſcharged that Province, and read thirteen Lectures upon the firſt eight Propoſitions of *Euclid*'s *Elements*, (which were afterwards printed) and then he ſurrendered the Chair to Mr. *Briggs*, after taking Leave of his Audience, in his laſt Lecture, with theſe Words, *Trado lampadem ſucceſſori meo, doctiſſimo viro, qui vos ad intima Geometriæ myſteria perducet.* He died at *Eaton College*, *Feb.* 19, 1621, and was interred in the Chapel there, near the Body of his Son *Henry*, who died in 1604, leaving behind him an only Daughter, named *Elizabeth*, who afterwards married Sir *John Sedley*, of *Kent*, Bart. Upon the News of Sir *Henry*'s Death, the Vice-Chancellor of *Oxford* and the Doctors ordered a Speech to be publicly made in Honour of him; which was done by Mr. *Thomas Goffe*, of *Chriſt Church*, and ſhortly after publiſhed; with ſeveral Copies of Verſes added to it; and an honorary Monument was erected to him in the South Wall, at the upper End of the Choir of *Merton College*.

His

His Works were as follow:

I. He tranſlated into *Engliſh*, *The End of* Nero, *and the Beginning of* Galba, *Four Books of the Hiſtories of* Cornelius Tacitus, and *The Life of* Agricola; *with Notes.* Printed in *London*, 1581.

II. *A View of certain military Matters*, 1598.

III. *Faſti regum & epiſcoporum Angliæ uſque ad Willielmum Seniorem*, Fol. 1596.

IV. A noble Edition of St. *Chryſoſtom*'s Works in *Greek*, printed at *Eaton*, 1613.

V. *Thomæ Bradwardini archiepiſcopi, olim Cantaurienſis, de cauſâ Dei contra Pelagium, & de virtute cauſarum ad ſuos Mertonenſes, libri tres, Lon.* 1618.

VI. *Prælectiones* XIII *in principium Elementorum Euclidis, Oxoniæ, habitæ, ann.* 1620.

VII. *Oratio coram reginâ Elizabethâ. Oxoniæ, habita, ann.* 1592.

VIII. He tranſlated into *Latin*, King *James*'s *Apology for the Oath of Allegiance.*

He likewiſe publiſhed *A Tract on the Original of Monaſteries*, ——and *An Oration on the Union of England and Scotland*;—— with Notes on many of his Books; —— as alſo *Letters to Mr. Camden, &c. &c.*

The LIFE of JOHN NEPER, BARON *of* MARCHISTON.

JOHN *NEPER*, or *Napier*, commonly called Lord *Neper*, and Baron of *Marchiſton*, deſcended from a very antient and honourable Family, near *Edinburgh*. His Father, Sir *Archibald*, was knighted by King *James* VI. and was made Maſter of the Mint, which Office he ſuſtained with Dignity. His Son and Heir, whoſe high Attainments in many Branches of uſeful Literature, render his Memory valuable to Poſterity, was born in the Year 1550. His Father, diſcovering a very early Propenſity in his Son to Reading and Study, made it his Care to give him every proper Aſſiſtance for his Improvement,

which

which joined with an uncommon Aſſiduity, produced many new, curious, and uſeful Inventions, ſuch as do Honour to his Abilities in the mathematical Science, amongſt which is his Invention of what is commonly called *Lord Neper's Bones*, or *Rods*.

His Invention of the *Five circular Parts*, is no ſmall Improvement in Trigonometry; but above all, his Invention of LOGARITHMS, diſcover his deep Penetration and amazing Genius.

Mr. *John Wood* tells us, "That one Dr. *Craig*, a *Scotchman*, coming out of *Denmark* into his own Country, called upon *John Neper*, Baron of *Marchiſton*, near *Edinburgh*, and told him (among other Diſcourſes) of a new Invention in *Denmark*, by *Longomontanus*, as 'tis ſaid to ſave the tedious Multiplication and Diviſion in aſtronomical Calculations. *Neper* being ſolicitous to know farther of him concerning this Matter, he could give no other Account of it, than that it was by proportional Numbers, which Hint *Neper* taking, he deſired him at his Return to call upon him again." *Craig*, after ſome Weeks had paſſed, did ſo, and *Neper* then ſhewed him a rude Draught, of what he called *Canon mirabilis Logarithmorum*. As the Story is told, one may think it ſtrange, that *Longomontanus* ſhould no where lay claim to the Honour of this admirable Invention, but leave the Glory of its firſt Diſcovery to be ſolely aſcribed to the Baron of *Marchiſton*. This Invention was no ſooner known, than it gained the general Applauſe of the eminent Mathematicians of that Age, who found it to anſwer what the noble Author had ſaid of it, in his Dedication to Prince *Charles*. But no one more extolled it than Mr. *Briggs*, who ſpeaks thus of it. "*Neper*, Lord of *Marchiſton*, has ſet my Head and Hands at Work with his new and admirable Logarithms." In 1616, the Baron publiſhed his *Rabdologia*, in the Dedication of which to the Lord Chancellor *Seton*, he mentions another Species of Logarithms, different from what he had publiſhed in 1614, and which he had invented ſince that Time; and it ſeems plain, that the Baron, being ſenſible of his declining Health, when he had the Opportunity of ſeeing Mr. *Briggs*, was more deſirous of communicating to him his new invented Method, to engage him more firmly in the Proſecution of that uſeful, but laborious Work; and as Mr. *Briggs*

ſtayed

ſtayed with him a Month, in their Converſation upon that Head, the Baron told him, he was ſenſible the Logarithms might be altered for the better before he publiſhed his Canon; but choſe to have them printed in the Manner he had propoſed them, till he had Leiſure and Health to make others more commodious, which he thought would be beſt, if a Cypher was made the Logarithm of (1) or Unity, and 10000000000, that of the whole Sine, or Radius. Mr. *Briggs*, upon his Return to *London*, threw by thoſe calculated upon the former Scheme, and made others ſuggeſted by the Baron; and having made theſe Calculations with much Difficulty and Labour, the Summer following he made a ſecond Journey to *Edinburgh*, and communicated them to the Baron, who highly approved of them, and earneſtly preſſed him to proceed; and it is plain from Mr. *Brigg*'s Account, that they both ſaw an Alteration from the firſt Plan in the Canon would be very convenient, and had formed a different Scheme before they knew each other's Sentiments; but when they came afterwards to converſe together, Mr. *Briggs* came into that propoſed by the Baron, as the more commodious. Upon this Plan Mr. *Briggs*'s *Arithmetica Logarithmica* was formed and publiſhed in the Year 1624; ſo that, from the Conceſſion of Mr. *Briggs* and others, we may conclude, that Lord *Neper* has a juſt Claim to the firſt Invention of Logarithms, tho' others have ſince made great Improvements therein.——— Beſides the excellent Inventions above-mentioned, he has publiſhed two others very conſiderable; one is entitled, *A Promptuary of Multiplication*, by which the long Operations of that Rule are very eaſily and expeditiouſly wrought by Means of *Lamellæ*, or thin Plates, with the Figures properly diſpoſed upon them, and contained in a ſmall Box. The other he calls *Local Arithmetic*, performed by Figures and Letters jointly, on each of which he has wrote a conſiderable Treatiſe, which was publiſhed with his *Rabdologia* at *Leyden*, in the Year 1626. We have no farther Memoirs of this ſingular Genius for Invention. He died in the Year 1622, and in the 72d Year of his Age. To perpetuate his Memory for his four Inventions, the following Lines were inſcribed to him in the laſt mentioned Edition of his *Rabdologia*.

JOHANNI NEPERO.

Ergo in tam faciles numerorum tædia luſus
Verſa, mathematicos qui latuere prius!
Dum Logarithmus *erit, dum* Virgula, Scacchia, Lamnæ,
Magnum erit & nomen, magne NEPERE, *tuum.*

The LIFE *of* HENRY BRIGGS.

HENRY BRIGGS, an eminent Mathematician of the 16th Century, deſcended from the antient Family of that Name at *Salle* in *Norfolk*, was born at *Warleywood*, near *Halifax*, in *Yorkſhire*, about the Year 1556. After his Education at a Grammar-ſchool in that Country, he was ſent to St. *John*'s College, *Cambridge*, and admitted a Scholar of the Houſe, *November* 5, 1579, took the Degree of Bachelor of Arts, 1581; that of Maſter in 1585; and was choſen Fellow of his College, *March* 29, 1588. He applied himſelf chiefly to the Study of the Mathematics, in which he greatly excelled, and in 1592, was made Examiner and Lecturer in that Faculty; and ſoon after, Reader of the Phyſic Lecture, founded by Dr. *Linacer*. Upon the Settlement of *Greſham* College, in *London*, he was choſen the firſt Profeſſor of Geometry there. About the Beginning of *March*, 1596, and ſome Time after, he conſtructed a *Table*, by the Help of which the magnetical Declination being given, the Height of the Pole may eaſily be found. This *Table* was ſuited to an Inſtrument deſcribed by Dr. *Gilbert*, and publiſhed by Mr. *Blondivelle*. In 1609, Mr. *Briggs* contracted an Intimacy with the learned Mr. *James Uſher*, afterwards Archbiſhop of *Armagh*, which was kept up many Years by Letters; two of which, written by our Author, are yet extant in Archbiſhop *Uſher*'s Letters; in the Former of them, dated in *Auguſt*, 1610, he tells his Friend, he was engaged in the Subject of *Ellipſes*, and in the Latter, dated *March* 10, 1615, he acquaints him with his being wholly employed about the noble Invention of *Logarithms* then lately diſcovered.

In

In the Year 1616, Mr. *Briggs* made this Invention his principal Study, and took a Journey into *Scotland*, in order to converſe with, and receive Improvement therein from *John Neper*, Baron of *Marchiſton*, mentioned in the preceding Life; and he made him a ſecond Viſit in 1617, with the ſame Intent; and for the Sake of his Friends and Hearers in *Greſham* College, he printed in 8vo. his *Logarithmorum Chilias prima*. Theſe Logarithms, he tells us, in the Preface, are of a different Kind from thoſe publiſhed by the illuſtrious Inventor of the Art, in his *Canon Mirificus*. He was made *Savillian* Profeſſor of Geometry at *Oxford*, *January* 8, 1620, (tho' he continued to hold his Profeſſorſhip of *Greſham* College, till the 26th of *January*) which he opened with an eloquent Oration: And as Sir *Henry Savile*, the Founder of that Lecture, had previouſly read 13 Lectures upon the firſt eight Propoſitions of *Euclid*'s *Elements*, he began his Lectures with the Ninth.

Upon his going to *Oxford*, he ſettled himſelf at *Merton* College, and ſoon after was incorporated Maſter of Arts in that Univerſity, where he continued till his Death. In 1622, he publiſhed a ſmall Tract in 4to. concerning the North-weſt Paſſage to the *South-Sea*, through the Continent of *Virginia* and *Hudſon*'s *Bay*, the Reaſon of which was, probably, his being then a Member of the Company trading to *Virginia*. His next Performance was his great and elaborate Work, intitled, *Arithmetica Logarithmica*, in Folio, printed at *London* in 1624, of which there was a ſecond Edition, with Improvements, by Mr. *Adrian Vlacq*, publiſhed in *Holland*. This Edition, with the Improvements, was tranſlated into *Engliſh* in 1631, with the following Title, *Logarithmical Arithmetic*; or *Tables of Logarithms* for abſolute Numbers, from an Unite to 100000; as alſo for Sines, Tangents, and Secants, for every Minute of a Quadrant, with a plain Deſcription of their Uſe in Arithmetic, Geometry, Aſtronomy, Navigation, *&c.* which we have already ſaid, were firſt invented by the moſt excellent *John Neper*, Baron of *Marchiſton*; but were transformed, and the Foundation and Uſe of them illuſtrated by *Henry Briggs*.—— Soon after, our Author engaged in another grand Work, intitled *Trigonometria Britannica*; he propoſed to compleat it in two Books; but lived to write the Firſt only, leaving the Second

cond to the Care of his old Friend Mr. *Henry Gellibrand*, who finiſhed the Work and publiſhed it.

This great Mathematician died the 26th of *January*, in *Merton* College, where ſome Account of him and his Works are regiſtered, to perpetuate the Honours of his Memory. We learn from this Account, that the Principals of the Univerſity attended his Funeral; that a Sermon was preached by Mr. *Sellar*, and a funeral Oration was ſpoken by Mr. *Creſſey*, Fellows of *Merton* College, on that Occaſion. He lies buried in the Choir of the Chapel there, under the honorary Monument of Sir *Henry Savile*, a plain Stone being laid over him, with his Name only inſcribed on it. Beſides the Pieces already mentioned, Mr. *Briggs* wrote many others; ſome of which have never been publiſhed, and others ſince publiſhed by other Perſons; as, *Tables* for the Improvement of Navigation;——a *Table* of the Sun's Declination to every Minute of the *Ecliptic*, in Degrees, Minutes, and Seconds;———a *Table* of the *Sun's Proſtaphæreſes*;———a *Table* of Equations for the Sun.——— *Tables* to find the Height of the Pole in any Latitude, from the Height of the Pole-ſtar.———Theſe *Tables* are printed in the 2d Edition of Mr. *Edward Wright*'s Works, intituled, *Certain Errors in Navigation detected and corrected.*———Likewiſe his firſt ſix Books of *Euclid*'s *Elements*, printed without his Name, *&c.* With Reſpect to his Character, and the Opinion of Writers concerning him, Dr. *Smith* gives him the Character of a Man of great Probity, eaſy of Acceſs to all; free from Arrogance, Moroſeneſs, Envy, Ambition and Avarice. A Contemner of Riches, and contented with his own Station; preferring a ſtudious Retirement to all the ſplendid Circumſtances of Life. The learned Mr. *Thomas Gataker*, who attended his Lectures, when he was Reader of Mathematics at St. *John*'s College, in *Cambridge*, repreſents him as highly eſteemed by all Perſons ſkilled in Mathematics, both at Home and Abroad; and ſays, that deſiring him once to give his Judgment concerning *Judicial Aſtrology*, his Anſwer was, "That he conceived it to be a mere Syſtem of groundleſs "Conceits."

Mr.

Mr. *Oughtred* calls him the Mirror of the Age, for his excellent Skill in Geometry; but his Succeſſor at *Greſham College*, the famous Dr. *Iſaac Barrow*, in his Oration there upon his Admiſſion, has given his Character more fully; wherein he celebrates his great Abilities, Skill, and Induſtry, in perfecting *Neper*'s admirable Invention of *Logarithms*, which, without his Care and Pains, might have continued an imperfect and uſeleſs Deſign.

The LIFE *of* GALILEO.

GALILEI, or *Galileo*, an eminent Mathematician and Aſtronomer in *Italy*, was born at *Piſa*, on the 19th of *Feb.* 1564. His Father's Name was *Vicenzo Galilei*. According to the Inclination of his own Genius, he gave himſelf wholly to the Study of *Euclid*, and afterwards of other Mathematicians of the beſt Eſteem; and in this, he made a vaſt Progreſs, almoſt entirely by the Efforts of his natural Abilities. In 1592, he was made Profeſſor of Mathematics in the Univerſity of *Padua*, where he made his inaugural Oration *Dec.* 7, 1592, and continued in this Poſt to the Year 1611, when *Coſmo* II, Grand Duke of *Tuſcany*, ſent for him to be Profeſſor at *Piſa*, and ſettled upon him a very conſiderable Stipend. That Prince afterwards ſent for him to *Florence*, and gave him the Title of principal Philoſopher, and Mathematician to his Highneſs. His Aſſertion of the Earth's Motion expoſed him to the ſevereſt Cenſures of the Inquiſitors, who obliged him to retract that Opinion. In the Year 1615, he was cited to *Rome*, to appear before the Holy Office, and charged with Hereſy, for maintaining theſe two Propoſitions; the Firſt of which was, That the Sun is the Center of the World, and immoveable; which Propoſition they cenſured as abſurd, and falſe in Philoſophy, and formally heretical, as being expreſsly contrary to the Sacred Scriptures. II. That the Earth is not the Center of the World, but moves with a diurnal Motion. This likewiſe they condemned as a Propoſition abſurd, and falſe in Philoſophy, and theologically conſidered, erroneous with regard to Faith.

He was detained in the Inquiſition till *February* 1616, on the 25th of which Month, he had Sentence pronounced againſt him, and he was commanded, by a Decree of the Inquiſitors, to renounce his heretical Opinions, and not to defend them either by Word, or Writing, or inſinuate them into the Minds of any Perſons: Nor was he diſcharged, till he had promiſed to conform himſelf to this Order; but upon his publiſhing at *Florence*, in 1632, his *Dialogues* concerning the two great Syſtems of the World, the *Ptolomaic* and *Copernican*, he was again cited before the Holy Office; by whoſe Order, he was committed to the Priſon of that Office at *Rome*; and upon the 22d of *June*, N. S. that Year, the Congregation convened, and in his Preſence pronounced Sentence againſt him and his Book, and obliged him to abjure his Errors in the moſt ſolemn Manner; committing him to the Priſon of the Holy Office during Pleaſure, and commanding him, as a ſaving Penance, for three Years to come, to repeat, once a Week, the ſeven penitential *Pſalms*; but reſerving to themſelves the Power of moderating, changing, and taking away, altogether, or in Part, the above-mentioned Puniſhment and Penance. He was diſcharged from his Confinement in 1634; but the Impreſſion of his *Dialogues* concerning the Syſtem of the World was burnt at *Rome:* Soon after he went to *Venice*, where he was informed, that a Glaſs was found out in *Holland*, by Means of which, Objects at a great Diſtance were rendered as viſible as if they were near at Hand. Without ever ſeeing this Inſtrument, he began to conſider what the Manner of its Form might be, and how it might be made; and at laſt, invented the *Teleſcope*, by the Application of which to the Heavens, he made many important Diſcoveries.

He diſcovered the Surface of the Moon not to be ſmooth, but rough, and full of Prominencies and Cavities.———He obſerved a new Motion of Trepidation; the Moon appearing to him ſometimes to ſhew more of one Side, and ſometimes more of the other:———He found that *Venus* imitated the Aſpects of the *Moon*, appearing now round, then one Half; afterwards gibbous, *&c.*—He demonſtrated a very ſenſible Change in Magnitude in the apparent Diameters of *Venus* and *Mars*; a Matter of no ſmall Conſequence in the Theories of *Copernicus* and *Tycho.*———He diſcovered Spots in the Sun, which he

he ſaw were not fixed and conſtant, like thoſe of the Moon, but changeable, appearing, as it were, to move about the Sun. He found, that, about *Jupiter*, four other Planets were moving, never before diſcovered by any Perſon, which in Honour of the Duke *de Medicis*, the *Mæcenas* of all learned Men, and his great Patron, he called by the Name of *Medicean* Stars. By the frequent Eclipſes of theſe Stars, he had Thoughts of finding out the Longitude, much better than by the Lunar Eclipſes; upon which, he compoſed his *Tables* of their Motions, leaving them with *Vicenzo Renieri*, a Mathematician of *Piſa*, who corrected, perfected, and intended to commit them to the Preſs. He imagined, that the Planet *Saturn* was tricorporate, or compoſed of three Bodies; one ſpherical, eſpecially that in the Midſt, and two other leſſer ones on the Sides, which afterwards appeared to be only the *Anſæ*, or extreme Parts of *Saturn*'s Ring, ſeen obliquely on each Side the Planet. He demonſtrated, that the *Via Lactea*, or *Milky-Way*, and the nebilous Stars, are no other than a Multitude of little Stars, ſo near each other, and ſo ſmall, that the naked Eye cannot diſtinguiſh them ſeparately;———all which Obſervations were made by *Galileo*, in the Compaſs of a few Years.

During the laſt eight Years of his Life, he lived out of *Florence*, partly in ſome Towns near that City, and partly at *Sienna*. By his continual Obſervation of the Heavens, and many Injuries which he received by the nocturnal Air, his Sight was much weakened, and three Years before his Death, he became entirely blind. He bore this Misfortune with a true philoſophical Reſignation, diverting himſelf with conſtant Meditation and Enquiry, and had prepared a great Heap of Materials, and begun to dictate his Conceptions, when by a Diſtemper, of three Months Continuance, inſenſibly decaying, he expired at *Arcetri*, near *Florence*, *January* 8, 1642, N. S. in the 78th Year of his Age. He was little of Stature, but of a venerable Aſpect, and vigorous Conſtitution. His Converſation was affable and free, and full of Pleaſantry. He took great Delight in Architecture and Painting, and deſigned extremely well. He likewiſe played admirably well on the Lute. He took great Pleaſure in Huſbandry, when he ſpent any Part of his Time in the Country. His Learning was very extenſive. Two Qualifica-

tions

tions (amongſt others) were obſerved to be wonderfully united in him, *viz.* Cleanneſs, and Acuteneſs of Wit. Monſieur *Libnitz* tells us, " that from the Time of *Archimedes*, there was Nothing done in mechanical Geometry till *Galileo*, who being a Man of excellent Judgment and great Skill in the moſt abſtruſe Points of Geometry, firſt extended the Boundaries of that Science, and began to reduce the Reſiſtance of ſolid Bodies to the Laws of it." Sir *John Finch*, in a Letter to *Thomas Saliſbury*, Eſq; dated at *Leghorn*, *April* 17, 1664, obſerves, " that many of his Books were unfortunately loſt, thro' his Wife's Devotion, who, ſolicited by her Confeſſor, gave him Leave to peruſe her Huſband's Manuſcripts, of which he tore, and took away, as many as he ſaid were not fit to be allowed." Dr. *Stokeham*, in a Letter to Mr. *Saliſbury*, dated at *Padua*, *Aug.* 2, 1663, obſerves, " that the Inſtrument, or Machine, with which the *Venetians* render their *Laguna* fluid and navigable, was *Galileo*'s Invention.———And a *Florentine* Academic, in a little Tractate of his, aſſerts the Problem of the *Cycloid* to have been *Galileo*'s, though the Solution thereof was afterwards made by *Torricelli*.

The principal Treatiſes which he publiſhed are as follow:

I. The Operations of the Compaſs, Geometrical and Military.

II. A Diſcourſe, addreſſed to the moſt Serene *Coſmo*, Grand Duke of *Tuſcany*, concerning the ſwimming of Bodies upon, and their Submerſion in Water.

III. *Mechanics*; or the Benefits derived from that Science, and its Inſtruments.

IV. *Galileo*'s Balance, for finding the Proportion of Alloy, or mixt Metals.

V. His *Nuncius Sidereus*.

VI. A Continuation of the *Nuncius Sidereus*; or an Eſſay on the Hiſtory of his laſt Obſervations on *Saturn*, *Mars*, *Venus*, and the *Sun*.

VII. A Letter, concerning the Trepidation of the *Moon*, lately diſcovered by him, inſcribed to *Alphonſo Antonini*; with *Antonini*'s Anſwer.

VIII. A Diſcourſe of the Solar Spots, with the Predictions and *Ephemerides* of the Poſitions and Periods of the *Medicean* Planets.

IX.

IX. Problems in *Mathematics*.

X. His Mathematical Diſcourſes and Demonſtrations about two New Sciences, relating to *Mechanics*, and *Local Motions*; with an Appendix concerning the Center of *Gravity* of ſome *Solids*.

XI. A Treatiſe of the *Mundane Syſtem*. With ſeveral others of a Philoſophical, Mathematical, and Scientifical Kind.

The Preceding is the general Account we meet with, of the Diſcoveries and Writings of *Galileo*: To which we think proper to add ſome further ingenious Obſervations and Reflections on this Author, by the judicious Mr. *Maclaurin*. He ſays,

"Geometry and Philoſophy advanced in this Time at a great Pace, and gave mutual Aid to each other. The Evidence of Geometry began to take Place and Philoſophy, while all Things were examined by Number, Weight, and Meaſure; and the Principles of the Theory of Motion, being now clearly underſtood, furniſhed excellent Illuſtrations of the abſtruſe Parts of Geometry. *Galileo* had Scholars worthy of ſo great a Maſter, by whom the Gravitation of the Atmoſphere was eſtabliſhed fully, and its varying Preſſure accurately and conveniently meaſured, by the Column of Quick-ſilver of equal Weight ſuſtained by it in the barometrical Tube. The Elaſticity of the Air, by which it perpetually endeavours to expand itſelf, and, while it admits of Condenſation, reſiſts in Proportion to its Denſity, was a Phænomenon of a new Kind (the common Fluids having no ſuch Property) and of the utmoſt Importance to Philoſophy. Theſe Principles opened a vaſt Field of new and uſeful Knowledge, and explained a great Variety of Phænomena, which had been accounted for in an abſurd Manner before that Time. It ſeem'd as if the Air, the Fluid in which Men lived from the Beginning, had been then firſt diſcovered. Philoſophers were every where buſy enquiring into its various Properties and their Effects; and valuable Diſcoveries rewarded their Induſtry. Of the great Number who diſtinguiſhed themſelves on this Occaſion, we cannot but mention *Torricelli* in *Italy*, *Paſchal* in *France*, *Otto Guerick* in *Germany*, and *Boyle* in *England*.

" *Galileo* made ſuprizing Diſcoveries in the Heavens by the Teleſcope, an Inſtrument invented in that Time; and, by applying Geometry to the Doctrine of Motion, began to eſtabliſh natural Philoſophy on a ſure Foundation. He made the Evidence of the *Copernican* Syſtem more ſenſible, when he ſhewed from the Phaſes of *Venus*, like to the monthly Phaſes of the Moon, that *Venus* actually revolves about the Sun. He proved the Revolution of the Sun on his Axis, from his Spots; and thence the diurnal Rotation of the Earth became more credible. The four Satellites that attend *Jupiter* in his Revolution about the Sun, repreſented, in *Jupiter*'s leſſer Syſtem, a juſt Image of the great ſolar Syſtem; and rendered it more eaſy to conceive how the Moon might attend the Earth, as a Satellite, in her annual Revolution. By diſcovering Hills and Cavities in the Moon, and Spots in the Sun conſtantly varying, he ſhewed that there was not ſo great a Difference between the celeſtial and ſublunary Bodies as the Philoſophers had vainly imagined.

" He did no leſs Service by treating, in a clear and geometrical Manner, the Doctrine of Motion, which has been juſtly called the Key of Nature. The rational Part of Mechanics had been ſo much neglected, that there was hardly any Improvement made in it, from the Time of the incomparable *Archimedes* to that of *Galileo*; but this laſt named Author has given us fully the Theory of equable Motions, and of ſuch as are uniformly accelerated or retarded, and of theſe two compounded together. He, firſt, demonſtrated, that the Spaces deſcribed by heavy Bodies from the Beginning of their Deſcent are as the Squares of the Times, and that a Body, projected in any Direction that is not perpendicular to the Horizon, deſcribes a Parabola. Theſe were the Beginnings of the Doctrine of the Motion of heavy Bodies, which has been ſince carried to ſo great a Height by Sir *Iſaac Newton*.

He alſo diſcovered the Gravity of the Air, and endeavoured to compare it with that of Water; and opened up ſeveral other Enquiries in Natural Philoſophy. He was not eſteem'd and followed by Philoſophers only, but was honoured by Perſons of the greateſt Diſtinction of all Nations. *Des Cartes*, indeed, after commending him for applying Geometry to Phyſics, complains that he had not examined Things in order, but had en-

enquired into the Reaſons of particular Effects only; adding that, by his paſſing over the primary Cauſes of Nature, he had built without a Foundation. He did not, 'tis true, take ſo high a Flight as *Des Cartes*, or attempt ſo univerſal a Syſtem; but this Complaint, I doubt, muſt turn out to *Galileo*'s Praiſe; while the Cenſure of *Des Cartes* ſhews that he had the Weakneſs to be vain of the worſt Part of his Writings.

The LIFE of THOMAS HOBBES.

THOMAS HOBBES, one of the greateſt Geniuſes of the Seventeenth Century, was born at *Malmeſbury*, *April* 15, 1588. He had made a great Proficiency in the Languages, when he was ſent, at fourteen Years of Age to *Oxford*, where he ſtudied, for five Years, *Ariſtotle*'s *Philoſophy*. He afterwards went into the Family of *William Cavendiſh*, who, ſoon after, had the Title of Earl of *Devonſhire* conferred upon him; and he was Governor to his eldeſt Son. He travelled into *France* and *Italy* with his Pupil; and perceiving that he remembered but little either of his *Greek* or *Latin*, and that the Philoſophy of *Ariſtotle*, in which he had made a conſiderable Progreſs, was deſpiſed by Perſons of the beſt Senſe, he applied himſelf intirely to polite Literature, upon his Return to his own Country. *Thucydides* appearing to him preferrable to all the *Greek* Hiſtorians, he tranſlated him into *Engliſh*, and publiſhed that Tranſlation in 1618, in order to ſhew the *Engliſh*, from the *Athenian* Hiſtory, the Diſorders and Confuſions of a democratical Government. In 1629 he travelled into *France*, as Governor to a young *Engliſh* Gentleman, and applied himſelf, to the Study of the Mathematics. He began then to apply himſelf, with great Pleaſure, to the Study of *Euclid*, being not ſo much induced to it by the Subjects of the Demonſtrations, as delighted with the Perſpicuity, Certainty, and uninterrupted Series of his Reaſoning: For this moſt ſagacious Man did not admire the Science of Mathematics on Account of the ſubtle Demonſtrations of the Properties, and mutual Relation of Sides and Angles, or Numbers, Lines, Surfaces, or Bodies, ſince he readily ſaw that all theſe Things were remote from the Uſes of common Life,

Life, tho', when reduced to Practice, of no ſmall Advantage; but becauſe, by the Method peculiar to it, the Underſtanding is beſt led to the Knowledge of Things, and ſupplied with the moſt certain Means of diſcovering difficult Truths, proving what is true, and refuting what is falſe. During that Journey, in 1631, he was employed by the Counteſs of *Devonſhire* to be Tutor to her Son, about thirteen Years old, and travelled with him three Years after into *France* and *Italy*. During his Stay at *Paris*, he applied himſelf to the Study of Natural Philoſophy, and eſpecially to the Enquiry into the Cauſes of the ſenſitive Operation of Animals. He diſcourſed with Father *Marſenneus* deeply upon this Point. He was recalled to *England* in 1637, but, foreſeeing the Civil War, upon reflecting on what paſſed during the firſt Seſſion of the Parliament of 1640, he went to *Paris* to ſeek an agreeable Retreat there, in order to philoſophize quietly with Father *Marſenneus*, *Gaſſendi*, and ſome other Great Men. He wrote there his Book *de Cive*, of which he publiſhed but a few Copies in 1642. He taught Mathematics to the Prince of *Wales*, who had been obliged to retire to *France*, and ſpent all his leiſure Time in compoſing his *Leviathan*, which he cauſed to be publiſhed in *England* in 1651. He ſtill reſided at *Paris*. Tho' he had given Proof of his Faith according to the Rites of the Church of *England*, yet he was rendered obnoxious to the Epiſcopal Party; and this was carried ſo far, that he was ordered not to come near the King any more. This was the Reaſon of his returning to *England*, where he lived but in an obſcure Manner, conſidering his great Merit, in the Earl of *Devonſhire*'s Houſe. However, he gained this Advantage by his obſcure Condition, that he had more Leiſure to compoſe his Book *de Corpore*, and ſome others. He received great Marks of Reſpect from K. *Charles* II. at the Reſtoration in 1660: From that Time, till his Death, he applied himſelf to his Studies, and to oppoſe the Attacks of his Adverſaries, who were very numerous. He retained the Uſe of his Senſes till he was above 91 Years old. His long Life was that of a perfect honeſt Man. He was a Lover of his Country, he was faithful to his King, a good Friend, charitable and obliging. However he was cenſured as an Atheiſt; but the Writers of his Life maintain, that he had very orthodox Notions concerning the

the Nature of God. They own, that in his Youth he was addicted to Wine and Women; but that, however, he choſe to live a Bachelor, that he might not be diverted from the Study of Philoſophy. He addicted himſelf much more to Thinking, than Reading; and was never fond of a great, but well-ſelected Library. Towards the End of his Life he had very few Books, and thoſe he read very little, thinking his chief Buſineſs was to digeſt what he had read. If Company came to viſit him, he would be free in his Diſcourſe; but if much preſſed, or contradicted, he had the Infirmity of being ſhort and peeviſh, and referred to his Writings for their better Satisfaction, of which his Friends cautioned thoſe who came to converſe with him. In *October* 1666, when Complaint was made to Parliament againſt his Books, and ſome Proceedings againſt him were depending, with a Bill againſt Atheiſm and Profaneneſs, he was at *Chatſworth*, and appeared extremely diſturbed at the News of it, fearing that Meſſengers would come for him, that the Earl of *Devonſhire* would deliver him up, that the two Houſes of Parliament would commit him to the Biſhops, and that they would decree him an Heretic and return him to the Civil Magiſtrates by a Writ *de Heretico Comburendo*. This Terror upon his Spirits made him ſink very much: He would be often confeſſing to thoſe about him, that he meant no Harm; but perſiſting in this, that there was no Authority to determine what was Hereſy. He alſo framed an Apology for his *Leviathan*, ſetting forth, that the exceptionable Things therein were not ſo much his Opinion, as Suppoſitions, humbly ſubmitted to thoſe who had the Eccleſiaſtic Power, and never dogmatically maintained by him in Writing, or Diſcourſe: And it is likewiſe aſſerted, that he preſerved a conſtant Attention to the Communion of the Church of *England*. Nevertheleſs, he did not conceal his Hatred to the Clergy, aſſerting, when called in queſtion, they could not teach him what he did not know. At the Cloſe of his Life, he expreſſed great Anxiety about Death, and ſpake of it as an unknown, uncertain State. He died, *December* 4, 1679, at the Earl of *Devonſhire*'s Houſe, after a Sickneſs of ſix Weeks. The principal Treatiſes which he wrote were,

I. He tranſlated into *Engliſh*, *the Hiſtory of the Grecian War*, by *Thucidides*, 1628.

II. *De Mirabilibus Pecci.*

III. Elements of Philoſophy.

IV. An Anſwer to Sir *William Davenant*'s Epiſtle, or Preface to *Gondibert.*

V. Human Nature, or the fundamental Elements of Policy.

VI. Elements of the Law.

VII. *Leviathan*; or the Matter, Form, and Power of a Common-wealth.

VIII. A Compendium of *Ariſtotle*'s Rhetoric.

IX. A Letter on Liberty and Neceſſity.

X. The Queſtions, concerning Neceſſity and Chance, ſtated.

XI. Six Leſſons to the Profeſſors of Mathematics, of the Inſtitution of Sir *Henry Saville.*

XII. The Marks of abſurd Geometry, *&c.*

XIII. Dialogues of Natural Philoſophy.

Beſides many other Pieces on Polity, Theology, and other miſcellaneous Subjects, to the Number of 41.

The LIFE of MICHAEL MÆSTLINUS.

MICHAEL MÆSTLINUS was born in the Palatinate of the *Rhine*, about the Year 1542. When his Parents had given him a proper Education, he was elected a Pariſh Prieſt at *Bachnang*; but the Proofs he gave of his Skill in the Mathematics ſo far diſtinguiſhed him, that he was promoted to the Profeſſorſhip of Mathematics in the Univerſities of *Heidelberg* and *Tubinge*, Maſter, or Tutor to *Kepler*, and firſt Monitor to the famous *Galileo.* He was addicted, before that Time, to the Study of *Ariſtotle* and *Ptolemy*; but, after more mature Inquiry, he embraced the *Copernican* Hypotheſis, to which he was perſuaded by the Force of his Arguments, which he made Uſe of in a public Lecture upon that Subject, about that Time, in *Italy.* The Variety of Subjects which he wrote upon, in the Philoſophical and Aſtronomical Sciences, beſpeak his great Improvement and Abilities. He wrote *De Stella Nova Caſſiopeiæ*

Caſſiopeia, and of the Comet which appeared in 1576: As alſo, *Ephemerides*, according to the *Prutenic* Tables*; and Additions to the firſt Narration of *Rheticus*; with an Appendix, *de Dimenſionibus Orbium Cæleſtium*, according to the Opinion of *Copernicus*. He publiſhed likewiſe, *Theſis de Eclipſibus*, and *an Epitome of Aſtronomy*. — He likewiſe wrote againſt the *Gregorian Calender*, in which he was oppoſed by *Clavius*; yet, very happy in this, that he always expreſt his great Satisfaction in having adopted the *Copernican* Syſtem, which he thought was ſupported by inconteſtible Evidence. Hiſtory does not inform us of the Time of his Death, or any other Circumſtances relating thereto. Pity the Character of ſo great a Man ſhould not be more minutely tranſmitted to Poſterity.

The LIFE of FRANCISCUS VIETA.

FRANCISCUS *VIETA*, a Frenchman, Native of *Fontenoy*, whom *Ricciolus* intitles, *Galicanæ Matheſeos inſigne decus*. Beſides his many other excellent Works in Geometry, and other Parts of the Mathematics, he exhibited to Pope *Clement* VIII. a new Form of the *Gregorian* Calender, to which he added, perpetual Canons, and an Explication thereof, againſt *Clavius*, whom he accuſed to have deformed the true *Lilian* Reformation, by not rightly underſtanding the Reaſon of it: Touching which Controverſy, *Thuanus*, in the 129th Book of his Hiſtory, writes more particularly. But the Work chiefly eſteemed, and whoſe Loſs cannot be ſufficiently deplored, was his *Harmonicon Cæleſte*, which, being communicated to *Marſennus*, was, by ſome perfidious Acquaintance of that honeſt-minded Perſon, ſurreptitiouſly taken from him, and irrecoverably loſt, or ſuppreſſed, to the unſpeakable Detriment of the lettered World. His Works, which are at preſent extant, are all collected into one Volume, by *Van Schooten*, a learned *Dutch* Mathematician, and printed by *Elziver* at *Leyden*,

* Theſe *Prutenic* Tables were firſt publiſhed by *Eraſmus Reinholdus*, in the Year 1551; this was a Work of ſeven Years Labour, which he ſpent in correcting the Numbers of *Copernicus*. He was a learned Profeſſor of Mathematics in the Academy of *Vitebergh* in *Germany*, and died in 1553.

den, in the Year 1646; they conſiſt of Sixteen different Treatiſes upon Analitical, Geometrical, and Chronological Subjects, many of which contain Problems of a curious Nature, and not to be met with in other Authors. There were other Works of an aſtronomical Kind, which have been buried in the Ruins of Time. Our Author flouriſhed about the Year 1590; but of the Time of his Death we have no certain Account.

The LIFE of WILLIAM, PRINCE *of* HESSE.

WILLIAM, Landgrave of *Heſſe*, merits an Elogium beyond what can be here given, for his aſſiduous Obſervations, for many Years, of the celeſtial Bodies; to which End, at *Caſſells*, he erected an Obſervatory, with excellent Inſtruments, well adapted to ſuch a Deſign, and called to his Aſſiſtance two eminent Artiſts, *viz.* *Chriſtophorus Rothmannus* and *Juſtus Byrgius*. He made many Obſervations of a very curious Nature, which were publiſhed at *Leyden* in the Year 1618, by *Willebrodus Snellius*, and are in Part mentioned by *Tycho Brahe*, as well in his Epiſtles as in the ſecond Tome of his *Progymnaſmata*, a ſignal Example to all princely and heroic Minds, to undertake the promoting and advancing this truly noble and celeſtial Science. He died in the Year 1597.

The LIFE of HUGO GROTIUS.

HUGO GROTIUS, one of the greateſt Men in *Europe*, conſidering his Abilities every Way, was born at *Delft*, 1583. His Father was named *Hugo de Groot*, that is, *Hugo the Great*, a Burgo-Maſter at *Delft*, who took great Care to give his Son an Education ſuitable to his promiſing Genius; and he made ſo rapid a Progreſs in his Sudies, that he compoſed Verſes, on ſeveral Subjects, when he was not more than nine Years old; and, at fifteen, had attained a conſiderable Skill in Philoſophy, Divinity, and the Civil Law. He had made ſtill great

greater Proficiency in polite Literature, as appears from the Commentary he made, at that Age, on *Martianus Capella*, in 1598. He accompanied the *Dutch* Embaſſador into *France*, and was honoured with ſeveral Marks of the Eſteem of *Henry* IV. He alſo took his Degree of Dr. of Laws, in that Kingdom; and, at his Return to his native Country, he devoted himſelf to the Bar, and pleaded before he was ſeventeen Years of Age, when he was appointed Attorney General. He ſettled in *Rotterdam*, in 1613, and was nominated *Syndic* of that City; but did not accept of the Employment till he had a Promiſe that he ſhould not be removed from it. He acted thus prudently, becauſe he foreſaw that the Quarrels of the Divines, on the Doctrine of Grace, might probably occaſion many Revolutions in the chief Cities: But however prudent in ſome Caſes, he ſo far embarked in the Affair that proved the Ruin of *Barnevelt*, that he was ſeized in *Auguſt* 1618, and ſentenced to perpetual Impriſonment. The Manner in which his Wife effected his Eſcape is ſo remarkable, that a brief Account of it may be agreeable. *Mary de Regelſberg*, his Wife, obſerving that his Keepers had often fatigued themſelves with ſearching a great Trunk of Books and Papers of his, ſhe deſired ſhe might remove it to a Friend's Houſe; and ſhe adviſed her Huſband to get into this Trunk, after boring ſome Air-holes in it: He complied with her Advice, and, getting into this Cheſt, was carried in this Manner to a Friend's Houſe, at *Gircum*, unſuſpected, from whence he went to *Antwerp*; the Wife, in the mean Time, feigning that he was extremely ill, till he was got into a Place of Safety, and then laughed at the Keepers, and ſaid, the Bird was flown. At firſt, there was ſome Deſign formed of proſecuting her; but the Majority over-ruled, and applauded her Artifice and Affection, and gave her immediate Liberty. He and his Wife then returned to *France*, where he was graciouſly received. *Lewis* XIII. gave a glorious Teſtimony to the Virtue of this illuſtrious Refugee. *Grotius*, notwithſtanding the ſevere Treatment he had met with, ſtill preſerved an Affection for his Country, and was ready to apologize for them to the *French* King, whilſt they ungratefully endeavoured to prejudice the King againſt him. *Grotius* now applies himſelf to his Studies, and committing his Improvements to Writing, during

his Reſidence there for eleven Years. He once more returned to *Holland*, where his Stay was but ſhort. He then reſolved to go to *Hamburgh*, where he ſtaid ſome Time, and received very advantageous Offers by the Crown of *Sweden*. *Queen Chriſtiana* appointed him one of her Councellors, and ſent him in Quality of Embaſſador of *France* to *Lewis* XIII. After having diſcharged the Duties of that Employment, about eleven Years, he left *France*, in order to give an Account to the Queen *Chriſtiana* of his Embaſſy; he took *Holland* in his Way, and then received many Honours at *Amſterdam*; and when introduced to her *Swediſh* Majeſty at *Stockholm*, he received many Tokens of her Approbation. He then deſired his Diſmiſſion, which ſhe granted, tho' with ſome Reluctance. ——— In his Return home, he was ſhipwrecked on the Coaſt of *Pomerania*. *Grotius*, who was now ſick, and uneaſy in Mind, continued his Journey by Land; but his Indiſpoſition forced him to ſtop at *Roſtock*, where he died the 28th of *October*, 1645, highly eſteemed, as the great Ornament of Learning and of his Country: Who, notwithſtanding the public Character in which he acted with general Applauſe, wrote many valuable Works.

I. He tranſlated into *Latin* Proſe, his Work *on the Truth of the Chriſtain Religion:* Which he compoſed in *Flemiſh* Verſe, for the Uſe of the Sailors going to *India*; with a further View to their converting the *Indians*.

II. His incomparable Work *De Jure Belli et Pacis*, was publiſhed at *Paris* in 1625.

III. A Commentary *de Imperio Summarum Poteſtatum Circa Sacra*.

IV. His Notes on the four Goſpels, and a Treatiſe of the Satisfaction of Chriſt.

V. His *Bibliotheque Univerſelle*.

VI. His *Aratus* in *Greek*, with Cuts of the ſeveral Conſtellations: To which he added, his own learned Notes, and the Names of the Stars in *Hebrew*, *Arabic*, *Greek* and *Latin*. 'Tis principally on Account of this laſt learned Work he is entitled to a Place in our *Philoſophia Biographia*.

The

The LIFE of EDWARD BRERewood.

EDWARD BREREWOOD was born at *Cheſter* in 1565, his Father *Robert Brerewood*, thrice Mayor of that City, who, from the promiſing Genius of his Son, took Care to improve it, by a ſuitable Education at *Cheſter*; and, at the Age of ſixteen ſent him to *Brazen-Noſe College* in *Oxford*, where he ſoon acquired the Character of a hard Student, and has ſhewn it by the Commentaries which he wrote upon *Ariſtotle*'s *Ethics*, which were writen by him about the Age of twenty-one. In the Year 1590, he took his Degree of Maſter of Arts.

About the Beginning of *March* 1596, he was choſen the *Firſt Profeſſor of Aſtronomy* in *Greſham* College, being one of the two, who, at the Deſire of the Electors, were recommended to them by the Univerſity of *Oxford*. He loved Retirement, and wholly devoted himſelf to the Purſuit of Knowledge. And tho' he never publiſhed any Thing himſelf, yet he was very communicative, and ready to impart what he knew, to others, either in Converſation or Writing. His Situation at *Greſham College* being agreeable, he did not appear to have had any other Views, but continued there the Remainder of his Life. He died of a Fever, *November* 4, 1613, in the Midſt of his Purſuits, and before he had taken proper Methods for collecting and digeſting his learned Labours; tho' they were not loſt, but, with ſome Trouble, reduced to proper Order. Theſe were many of them of a miſcellaneous Nature, as may be ſeen in the Catalogue of them in Mr. *Ward*'s Lives of the Profeſſors of *Greſham College*, Page 75. He was buried in the Chancel of *St. Helen*'s Church, near the Reader's Pew, without any monumental Inſcription to perpetuate his Memory.

The LIFE of EDMUND GUNTER.

EDMUND GUNTER was born in the County of *Hertford*; but deſcended originally from *Gunter's-town* in *Brecknockſhire*. He was educated on the Royal Foundation at *Weſtminſter* School, and elected from thence to *Chriſt-church College*

College in *Oxford*, in the Year 1599, being then eighteen Years of Age, where he took the Degrees in Arts. Mathematics were the prevailing Studies of his Youth, and about the Year 1606 he invented the *Sector*, and wrote the Deſcription and Uſe of it in *Latin*, many Copies of which were taken in Writing, but none of them printed. After this, in 1614, he took Orders, became a Preacher, and proceeded to qualify himſelf for the Degree of Batchelor in Divinity.

But his Genuis ſtill leading him chiefly to Mathematical Purſuits, when Mr. *Williams* reſigned the Profeſſorſhip of Aſtronomy in *Greſham College*, he was choſen to ſucceed him, *March* 6, 1619, two Days after his Surrender. When he was ſettled at *Greſham College*, his Diligence in his Profeſſion, and the great Improvements he made in Mathematical Science, ſoon diſcovered the right Judgment of his Electors, and how much they benefited the Public, in the Choice of him; for the Year following, he publiſhed his *Canon Triangulorum*. This was the firſt Book that was printed of this Kind, of the Nature and Uſe of which, our Author appears to have had no mean Opinion, and expreſſed himſelf concerning it with a great deal of Pleaſure, yet with equal Modeſty. *Edmund Wingate*, Eſq; attributes the Improvement of *Logarithms*, in their Application to *Spherical Triangles*, to our Author, in the following Words: "Mr. *Edmund* "*Gunter*, Profeſſor of Aſtronomy, in *Greſham College*, *London*, "hath taken great Pains in calculating of a Table containing "the Logarithms of the Sines and Tangents of all the Degrees "and Minutes of the Quadrant." The like is done by Mr. *Burton*, in the following Paſſage: "What ſo pleaſing can there "be, if a Man be Mathematically given, as to calculate, or "peruſe *Napier*'s Logarithms, or thoſe Tables of Artificial Sines "and Tangents not long ſince ſet out by my old Collegiate, "good Friend, and fellow Student of *Chriſt-church* in *Oxford*, "Mr. *Edmund Gunter*, which will perform that by Addition "and Subtraction only, which heretofore *Regiomontanus*'s "Tables did by Multiplication and Diviſion: Or thoſe elaborate "Concluſions of his Sector, Quadrant, and Croſs-Staff." The ſame is more fully expreſſed by Mr. *Henry Bond*, ſen. who ſays, Mr. *Edmund Gunter* firſt calculated the Tables of Logarithms, Sines and Tangents to eight Places, and cauſed them

to

to be printed in 1620. He invented alſo, the Rule of Proportion, as we are told by Mr. *Oughtred*, who, ſpeaking of *his own Circle of Proportion*, ſays, "For theſe, I muſt freely confeſs, I have not ſo good a Claim againſt all Men, as for my horizontal Inſtrument: The Honour of the Invention of Logarithms, next to the *Lord of Marchiſton*, and our Mr. *Briggs*, belonging to Maſter *Gunter*, who expoſed their Numbers upon a ſtrait Line. And what doth this new Inſtrument (of mine) called the *Circle of Proportion*, but only bow and inflect *Maſter Gunter*'s Line, or Rule.

In the Year 1624, this Invention was carried into *France* by Mr. *Wingate*, who not only communicated it to moſt of the principal Mathematicians then at *Paris*, but likewiſe, at their Requeſt, publiſhed an Account of its Uſe, in the *French* Language: Tho' this had been then lately done more largely, in *Engliſh*, by the Author himſelf in his Treatiſe of the *Croſs-ſtaff*. But ſeveral Years after Mr. *Gunter*'s Death, Mr. *Wingate* having tranſlated his *French* Tract into *Engliſh*, publiſhed it with many Additions and Improvements, which has ſince been called *Wingate*'s *Rule of Proportion, or Gunter*'s *Line*.

Mr. *Gunter* likewiſe drew the Lines on the Dials in *Whitehall* Garden, and wrote the Deſcription and Uſe of them, by the Direction of *Prince Charles*, in a ſmall Tract; which he afterwards printed, by the Order of his Majeſty King *James*, in the Year 1624. The Dials were placed, as he deſcribed them, on a Stone. For a more particular Account of this Dial, ſee our Miſcellaneous Correſpondence, Page 833, illuſtrated by a Copper-plate.

Another Diſcovery of Mr. *Gunter*'s, tho' ſome attribute it to Mr. *Gillibrand*, was, "That the magnetic Needle, in its horizontal Poſition, doth not retain the ſame Declination, or vary from the true North, in the ſame Place, at all Times; but doth ſucceſſively vary that Declination from Time to Time." Which, tho' it were at that Time a new Diſcovery, is now well known.

Beſides what has been already deſcribed, he was the Author of many other Inventions and Improvements in the Mathematics, moſt of which were, firſt, the Subjects of his Lectures at *Greſham-College*, and afterwards diſpoſed into Treatiſes, and

printed in his Works. Had he lived longer, the World would, doubtleſs, have reaped more Fruits of his fertile Invention and great Abilities: But he was taken off, the 10th of *December*, 1626, about the 45th Year of his Age, the Prime of Life for ſuch Studies. He died in *Greſham-College*, and was buried in the Church of St. *Peter the Poor* in *Broad-ſtreet*, without any Monument or Inſcription; but his Memory will always be preſerved, with great Eſteem, by thoſe who are Judges of his Worth; and his Inſtruments will tranſmit his Name to lateſt Poſterity.

The LIFE *of* JOSEPH SCALIGER.

JOSEPH SCALIGER, otherwiſe *Juſtus Joſephus Scaliger*, born at *Agen*, *Auguſt* 4, 1540, began his firſt Studies at *Bourdeaux*, and having continued them for ſome Time after, under the Inſtruction and Conduct of his Father, he came to *Paris*, and followed his Studies in that Univerſity. He learnt the *Greek* Tongue under *Adrianus Turnebus*, and perfected himſelf in the *Hebrew* by his own Study; but, above all, he excelled in critical Learning. The Curators of the Univerſity of *Leyden* invited him to be an honorary Profeſſor in that Univerſity, where he lived ſixteen Years. He likewiſe diſtinguiſhed himſelf by his eminent Skill in aſtronomical and mathematical Studies: So that he was eſteemed, the great Prince and Patron of univerſal Learning. His elaborate Work, *De Emendatione Temporum*; his exquiſite Animadverſions on *Euſebius*; with his Canon *Iſagogicus Chronologiæ*; and his accurate Comment upon *Manilius*'s *Aſtronomicon*, ſufficiently evidence his Knowledge in the Aſtronomy, and other Branches of Learning, among the Antients, who, according to the Opinion of the celebrated *Vieta*, was far ſuperior to any of that Age. The ſame is likewiſe reported of him by the learned *Caſaubon*, Epiſtle 586. He wrote *Cyclometrica et Diatriba de Equinoctiorum Anticipatione*: He likewiſe wrote Notes upon *Seneca*, *Varro*, and *Anſonius*'s Poems: But that which above all Things renders the Name of *Scaliger* memorable to Poſterity is, the Invention of the *Julian* Period, which

which consists of 7980 Years, being the Product of the Cycle of the Sun 28, the Cycle of the Moon 19, and the Cycle of Indiction 15. This Period had its Beginning fixed to the 764th Year before the Creation, and is not yet completed, and comprehends all other Cycles, Periods, and Epochas, and the Times of all memorable Actions and Histories; and therefore is not only the most general, but the most useful of all Periods in Chronology. He died *January* 21, 1609.

The LIFE of EDWARD WRIGHT.

EDWARD WRIGHT was Cotemporary with Mr. *Briggs*. Having spent some Time in the University of *Cambridge*, and being naturally addicted to mathematical Studies, was prevailed on to accompany the Right Hon. *George*, Earl of *Cumberland*, in his Expedition to the *Azores* in the Year 1589, on Purpose to add the Practice of Navigation to the Theory; and in the Year 1599, he published his Book called, *the Errors of Navigation corrected*, a most excellent Work, for the true describing a Sea Chart: Which Invention of his, *Gerrard Mercator* published, without owning the Author. This is the Account usually given by Biographers; but it appears not strictly true, from the Account which Mr. *Wright* himself gives of this Affair, which seems rather to intimate the contrary, *viz.* that he stole it from *Gerrard Mercator*; at least, he tells us, he was accused of so doing; or that it was suggested against him, that his Chart had been before published both by *Gerrard Mercator* and *Iodocus Hondius*, in their Maps of the World and of *Europe*. In answer to this Charge, he acknowledges, that it was by the Occasion of *Mercator*'s Map that he first thought of correcting so many, and such gross Errors and Absurdities as he found in the common Chart; but he denies that he learnt the Method of doing this either from *Mercator*, or any one else. And as to *Iodocus Hondius*, his own Letters to Mr. *Briggs* are sufficient to shew, that whatever he published, in regard to his Corrections in the Maps, were taken entirely from Mr. *Wright*. Those Errors indeed were much complained of by the first Writers on Naviga-

Navigation, as *Martin Corteſe*, *Peter Nonius*, *Gerrard Mercator*, and others; but Mr. *Wright*'s Book was the firſt in which the Reaſons of any Corrections appeared, and a Table of meridional Parts for conſtructing what is commonly called *Mercator*'s *Chart*, which has afforded the greateſt Improvement that ever was made in Navigation, and muſt, in Juſtice, be aſcribed to Mr. *Wright*, eſpecially as to all that regards the *Rationale* of it. Before the Publication of this Work, in the Years 1594, 1595, and 1596, he, by a large Quadrant of ſix foot Radius, made Obſervation of the Sun's meridian Altitude, and thereby left not only the beſt Theory of the Sun's Motion at that Time, but made new and very curious Tables for the Sun's Declination. He maintained a Correſpondence with the moſt able Artiſts abroad, and being choſen Tutor in the Mathematics to Prince *Henry*, he, by the Help of ſome *German* Workmen, cauſed to be made, for that hopeful Prince, a large Sphere with curious Movements, which, by the Help of Spring-work, not only repreſented the Motions of the whole celeſtial Sphere, but ſhewed likewiſe the particular Syſtems of the Sun and Moon, and their circular Motions, together with their Places and Poſſibilities of eclipſing each other; there is in it a Work for a Motion of 17100 Years certainly effected, if the Sphere ſhould be ſo long kept in Motion. This Sphere, tho' thus made at a great Expence of Money and ingenious Induſtry, was in the late Times of Devaſtation caſt aſide, among other Rubbage, and had been utterly loſt and deſtroyed had it not, in the Year 1646, been found out by Sir *James Moore*, and at his great Coſt and Charge, reſtored to its priſtine Perfection; and was not long ſince at his Houſe in the *Tower*, amongſt other mathematical Inſtruments and Curioſities in his Poſſeſſion. Beſides the Book of the Errors in Navigation, before mentioned, the ſaid Mr. *Wright* wrote a Book of the Uſe of the Sphere, a Piece of Dialling, and a Book of Navigation called, *the Haven-finding Art*. In all which he hath ſhew himſelf not only ſedulous, but a knowing Aſtronomer. He flouriſhed about the Year 1624.

The

The LIFE of RENE' DES CARTES.

RENE' DES CARTES, one of the moſt eminent Philoſophers and Mathematicians of the ſeventeenth Century, was deſcended of an antient and noble Family in *Touraine* in *France*, and younger Son of *Joachim Des Cartes*, Councellor in Parliament of *Rennes*: He was born at *La Haye* in *Touraine*, *March* 31, 1596; his Mother died ſoon after his Birth, and his Father married ſome Years after; but from an Appearance of a promiſing Genius as well as a paternal Affection, did not at all neglect his Education, frequently calling him the Philoſopher, on Account of his inſatiable Curioſity in aſking the Reaſons of every Thing that he did not apprehend. He was ſent to the *Jeſuits* College at *La Fleche* in 1604, and put under the Tuition of Father *Charlet*: Here he made a great Progreſs in the learned Languages and polite Literature, and contracted an Acquaintance with ſeveral Gentlemen, eminent in the Republic of Letters; but having paſſed thro' his Courſe of Philoſophy without any great Satisfaction to himſelf, he left the College in *Auguſt* 1612, intending to decline his Studies, and began to addict himſelf to military Exerciſes, in learning to ride the great Horſe and to Fence, and other ſuch like Actions ſuitable to his Quality; but notwithſtanding his Inclination to military Atchievements, the Weakneſs of his Conſtitution not permitting him early to expoſe himſelf to the Fatigues of War, he was ſent to *Paris* in the Spring under the Care of a Tutor or Companion, under no other Reſtrictions than conſiſted with Virtue and Quality: Here he renewed his Acquaintance with ſeveral Perſons who ſerved to reclaim him from his Intention to decline his Studies, particularly Father *Merſenne*, whoſe Converſation revived in him a Deſire after Truth, and tho' his Father removed ſoon after to *Nevers*, the Impreſſions were ſo ſtrong that he did not return to his former Diverſions; but, inſpired with the Love of Knowledge, he entered upon a ſevere Courſe of Study, which he purſued till he was found out by ſome of his Friends and diſſuaded from it. He then departed for *Holland*, *May* 1616, and inliſted himſelf in the Prince of *Orange*'s Troops as a Volunteer, and while he

lay in Garriſon at *Breda*, during the Truce between the *Spaniards* and the *Dutch*, ſolved a Problem in the Mathematics to the Satisfaction of *Iſaac Beekman*, Principal of the College of *Dort*. A Perſon unknown cauſed the Problem to be fixed up in the Streets of *Breda*, which occaſioned a great Reſort of Perſons to viſit him and ſeek an Acquaintance with him, which was greatly encouraged by Mr. *Iſaac Beekman*, who was more than thirty Years older than *Des Cartes*. During his Stay at *Breda* he likewiſe wrote a Treatiſe of Muſic, and laid a Foundation for many of his other Works. He left *Breda* in 1619. In the Spring following he attended the Duke of *Bavaria*'s Army, in which he had entered as a Volunteer, into *Swabia*, and arrived at *Ulm* 1620, where he became acquainted with *John Faulhaber*, who encouraged him in the Study of Mathematics: He was preſent at the Siege of *Prague*, *Presbourg*, *Tinaw*, *&c.* but the raiſing of the Siege of *Dew-Hauſel* with the Loſs of his General who was killed there, determined him to abandon the Profeſſion of Arms. Then he began his Travels into the North, viſited *Sileſia*, *Poland*, *Pomerania*, the Coaſt of the *Baltic*, *Brandenburg*, *Holſtein*, *Eaſt* and *Weſt Frieſland*, from thence went into *Holland*, and then to *Rennes* in *France*, then to *Bretagne* and *Poictou*, where he ſold his Eſtate, and proſecuted his Travels through *Switzerland*, *Italy*, *&c.* Upon his Return home, 1628, he attempted to conceal himſelf, but, being known to be returned, Men of Learning in the Sciences ſought to divert him from too ſecluſe a Life. The Pope's Nuncio prevailed upon him to explain his Sentiments with regard to Philoſophy, for which Purpoſe our Author retired to *Amſterdam* in 1629, and from thence to *Frieſland*, where he began his metaphyſical Meditations; but that he might undertake nothing that had any Affinity with Divinity, he conſidered God only as the Author of Nature, and it was not natural Religion, but revealed, that he excluded from his Deſigns. During his Stay in *Frieſland* he ſpent ſome Time in Dioptrics, to which he applied himſelf in *France*. About ſix Months after he returned again to *Amſterdam*, where he reaſſumed his Studies with great Aſſiduity in the Mathematics. Here he likewiſe drew up his Diſcourſe of Meteors, and ſoon after he ſeriouſly undertook the Study of Phyſic, Anatomy and Chemiſtry, as he conceived nothing was more capable of promoting

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the temporal Felicity of Mankind than an happy Union of Phyſic with Mathematics: He began this Study with that of Anatomy, in which he ſpent his Time all the Winter he reſided at *Amſterdam*, and rejected an Invitation of going into the *Levant* with Count *De Marchivell*, Embaſſador from the King of *France* to the *Grand Seignior*; but ſoon after took a Tour to *England*, and not far from *London* made ſome Obſervations concerning the Declination of the Magnetical Needle. Upon his Return he admitted Monſieur *Ville-Breſſieux*, who had a prodigious Genius for the Mathematics and Chemiſtry, into his Family; and in the Spring of the Year 1633 he removed to *Deventer*, where one of his own Diſciples was appointed Profeſſor of Philoſophy. Here he applied himſelf to compleat ſeveral Works which he had left unfiniſhed the Year before, and reſumed his Studies in Aſtronomy, and the Summer following finiſhed his Treatiſe of the World: He called it his World, becauſe it was the Idea of a World which he had imagined anſwerable to the World in which we live, and it contained an Abridgment of all his natural Philoſophy, that is, of all that he could come to the Knowledge of with regard to material Things, except what relates to Light, which he propoſed to explain afterwards in its full Extent. The next Year he removed to *Amſterdam*, and ſoon after took a Journey into *Denmark* and the lower Parts of *Germany* with Monſieur *Ville-Breſſieux*. The Winter following afforded our Author an Opportunity for thoſe Obſervations which he made upon Snow of ſix Points or Angles, and upon that Occaſion to make others upon Hail and Rain, in five Diſcourſes. He afterwards wrote a ſixth Diſcourſe of them, publiſhed in his Treatiſe of Meteors. In 1635 he went to *Lewarden* in *Frieſland*, where he continued to the Year 1637, and wrote his Treatiſe of *Mechanics*. He returned to *Amſterdam* about the Middle of *March*, and made a great many curious Obſervations concerning the Circles about Candles, *&c.* In 1637 he publiſhed his four Treatiſes concerning Method, Dioptrics, Meteors, and Geometry: He ſoon after took a Journey to *Breda*; at his Return he ſettled at *Egmond*, where, notwithſtanding he had not attempted to undermine the Catholic Religion, his Book produced ſome Objections, which he was called upon to anſwer, *viz.* by *Fromond*, *Regius* Profeſſor of the Holy Scriptures at *Lovain*; *Plempius* a *Dutch* Phyſician in

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that Univerſity; and Monſieur *Morin*, *Regius* Profeſſor of Mathematics in the *Jeſuits* College there. In *France* his Book was received according to the different Sentiments of the Readers. The Diſputes which he had with the *Regius* Profeſſor of Mathematics at *Paris*, and Monſieur *Beaugrand*, Secretary to the King of *France*, terminated very amicably; nevertheleſs, he reſolved to diſcontinue his Application to abſtract Geometry, tho' he determined to continue that Part of it which is converſant about the Phænomena of Nature, and wrote a Book to explain ſome Parts which were ſomewhat obſcure, and conſented that a *Dutch* Gentleman ſhould draw up a regular Introduction to his Geometry, to facilitate the Underſtanding of it to all his Readers. After having his Patience tried with Problems, *&c.* about the Year 1638, he deſired to be excuſed from anſwering any more, and to avoid it he drew up a Series of the moſt uſeful Problems with their Solutions, in order to be printed. His Philoſophy now grew much in Eſteem; and by the Influence of *M. Renneri*, and *Henry Regius* a Phyſician in much Eſteem, the Univerſity of *Utrecht*, declared likewiſe in its Favour, but was afterward vehemently attacked by *Gilbert Voetius*, Profeſſor of Divinity in *Holland*. *Des Cartes* now removed to *Harderwick* near *Utrecht*, and thence to *Leyden*, and not long after was invited to ſettle in *England*, by Sir *Charles Cavendiſh*, Brother to the Earl of *Newcaſtle*. About this Time he was violently attacked by ſome *Jeſuits*, and particularly by Father *Bourdin*. At the latter End of the Year 1641, *Lewis* XIII. King of *France*, invited him to his Court upon very honourable Conditions, but there was no Sollicitations powerful enough to prevail upon him to part with his preſent happy Retirement. In 1641 he publiſhed his Meditations concerning the Exiſtence of God, and the Immortality of the Soul. *Voetius* being choſen Rector of the Univerſity of *Utrecht* in the ſame Year, he wrote againſt him, and procured his Philoſophy to be prohibited there; whereupon *Des Cartes* publiſhed a Vindication of himſelf, printed at *Amſterdam* in 1643; but in this he was greatly cenſured for treating his Opponent with too much Rancour and Scurrility. The ſame Year he took a Voyage into *France*, where he found the Edition of his Principles, and *Latin* Tranſlation of his Eſſays finiſhed, and the Copies ſent from *Holland*: He dedicated his

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Principles to his illuſtrious Diſciple, *Elizabeth*, Princeſs Palatine and Queen of *Bohemia:* After paying Viſits at *Paris*, he departed for *Holland*, about the End of *October*, and retired to *Egmond*, with a Reſolution to apply himſelf wholly to the Knowledge of Animals, Plants, and Minerals. —— In *June*, 1645, he publicly renounced his Diſciple *Regius*, who had preſumed to advance ſeveral Notions of his own, and had artfully poſſeſſed himſelf of *Cartes*'s Treatiſe of Animals. He then directed his Application with freſh Vigour to Anatomy; and being viſited at this Time by a Gentleman who deſired to ſee his Library, he ſhewed him nothing but a Calf, which he was about to diſſect. He was a little diverted from this Study, by the Queſtion concerning the Quadrature of the Circle, agitated in 1645, between *Longomontanus*, and Mr. *John Pell*; which Queſtion he declared impoſſible to be ſolved. He paſſed the ſevere Winter of that Year at *Egmond*, and compoſed two Books, one againſt *Gaſſendus*'s Inſtances, and another on the Nature of the Paſſions: About the ſame Time he had a Diſpute with Monſieur *Roberval*, concerning Vibrations, and carried on a Correſpondence upon Moral Philoſophy, with the Princeſs *Elizabeth*. In the Beginning of the Year 1647, he anſwered ſome Queſtions propoſed to *Chriſtiana*, Queen of *Sweden*, and Monſieur *Chanut*, the Reſident of *France* in that Kingdom: But the Pleaſure of this Correſpondence was diſturbed by the Clamours which *Ravius*, Principal at the College of *Leyden*, and *Triglianus*, Profeſſor of Divinity there, had raiſed againſt his Philoſophy in that Univerſity: They were ſoon after enjoined Silence with regard to him, tho' they afterwards wrote againſt ſome Parts of his Philoſophy In *June*, he took a Journey to *France*, where the King ſettled on him a Penſion of 3000 Livres; and he returned again to *Holland* about the End of *September*. In *November* he received a Letter from Monſieur *Chanut*, deſiring, in Queen *Chriſtiana*'s Name, his Opinion of the ſovereign Good, which he ſent her with ſome Letters which he had formerly written to the Princeſs *Elizabeth*, upon the ſame Subject, and his Treatiſe of the Paſſions: The Queen was ſo highly pleaſed with them, that ſhe wrote him a Letter of Thanks with her own Hand. In *May* following, he took a third Journey into *France*, where *Gaſſendus* and he were reconciled: And in *September* he returned to *Egmond*, where the

Queen of *Sweden* having invited him into that Kingdom, he went, and was received with the higheſt Civility by her Majeſty, who engaged him to attend her every Morning at five o'Clock, to inſtruct her in his Philoſophy, and deſired him to correct and reviſe all his Works, and to form a compleat Body of Philoſophy from them: She propoſed likewiſe to ſettle him in *Sweden* upon very honourable Terms, and to allow him a Revenue of 3000 Crowns *per Annum*, with an Eſtate which ſhould deſcend to his Heirs, and to eſtabliſh an Academy, of which he ſhould be the Director: But all theſe Deſigns were obſtructed by his Death, which happened *February* 11, 1650, he being then fifty-three Years and ten Months old. His Body was interred at *Stockholm*, and ſeventeen Years afterwards removed to *Paris*, where a magnificent Monument was erected to him in the Church of St. *Genevieve*. Monſieur *du Mont* has given us a particular Account of the Qualifications of his Mind and Body, and highly recommends him for his Contempt of Wealth and Fame, his Love of Truth, his ſingular Modeſty, diſintereſted Moderation, Piety, and Submiſſion to the Authority of the Church: But we ſhall chuſe to give his Character from Dr. *Barrow*, and other Authors of Note. Dr. *Barrow*, in his *Opuſcula*, Page 156, tells us, "That he was undoubtedly a very good and "ingenious Man, and a real Philoſopher, and one who ſeems "to have brought thoſe Aſſiſtances to that Part of Philoſophy "which relates to Matter and Motion, which perhaps no other "had done: That is, a great Skill in Mathematics; a Mind habituated, both by Nature and Cuſtom, to profound Meditation; "a Judgment exempt from all Prejudices and popular Errors, and "furniſhed with a conſiderable Number of certain, and ſelect "Experiments; a great deal of Leaſure; entirely diſengaged, "by his own Choice, from the Reading of uſeleſs Books, and "the Avocations of Life; with an incomparable Acuteneſs of "Wit, and an excellent Talent of thinking clearly and diſtinctly, expreſſing his Thoughts with the utmoſt Perſpicuity." *Samuel Moreſius*, *Alexander Morus*, *Morhoff*, *Bullart*, and many other foreign Writers ſpeak of him with great Commendation. And the great Dr. *Edmund Halley*, in a Paper concerning Optics, communicated to Mr. *Wotton*, writes thus: "As to Di-"optrics, tho' ſome of the Ancients mentions Refraction as a

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" natural Effect of tranſparent Media, yet, *Des Cartes* was the " firſt, who in his Age has diſcovered the Laws of Refraction, " and brought Dioptrics to a Science." But Dr. *John Wallis*, ſpeaking of his Knowledge in Algebra and Geometry, ſays, " It was in great Meaſure owing to Mr. *Harriot*'s Book called, " *Artis Analyticæ Praxis*, on which the *Carteſian* Method of Al- " gebra was founded, there being ſcarce any Thing of pure " Algebra in *Des Cartes*, which was not before in *Harriot*; but " the Application thereof to Geometry, or other particular " Subjects which *Des Cartes* purſues, is not the Buſineſs of that " Treatiſe of *Harriot*."

We ſhall only add to the above Account, that his Principles of Philoſophy were not only arbitrary, imaginary, groundleſs, and inſupported by any Experiments, or mathematical, or mechanical Reaſoning; but were ſoon found to be abſurd and contrary to the known, and eſtabliſhed Laws of Nature: And it is happy for the preſent Age, that his Vortices has hurled away his *Materia Subtilis*, beyond the Extent of the ſolar Syſtem: And it may be ſaid of his, as of the *Hutchinſonian* Philoſophy, that it had never any Abettors or Admirers, but among thoſe who were never qualified to underſtand any true Philoſophy at all: And *Jacob Bremen* might as well have been compared, or paralleled with Sir *Iſaac Newton*, in regard to Philoſophy, as *Des Cartes*. In ſhort, the Sum of his Character may be reduced to this, that he was a very great Mathematician, but made the leaſt Uſe of his Skill of that Sort, where it was moſt required, and the faireſt Opportunity offered, *viz.* in his bold Attempt of making a *World*.

The LIFE *of* PETER GASSENDUS.

PETER *GASSENDUS*, Dean of the Cathedral Church of *Digne* in *Provence*, and Regius Profeſſor of Mathematics in the Univerſity of *Paris*; the learned Reſtorer and Vindicator of the Epicurean Philoſophy: Among other laſting Monuments of his Erudition he hath left divers aſtronomical Tracts,

viz.

viz. four Epiſtles *De apparente Magnitudine Solis humilis et ſublimis.* ——— Three, *De Motu impreſſo à Motore tranſlato*, wherein he defends the *Copernican* Hypotheſis of the Earth's Motion. ——— Another Work, he entitled, *De Parheliis, ſeu Solibus quatuor ſpuriis Romæ circa verum viſis*, *Anno* 1629. He put forth alſo, about the Time of his Admiſſion into the philoſopical Chair at *Paris*, his aſtronomical Inſtitutions, printed lately at *London*, with the Addition of *Kepler*'s Dioptrics; and hath left, among other of his Works, a Volume of celeſtial Obſervations, which, from the Year 1621 to the Year 1655, he made with aſſiduous Care and accurate Speculation. ——— A Treatiſe alſo entitled, *Mercurius in Sole viſus et Venus inviſa*, printed at *Paris* in the Year 1631. His Conjecture about nine pretended Satellites of *Jupiter*, in anſwer to *Rheita*. *Solſtitialis Altitudo Maſſilienſis, ſeu Proportio Gnomonis ad Solſtitialem Umbram obſervata Maſſiliæ* 1636, in an Epiſtle to *Vendelinus*. ——— The Lives of *Purbacchius* and *Regiomontanus*, as likewiſe thoſe of *Copernicus* and *Tycho Brahe*, the moſt illuſtrious Aſtronomers of their Times: And a compendious Expoſition of the *Roman* Calendar. Beſides the Life of the incomparable *Peireſkius*, and his Epiſtles to divers eminent and learned Perſons; wherein he frequently treats, upon Occaſion given, of aſtronomical Subjects.

One Circumſtance in the Life of our Author we muſt not omit, the Tranſits of the Planets *Mercury* and *Venus*, over the ſolar Diſk, are Phænomena of the moſt delightful and uſeful Kind; they were never obſerved till after the Uſe of Teleſcopes: The firſt who ever ſaw the Tranſit of *Mercury* was *Gaſſendus*, and *Horrox* firſt predicted and ſhewed the Tranſit of *Venus*. *Kepler*, whoſe Life we have given, Page 214, before he had finiſhed his Tables, had placed the Nodes of *Mercury*'s Orbit at the Beginning of the Signs of *Gemini* and *Sagittary*, and thence predicted his Appearance in the Sun, *May* 20, 1607, on which Day he obſerved the Sun very diligently, viewing his Image caſt upon a Paper in a dark Room, thro' a ſmall Hole in the Window ſhut; then alſo there happened to be a large Spot in the Sun, which *Kepler* took for *Mercury*. It was lucky for him that Teleſcopes were invented ſoon after, which preſently convinced him that what he took for *Mercury* was only a ſolar Spot; upon this he rectified his Tables, and by placing the Nodes of *Mercury*

cury about the Middle of *Taurus* and *Scorpio*, he predicted, that his firſt Appearance in the Sun would be on the 7th of *November*, 1631.

Gaſſendus was then at *Paris*, and made due Preparation to obſerve it in the Manner he uſed to obſerve Spots upon the Sun, by receiving its Rays thro' a Teleſcope, a little lengthened, in order to collect them into an Image caſt upon white Paper; and in watching for *Mercury*, he fell into a contrary Miſtake to that of *Kepler*, taking *Mercury* himſelf for a ſolar Spot juſt ſprung from the Sun, having found it quite free from them the Day before: However, he took the Poſition of the Spots once or twice, intending to compare it with that of *Mercury*, which he thought would appear much larger; but in taking its third Poſition, and obſerving it moved quicker than Spots uſually do, he began to ſuſpect it might be *Mercury* himſelf; and being farther aſſured of it by his fourth Obſervation, he prepared to obſerve its Egreſs from the Sun's Diſk, which happened on the 7th of *November*, 20 Minutes after ten in the Morning, at the Diſtance of $33\frac{1}{2}$ Degrees from the Sun's vertical Point: This was the firſt Time that *Mercury* was ever ſeen in the Sun, and the only Obſervation then made of that Tranſit; ſeveral ſubſequent Obſervations of the like Tranſits have been made by other Authors.

His Library was large and valuable: To which he added, an aſtronomical and philoſophical Apparatus, which, for their Accuracy and Worth, were purchaſed by the Emperor *Ferdinand* III. and ſince by the preſent Emperor of *Germany*, and depoſited, with other valuable Collections, in the Emperor's unparalleled Library at *Vienna*. He died, greatly regretted by all who had the Happineſs of his Acquaintance, in the Year 1655.

The LIFE of CHRISTOPHER SCHEINERUS.

CHRISTOPHER SCHEINERUS, a Native of *Mundeilhen* in *Swaben*, of the Society of *Jeſus*, and ſometime Profeſſor of the *Hebrew* Tongue, and Mathematics, at *Fribourg* and *Ingolſtadt*, afterwards Rector in the College of *Niſſa*,

diſplayed a remarkable Genius in aſtronomical Sciences. He diſcovered the Spots in the Sun about the ſame Time as *Galileo*, and he attended to the Obſervation of the ſolar Spots for many Years at *Rome*, with the greateſt Aſſiduity and Sagacity, and conſtantly made Drawings of the ſame on Paper, deſcribing their Places, Figures, Magnitude, appearing and diſappearing, Revolutions, and Periods, which he ſo plainly tranſmitted to Poſterity, that *Ricciolus* delivered it as his Opinion, that we had little Reaſon to hope for better Obſervations than he has left us. —— *Des Cartes*, and *Hevelius*, alſo ſays, that according to their Judgment, nothing can be expected of that Kind more Satisfactory. —— Mr. *Heathcote*, in his Hiſtory of Aſtronomy, makes particular mention of this Author, and ſays, that he diſcovered the ſolar Spots in the Year 1611; and he was certainly the firſt Author that publiſhed any Thing conſiderable on that Subject; for which Reaſon, principally, we think him worthy a Place in our *Biographia*.

The moſt eminent Pieces by which he hath ſignalized his Name, are theſe:

I. *Occulus, ſeu fundamentum opticum.*
II. *Sol ellipticus, diſquiſitiones mathematicæ.*
III. *De controverſiis et novitatibus aſtronomicis.*
IV. *Roſa urſina.*

He died at *Rome*, about the Year 1630.

The LIFE of PHILIP LANSBERGIUS.

PHILIP LANSBERGIUS had a Rank amongſt the Mathematicians of the ſeventeenth Century. He was born in *Zealand*, in the Year 1561, and was Miniſter of the Goſpel at *Antwerp* in the Year 1586, and afterwards for ſeveral Years; *Voſſius* mentions, that he was Miniſter at *Goeſe* in *Zealand* 29 Years; and being then diſcharged of his Functions, on Account of his old Age, he retired to *Middleburgh*, where he died in the Year 1632. His

His Works were principally the following:

I. Six Books of ſacred Chronology; printed in the Year 1626.

II. Eſſays on the Reſtitution of Aſtronomy; printed at *Middleburgh*, 1629.

III. Four Books of geometrical Triangles; printed in the Year 1631.

IV. Of Meaſuring the Heavens, in three Books, in the ſame Year.

V. An Account of the diurnal and annual Motion of the Earth and of the true Situation of the viſible celeſtial Bodies. In this Work he declares himſelf openly for *Copernicus*'s Syſtem, and even pretends to improve it. He compoſed this Work in *Dutch*, and it was tranſlated into *Latin*, by *Martinus Hortenſius*, and printed at *Middleburgh*, 1930. *Fromond*, a Doctor of *Louvain*, wrote an Anſwer to it, and endeavoured to prove the Earth ſtood ſtill. He did not live to write a Reply to it, but his Son publiſhed an Anſwer to *Fromond*, and *Morin*, *Regius* Profeſſor at *Paris*, and to *Peter Bartholinus*, which is entitled, *A Defence of the Account, &c.* by *James Lanſbergius*. This was alſo anſwered; but we don't find which Side gave out firſt.

The LIFE of HENRY GELLIBRAND.

HENRY GELLIBRAND was born in the Pariſh of St. *Botolph*, *Alderſgate*, in the City of *London*, on the 27th of *November*, 1597; and in the Year 1615 he was admitted a Commoner at *Trinity College* in *Oxford*, where, about four Years after, he took the Degree of Batchelor of Arts: Soon after, upon hearing one of Sir *Henry Saville*'s mathematical Lectures, he was ſo extremely taken with it, that he immediately fell to the Study of that noble Science, and made a conſiderable Proficiency before he took his Maſters Degree, which was in the Year 1623. While he continued in the Purſuit of thoſe Studies, the Profeſſorſhip of Aſtronomy in *Greſham College* becoming vacant by the Death of Mr. *Gunter*, he endeavoured

endeavoured to ſucceed him, and for that End procured a Teſtimonial from the Preſident and Fellows of *Trinity College*, which being preſented to the Electors, he was choſen the 2d of *January*, 1626: But Mr. *Gellibrand* had not been ſettled there many Years before (as Mr. *Prynne* informs us) he was brought into Trouble in the High Commiſſion Court, by Dr. *Laud*, then Biſhop of *London*, upon the Account of an Almanac, publiſhed by *William Beale*, Servant to Mr. *Gellibrand*, for the Year 1631, with the Approbation of his Maſter. In this Almanac the *Popiſh* Saints, uſually put into our Kalendar, were omitted, and the Names of other Saints and Martyrs, mentioned in the Book of Martyrs, were placed in their Room, as they ſtand in Mr. *Fox*'s Kalendar. This it ſeems gave Offence to the Biſhop, and occaſioned the Proſecution: But when the Cauſe came to be heard, it appearing, that other Almanacs of the ſame Kind had been formerly printed, both Mr. *Gillibrand*, and Mr. *Beale*, were acquitted. —— Mr. *Gellibrand* was then employed in finiſhing the *Trigonometria Britannica* of Mr. *Briggs*, which was deſigned by the Author to conſiſt of two Books; but he dying on the 26th of *January*, 1630, when he had completed only the firſt of them, recommending it to the Care of his old Friend Mr. *Gellibrand*, to draw up the ſecond, and complete the Work. Several other Perſons, alſo eminent for their Skill in the Mathematics, were earneſt with him to engage in this Deſign, which he having undertaken and finiſhed, was printed in *Holland*, 1633. He likewiſe publiſhed a Diſcourſe on the Variation of the magnetic Needle, and annexed a Treatiſe of Mr. *Edward Wright*'s, entitled, *Certain Errors in Navigation, detected and corrected.* Thoſe Obſervations had been made partly by *Engliſhmen*, and partly by Foreigners in almoſt all Parts of the World, where Navigation had been then carried; they have been ſince much eſteemed, and great Uſe has been made of them by very eminent Mathematicians.

Mr. *Gellibrand*'s Situation at the College, free Converſe with the Lovers of mathematical Studies, and diligent Enquires gave him an Opportunity of contributing much to the Improvement of Navigation, which probably would have owed more to him, had he lived longer: But he was taken off *February* 9, 1636, in the 40th Year of his Life, and was buried in the Church

Church of St. *Peter the Poor*, without any Inſcription to his Memory: Dr. *Hanibal Potter*, formerly his Tutor at *Trinity* College, and afterwards Preſident of it, preached his funeral Sermon, in which he much commended his Piety and Worth. There is a Dial made by him, which yet remains on the Eaſt Side of the old Quadrangle in that College; but the beſt Memorial of him are his Writings, *viz.*

I. His *Trigonometria Britannica:* Or, the Doctrine of Triangles.

II. A ſmall Tract concerning Longitude.

III. A Diſcourſe on the Variation of the Magnetic Needle.

IV. An Inſtitution of Trigonometry, with its Application to Aſtronomy and Navigation.

V. An Epitome of Navigation, with the neceſſary Tables.

VI. Several MSS. never publiſhed, as the Doctine of Eclipſes. —— A Treatiſe of Lunar Aſtronomy. —— A Treatiſe of building Ships, *&c.*

The LIFE of SAMUEL FOSTER.

SAMUEL FOSTER was born in *Northampton*, and admitted a *Sizer* at *Emanuel* College, *Cambridge*, on the 23d of *April*, 1616, where he took the Degree of Bachelor of Arts in the Year 1619, and that of Maſter in 1623: The Year following he publiſhed his Treatiſe, called *The Uſe of the Quadrant.* He never had a Fellowſhip, and is therefore placed, by Mr. *Fuller*, among the leaned Writers of that College who were not Fellows.

His Inclination led him chiefly to the Mathematics; and upon the Death of Mr. *Gellibrand*, Aſtronomy Profeſſor in *Greſham* College, he was choſen in his Room, upon the 2d of *March*, 1636, but quitted that Place on the 25th of *November* following, and was ſucceeded by Mr. *Murray*.

After the Surrender of his Profeſſorſhip, he continued to purſue his mathematical Studies; and in the Year 1638 he publiſh-

ed his *Art of Dialling*. But, in the Year 1641, that Profeſſorſhip being vacant again by the Marriage of Mr. *Murray*, he was again re-choſen, *May* the 26th, that Year. And upon the breaking out of the national Troubles, which ſoon followed his Return to *Greſham* College, he was one of that worthy and learned Society of Gentlemen who met in *London*, and applied themſelves to experimental Enquiries, and the Study of Nature, which was then called *the New Philoſophy*, and at Length gave Birth to the *Royal Society*. In 1646, Dr. *Wallis*, who aſſociated with them, received from Mr. *Foſter* a Theorem, *De Triangulo Sphærico*, which he afterwards publiſhed. The happy Effects of thoſe Meetings, both at *London* and *Oxford*, were very great and extenſive; though Mr. *Foſter* had not the Pleaſure of ſeeing it, for he died at *Greſham* College in the Month of *July*, 1652, and was buried in the Church of St. *Peter the Poor* in *Broad-ſtreet*.

Dr. *John Twyſden* gives him the Character of a learned, induſtrious, and moſt ſkillful Mathematician; the Truth of which he has abundantly ſhewn by his Works: Nor did he only excel in his own Faculty, but was likewiſe well verſed in the antient Languages, as appears by his reviſing and correcting the *Lemmata* of *Archimedes*, which had been tranſlated into *Latin* from an *Arabic* Manuſcript, but not publiſhed, by Mr. *John Greaves*. He made ſeveral curious Obſervations of Eclipſes, both of the Sun and Moon, as well at *Greſham* College as in other diſtant Places: And he was particularly famous for inventing and improving many planetary Inſtruments. He publiſhed but little himſelf; but many Treatiſes, written by him, were publiſhed after his Death, though, as Dr. *Twyſden* and Mr. *Wingate* ſays (to whom the Public is obliged for them) being diſabled, by his great and long Infirmities, to fit them for the Preſs as he deſired and intended, they muſt needs want very much of that Accompliſhment, which otherwiſe they would have had; and Dr. *Twyſden* complains, that ſome Perſons, having got into their Hands ſome Things of Mr. *Foſter*'s, which, out of that diffuſive Goodneſs and Candor of Diſpoſition that was in him, he communicated to others, had, under a diſguis'd Face, vented them as their own. His Works are moſt of them ſtill extant, and very uſeful. The principal of which here follow:

I. The

I. The Uſe of *Gunter*'s Quadrant.

II. The Art of Dialling.

III. His poſthumous Works, publiſhed by Mr. *Wingate*.

IV. Four Treatiſes of Dialling. Containing the Nature of elliptical, circular, rectilineal and azimuthal Dials.

V. Miſcellanies, or mathematical Lucubrations.

VI. The Sector altered and improved, with an Addition of other Scales.

To which we may add, a MSS. Treatiſe, in Folio, on the Uſes of a general Quadrant, invented by Mr. *Samuel Foſter*.

The LIFE of JEREMIAH HORROX.

JEREMIAH HORROX, an eminent *Engliſh* Aſtronomer in the ſeventeenth Century, was born at *Toxteth* near *Liverpool* in *Lancaſhire*, about the Year 1619, and, when but very young, was placed under the Care of a School-maſter in the Country, where he made himſelf Maſter of Grammar Learning; but, as he diſcovered a remarkable Genius, he was ſent to *Emanuel* College in *Cambridge*, and ſpent ſome Time there in academical Studies. About the Year 1633, he began to apply himſelf to the Study of Aſtronomy; but living at that Time with his Father at *Toxteth*, in very moderate Circumſtances, and being deſtitute of proper Books and Aſſiſtances for the Proſecution of this Study, he could not make any conſiderable Progreſs in it: But having ſpent ſome Years to little Purpoſe, in the Study of *Lanſbergius*, he renews his Application to the Study of *Tycho Brahe*, *Kepler*, and other excellent Writers. And, about the Year 1636, he contracted an Acquaintance and Friendſhip with Mr. *William Crabtree*, who was ingaged in the ſame Studies, and who lived at *Broughton* near *Mancheſter*, who carried on a mutual Correſpondence for a conſiderable Time, and ſometimes communicated their Improvements to Mr. *Samuel Foſter*, Profeſſor of Geography at *Greſham* College in *London*. Mr. *Horrox*, having now obtained a Companion in his

his Studies, aſſumed new Vigour, and procured aſtronomial Inſtruments and Books, applied himſelf to the making many curious Obſervations which had never been made before, and was purſuing his Studies with great Aſſiduity, when he was removed, by ſudden Death, the 3d of *January*, 1640, in the 22d, or at the Entrance of the 23d Year of his Age, according to the Account given us by Dr. *Wallis*.

What we have extant of his Writings, gives us ſome Idea of the great Loſs the World had by his Death. He had juſt finiſhed his *Ventus* in *Sole Viſa*, a little before his Death; for it appears by a Letter of his to Mr. *Crabtree*, dated *October* 3d, 1640, that this Book was not then finiſhed; and in another Letter of the 19th of *December*, he intimates, he had finiſhed it, and ſhould ſet out on the 4th of *January* to ſee him; but died the Day before.——Our Author made his Obſervations of *Venus* in *Sole* at *Hool* near *Liverpool*, as is evident from his Letters. This moſt excellent *Tractate of* Venus *ſeen in the Sun*, was publiſhed by the famous *Hevelius*, together with his own *Mercurius in Sole Viſus*, and illuſtrated with his accurate Annotations; his other poſthumous Works, or rather his imperfect Papers, were digeſted and publiſhed by the great Care and Labour of that learned Mathematician Dr. *John Wallis*, wherein we find, he firſt aſſerts and promotes the *Keplerian* Aſtronomy againſt the Hypotheſis of *Lanſbergius*, which he proves to be inconſiſtent with itſelf; not agreeable to former Obſervations exactly made, nor the Precepts of them well demonſtrated. He likewiſe reaſons, with great Juſtice, concerning the celeſtial Bodies and their Motions, vindicates *Tycho Brahe* from ſome Objections made to his Hypotheſis, and gives a new Theory of the Moon: To which are added, the lunar Numbers of Mr. *Flamſtead*. There are alſo Extracts of ſeveral Letters of his, to his Friend and Aſſociate in Study, Mr. *Crabtree*, upon diverſe aſtronomical Subjects; with a Catalogue of aſtronomical Obſervations, made by the ſaid *Horrox*, without Allowance of the Excentricity of the Eye, concerning which he afterwards altered his Sentiments, as appears by a Correction fairly written with his own Hand.

There

There are two Things which will eternize the Memory of this great, though very young Man; one is, that he was the firſt that ever predicted, or ſaw the Planet *Venus* in the *Sun*; and, indeed, we do not find that any but himſelf and Mr. *Crabtree*, of all Mankind, ever beheld ſuch a Phænomenon. Tho' he was not apprized of the grand Uſe that was to be made of it, in diſcovering the Parallax and Diſtance of the Sun and Planets, yet he made many uſeful Obſervations, Corrections, and Improvements in the Theory of *Venus*'s Motion from thence.

2dly, His new Theory of lunar Motion, which Sir *Iſaac Newton* himſelf made the Ground-work of all his Aſtronomy, relative to that ſecondary Planet, and always ſpoke of our Author as a Genius of the firſt Rank. —— His poſthumous Works, above-mentioned, will furniſh the Reader with many excellent Treatiſes on aſtronomical Subjects, which, tho' they are much improved ſince his Time, were then far ſurpaſſing any Thing that had before been publiſhed by others, and are ſtill worthy the Peruſal of the beſt Judges in that Science.

The LIFE of JOHN WALLIS.

JOHN WALLIS, Son of Mr. *John Wallis* a Clergyman, was born at *Aſhford* in *Kent*, *November* 23, 1616: His Father dying when he was but 6 Years old, he was put under the Care of Mr. *James Movat*, a *Scotchman*, and trained up in his School at *Leygreen*, near *Tenterden*, till about the Year 1630, when he was ſent to *Felſteed* School in *Eſſex*, under the Direction of Mr. *Martin Holbeach*, and was inſtructed by him in the *Latin*, *Greek*, and *Hebrew* Tongues, and the Rudiments of *Logic*, *Muſic*, and the *French* Language. Thus accompliſhed, about 1632, he was ſent to the Univerſity of *Cambridge*, where he was admitted of *Emanuel* College, under the Tuition of Mr. *Anthony Burgeſsthen*, of Mr. *Thomas Horton*, and afterwards of Mr. *Whichcot*: Under theſe famous Tutors he made a great Progreſs in Learning, was, ſoon after his Admittance to *Emanuel* College, choſen of the Foundation, and admitted a Scholar of

the Houſe. Mr. *Wallis*, after this, removed to *Queen*'s College, *Cambridge*, where he was choſen Fellow, and continued ſo till, by his Marriage, he vacated his Fellowſhip. On this Account, in 1636, he took the Degree of Batchelor of Arts, and, about four Years after that, of Maſter. The ſame Year, 1640, he took holy Orders from Dr. *Walter Curle* of *Wincheſter*, but quitted the College to be Chaplain to Sir *Richard Darby* in *Yorkſhire*; after, he removed into that of the Lady *Vere*. The next Year he was choſen one of the Scribes, or Secretaries to the Aſſembly of Divines at *Weſtminſter*; and on the 4th of *March*, 1645, he married *Suſanna*, Daughter of *John* and *Rachael Glyde*, of *Northiam* in *Suſſex*. Soon after, he came to reſide at *London*, at a Time when, by the Civil Wars, academical Studies were much interrupted in both Univerſities, and in that City. He had great Opportunities, by an Acquaintance with many worthy Perſons, of improving his Mind in the Knowledge of natural and experimental Philoſophy. "We did, ſays he, in a Letter to Dr. *Smith*, meet weekly in *London*, to treat and diſcourſe of ſuch Affairs; of which Number were Dr. *John Wilkins*, Dr. *Jonathan Godard*, Dr. *Samuel Foſter* when Profeſſor of Aſtronomy at *Greſham* College, Mr. *Theodore Naak* of the Palatinate, *&c. &c.* Theſe Meetings we held ſometimes at Dr. *Godard*'s Lodgings in *Woodſtreet*, or ſome convenient Place near, on Account of his keeping an Operator in his Houſe for grinding Glaſſes for Teleſcopes and Microſcopes, *&c.* Our Buſineſs was (precluding Matters of Theology and State Affairs) to diſcourſe and conſider of philoſophical Enquiries, and ſuch as related thereunto, as Phyſic, Anatomy, Geometry, Aſtronomy, Navigation, Statics, Magnetics, Chymics, Mechanics, and natural Experiments, with the State of theſe Studies as then cultivated abroad and at home. We there diſcourſed of the Circulation of the Blood, the Valves in the Veins, the lymphatic Veſſels, the Nature of Comets and new Stars, the Satellites of *Jupiter*, the oval Shape (as it then appeared) of *Saturn*, the Spots in the Sun, and its turning on its own Axis, the Inequalities and Selenography of the Moon, the ſeveral Phaſes of *Venus* and *Mercury*, the Improvement of Teleſcopes and grinding of Glaſſes for that Purpoſe; the Weight of Air, the Poſſibility or Impoſſibility of Vacuities, and Nature's Abhorrence thereof; the *Torricellian*

ricellian Experiment in Quick-ſilver, the Deſcent of heavy Bodies, and the Degrees of Acceleration therein, and diverſe other Things of the like Kind; many of which were new Diſcoveries at that Time, and others not ſo generally known and embraced as now they are; with other Things appertaining to what has been called the *New Philoſophy*, which, from the Time of *Galileo* at *Florence*, and Sir *Francis Bacon*, Lord *Verulam*, in *England*, hath been cultivated in *Italy*, *France*, *Germany*, and other Parts abroad, as well as with us in *England*."

"About the Year 1648, ſome of our Company being removed to *Oxford*, firſt Dr. *Wilkins*, then I, and ſoon after Dr. *Goddard*, our Company divided; thoſe in *London* continued their Meeting there, as before, and we with them when we could be there; and thoſe of us, at *Oxford*, with Dr. *Ward*, ſince Biſhop of *Saliſbury*, Dr. *Bathurſt*, Dr. *Petty*, Dr. *Willis*, then an eminent Phyſician in *Oxford*, and brought thoſe Studies into Faſhion there. Our Meetings were uſually at Dr. *Petty*'s Lodgings, at an Apothecary's, becauſe of the Convenience of inſpecting Drugs, and the like, as there was Occaſion; and, after his removal to *Ireland*, at Dr. *Wilkins*'s Lodgings; and afterwards at Mr. *Robert Boyle*'s, then Reſident for diverſe Years in *Oxford*. During which, the Meetings in *London* continued; and, after the King's Return, in 1660, were increaſed with the Acceſſion of diverſe worthy and honourable Perſons, and were afterward incorporated by the Name of *the Royal Society*."

With reſpect to the theological Character of this great Man, he appears to have been indefatigable in his Studies, ſteady and inflexible, yet moderate in his Principles; as is evident from the many polemical Tracts which he wrote, *viz.* that of *Truth tried*, *&c.*

His Wiſdom was very conſpicuous in his Conduct in thoſe critical Times in which he lived: Concerning which, the Doctor ſpeaks thus of himſelf, "It hath been my Lot to live in a Time wherein have been many and great Changes and Alterations; it hath been my Endeavour to act all along, by moderate Principles, between the Extremities on either Hand, in a moderate Compliance with the Powers in Being, in thoſe Places where it has been my Lot to live, without the fierce and violent Animoſities uſual in ſuch Caſes, againſt all that did not act juſt

as

as I did, knowing that there were many worthy Perſons engaged on either Side, and willing, whatſoever Side was uppermoſt, to promote, as I was able, any good Deſign for the true Intereſt of Religion, of Learning, and the public Good; and ready to perform good Offices as there was Opportunity; and, if Things could not be juſt as I could wiſh, to make the beſt of what is, and hereby, through God's gracious Providence, have been able to live eaſy and uſeful, if not great.

In 1653, he publiſhed at *Oxford*, in 8vo, a Grammar for the *Engliſh* Tongue for the Uſe of Foreigners, in *Latin*, under this Title; *Grammatica Linguæ Anglicanæ, cum Tractatu de Loquelâ ſeu ſonorum formatione.* *May* the 31ſt, 1654, he took the Degree of Doctor of Divinity, which, *June* the 23d, 1662, was confirmed by the Convocation. In 1655, Mr. *Thomas Hobbes* having printed his Treatiſe *De Corpore Philoſophico*, Dr. *Wallis*, the ſame Year, publiſhed a Confutation of it in *Latin* under the Title of *Elenchus Geometriæ Hobbianæ*, printed at *Oxford* in 8vo. This ſo provoked Mr. *Hobbes*, that he publiſhed it in *Engliſh*, with the Addition of what he called *Six Leſſons to the Profeſſors of Mathematics in Oxford.* Upon this, Dr. *Wallis* wrote an Anſwer in *Engliſh*, intitled, *Due Correction for Mr.* Hobbes; *or School-Diſcipline for not ſaying his Leſſon right*, &c. *Oxford* 1656, in 8vo. Mr. *Hobbes* replied in a Book, which he called Στίγμαι, *or, The Marks of the abſurd Geometry, rural Language, &c. of Dr.* Wallis: *London*, 1657. This was immediately rejoined to by the Doctor in his *Hobbiani Puncti Diſpunctio, in anſwer to Mr.* Hobbes's Στίγμαι; *Oxford*, 1657. Here this Controverſy ſeems to have ended at this Time; but four Years after, *viz.* in 1661, Mr. *Hobbes* printed *Examinatio & Emendatio Mathematicorum hodiernorum in ſex Dialogis*; which occaſioned Dr. *Wallis* to publiſh the next Year *Hobbius Heautontimoreumenos*; *Oxford*, 1662, in 8vo, addreſſed to Mr. *Robert Boyle.* In 1657, the Doctor collected and publiſhed his Mathematical Works in two Parts, with the Title of *Matheſis Univerſalis.*

In 1658, he publiſhed, at *Oxford*, in 4to, *Commercium Epiſtolicum de quæſtionibus Mathematicis inter J. Walliſium & alios Viros doctrinâ ac nobilitate illuſtres.* About this Time, Mr. *William Neile*, who had ſtudied Mathematics at *Oxford* under the other Savilian Profeſſor and Dr. *Wilkins*, publiſhed his Invention

tion of *the equating of a ſtrait Line to a crooked One, or a Parabola*; and Dr. *Wallis*, ſoon after, gave the World a Demonſtration of it, at large, in a Book which he publiſhed in 1659, with this Title, *De Cycloide & Corporibus inde Genitis, &c.* Upon the Reſtoration he met with great Reſpect; the King himſelf entertained a favourable Opinion of him, on Account of ſome Services which his Majeſty knew the Doctor had done to his Royal Father and himſelf; he was therefore not only admitted one of the King's Chaplains in Ordinary, but likewiſe confirmed in his two Places of Savilian Profeſſor and Keeper of the Archives at *Oxford*. In 1661, he was appointed one of the Divines who were empowered to review the *Book of Common Prayer*, and afterwards complied with the *Act of Uniformity*, and continued a ſteady Conformiſt to the Church of *England* till his Death. He was one of the firſt Members of the *Royal Society*, with which he kept a conſtant Correſpondence, till his Death, by Letters or Papers, many of which are publiſhed in the *Philoſophical Tranſactions*. In 1668, he publiſhed *De Æſtu Maris Hypotheſis Nova*, in ſome Letters to Mr. *Boyle* and Mr. *Aldenbury*; and in 1671, *Mechanica, ſive de Motu tractatus geometricus*, in three Parts; and in 1676, *Archemedis Syracuſani Arenarius & Dimenſio Circuli*. In 1677, he wrote a Letter to Dr. *Thomas Barlow*, Biſhop of *Lincoln*, concerning the *Paſcal Tables* in the *Book of Common Prayer*. From 1682 to 1692 he was engaged in ſeveral theological Diſputes, particularly on the Sabbath, the Unity of God, *&c.* on which he wrote and publiſhed ſundry Tracts, and a great Variety of Letters on philoſophical, mathematical, and mechanical Subjects.

In 1697, the Curators of the Univerſity Preſs at *Oxford*, thought it for the Honour of the Univerſity, to collect the Mathematical Letters, and other Works of the Doctor. He held a Correſpondence with a great many learned Men, and particularly Mr. *Flamſtead*, as appears from ſeveral original Letters of his, which are publiſhed in the *general Dictionary*, Vol. X. p. 98, *& ſeq.* —— And there are ſeveral others, to Mr. *John Collins*, in the Poſſeſſion of the late *William Jones*, Eſq; F. R. S. He died, *October* 28, 1703, being 87 Years, 3 Months, and 5 Days old, and was interred in the Choir of St. *Mary*'s Church in *Oxford*, where a Monument is erected to his Memory, by his Wife,

who died at *Oxford*, *March* 17th, 1686: He had ſeveral Children, but two only ſurvived him, *viz.* one Son and one Daughter.

Mr. *Lewis* obſerves, that the Doctor was happy in the Enjoyment of a vigorous Conſtitution of Body and Mind, which was ſtrong, ſerene, and calm, and not eaſily ruffled, or diſcompoſed; and that though, whilſt he lived, he was looked on, by the moſt rigid and zealous Party-men in the Univerſity, with a jealous Eye, and ſuſpected as not thoroughly well affected to the Monarchy and Church of *England*, he was yet very much honoured and eſteemed by others of better Temper and Judgment, and of more Knowledge and Latitude of Sentiment: By theſe, he was always eſteemed, both at Home and Abroad, as the Ornament of his Country, and of the Univerſity in particular: And this Account is very conſiſtent with the Character which the Doctor gives of himſelf, above recited.

The LIFE of JOANNES BAPTISTA RICCIOLUS.

JOANNES BAPTISTA RICCIOLUS, was born at *Ferrara*, a City in *Italy*, in the Dominions of the Pope, a learned and honoured Jeſuit. He was ſometime a Profeſſor of Rhetoric and Poetry, then of Philoſophy and Divinity, partly at *Parma*, partly at *Bologna*; but being chiefly addicted to geographical, chronological, and mathematical Studies, his Improvements in theſe Sciences gave a peculiar Luſtre to his Character; and he hath abundantly enobled his Memory by his many excellent Works, particularly, his *Almageſtum Novum*, divided into three Tomes: in the firſt whereof, he treats of the Sphere, of the Sun, and Moon, and their Eclipſes; of the fixed Stars, of the leſſer Planets, of the Comets and new Stars, of the ſeveral mundane Syſtems, and ſix Sections of general Problems ſerving to Aſtronomy, *&c.* In the Second, he handles the Subject of Trigonometry, or the Doctrine of plain and ſpherical

rical Triangles; propoſes to give a Treatiſe of aſtronomical Inſtruments, and, the optical Part of Aſtronomy, tho' we do not find it was ever publiſhed. In the Third, he comprehends Obſervations of the Sun, Moon, Eclipſes of the fixed Stars and leſſer Planets, with Precepts and Tables of the primary and ſecondary Motions, and other aſtronomical Tables. He put forth, likewiſe, another Work entitled, *Aſtronomia Reformata*; the Deſign of which is (conſidering the various Hypotheſis of ſeveral Aſtronomers, and the Difficulty thence ariſing of concluding any Thing certain) by comparing together all the beſt Obſervations, and examining what they have moſt perfect in them, to reform, upon that Meaſure, the Principles of Aſtronomy. Beſides which, he publiſhed his *Chronology*, in Folio: Alſo, a *Treatiſe of Geography*, of the ſame Size.

The above-mentioned great Work he intitles, *Almageſtum Novum*, in reference to the old *Almageſt of Ptolomy*, and they had both the ſame Deſign; for as that of *Ptolomy* was a Collection of the Improvements, and Inventions in Aſtronomy, from the earlieſt Ages of Antiquity to his own Time, ſo the ſame Thing was attempted by *Ricciolus*, and, in a great Meaſure, executed in the firſt Tome of his *Almageſt*, which conſiſts of two large Volumes in Folio, were publiſhed in the Year 1651, and dedicated to *Cardinal Grimaldus*. And tho' this great Man ſtood firſt in the Claſs of Aſtronomers of the laſt Age, yet our biographical Hiſtories give us but a ſuperficial Account of him, or his Writings, and mention nothing of his Age, or Time of his Death.

The LIFE of Mr. JOHN BAYER.

JOANNES BAYERUS (or *John Bayer*) was a *German* by Nation; but of the particular Place or Time of his Birth, Hiſtory hath not informed us: However, his Name will be ever memorable in the Annals of Aſtronomy, on Account of that great and excellent Work which he publiſhed in the Year 1603, under the Title of URANOMETRIA, being a compleat

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Celeſtial Atlas, or large Folio Charts of all the Conſtellations, with a Nomenclature collected from all the antient and modern Tables of Aſtronomy, with the uſeful Invention of denominating the Stars in every Conſtellation by the Letters of the *Greek* Alphabet, by which the Stars of the Heavens may, with as great Facility, be diſtinguiſhed and referred to, as the ſeveral Places of the Earth are by Means of geographical Tables; and as a ſufficient Proof of the Uſefulneſs of this Method, our Celeſtial Atlaſſes and Globes have ever ſince retained it, and is, by that Means, become of general Uſe through all the literary World. He was, by Profeſſion, a Lawyer, and lived many Years after the firſt Publication of this Work, which he greatly improved and augmented by his conſtant Attention to the Study of the Stars: At length, in the Year 1627, it was re-publiſhed under a new Title, *viz.* *Cœlum Stellatum Chriſtianum*, that is, *the Chriſtian ſtellated Heaven*; or, *the ſtarry Heavens chriſtianized:* For in this Work, the Heathen Names and Characters, or Figures of all the Conſtellations were rejected, and others, which were taken from the Scriptures, were inſerted in their Stead, to circumſcribe the reſpective Conſtellations. This was the Project of one *Julius Schillerus*, a Civilian of the ſame Place: But this Attempt was too great an Innovation, to find Succeſs, or a general Reception; for Aſtronomers, having been long inured to heathen Appellations, thought it would occaſion too much Trouble, to change them for others that were entirely new, eſpecially as there was no real Religion concerned in the Nomenclature, or Denomination of the Stars.

The LIFE of WILLERBRORDUS SNELLIUS.

WILLERBRORDUS SNELLIUS, Son of *Rodolphus Snellius*, born at *Royen*, was a famous Mathematician, and was the third Perſon who undertook the arduous Taſk of meaſuring a Degree on the Earth's Surface; which he effected by meaſuring a Space between *Alcmaer* and *Bergen-op-zoom*, which two Places had the Difference of Latitude 1° 11′ 30″.

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He alſo meaſured another Diſtance between the Parallels of *Alemaer* and *Leyden*, and from the Mean of both theſe Meaſurements he made a Degree to conſiſt of 55,021 *French* Toiſes, or Fathoms. Theſe Meaſures were afterward repeated, and corrected, with great Skill and indefatigable Induſtry, by Mr. *Muſchenbrock*, the preſent learned Profeſſor of experimental Philoſophy in the Univerſity of *Leyden*; who found a Degree to conſiſt of 57033 Toiſes, which was very near the ſame Quantity as had been determined by Mr. *Pichard*, and Mr. *Caſſini*, who both of them made a Degree to conſiſt of 57060 Toiſes, which was 378 more than the *French* Mathematician found it, under the arctic Circle, and 293 greater than the Degree meaſured under the Equator, by the *Spaniſh* Mathematicians in the Year 1735. As our Author ſtands foremoſt in the Number of thoſe who have undertaken to determine the true Figure of the Earth, by Menſuration, it will perpetuate his Memory to all Poſterity. Beſides the Treatiſe in which he gives an Account of this Work, entitled *Eratoſtones Batavus*, he wrote many others equally fraught with Learning, *viz.* one concerning the Comet which appeared in 1618; another on the Elements of Trigonometry; alſo another Treatiſe entitled, *Heſſian and Bohemian Obſervations*, with his own Notes; another Work entitled, *Libra Aſtronomica & Philoſophica*, wherein he undertakes the Examination of the Principles of *Galileo* concerning Comets. He flouriſhed about the Beginning of the 17th Century, as we find no Publication of his Works after the Year 1619.

The LIFE of JOHN BAINBRIDGE.

JOHN BAINBRIDGE, an eminent Phyſician and Aſtronomer, was born of a good Family at *Aſhby-de-la-Zouch* in *Leiceſterſhire*, in the Year 1582, and educated in the public School of that Town; from whence he was tranſplanted to *Emanuel* College in *Cambridge*, and put under the Care of Dr. *Joſeph Hall*, afterwards Biſhop of *Norwich*, to whom he was related. He took the Degrees in Arts, and ſtudied Phyſic there; after which, he retired into his own Country, where he taught

a Grammar-ſchool, and practiſed Phyſic with great Succeſs; at the ſame Time aſſiduouſly applied himſelf, at all Hours of Leiſure, to the Study of the Mathematics, and particularly of Aſtronomy, which he had been extremely fond of from his early Years. About the Year 1608, by the Advice of his Friends, (who thought that his diſtinguiſhed Merit was too much concealed in the Country) he removed to *London*, in order that he might the more improve himſelf by Converſation, and the Advantage of Books, and was admitted a Fellow of the College of Phyſicians. His Deſcription of the Comet which appeared in 1618, raiſed him a very great Character, and introduced him to the Acquaintance of Sir *Henry Savile*, who having founded two Lectures, one for Geometry, and the other for Aſtronomy, in the Univerſity of *Oxford*, in *Auguſt* 1619, preferred Mr. *Bainbridge* to the Profeſſorſhip of the latter, without any Solicitation; upon which he removed to *Oxford* in 1620, and was entered a Maſter-commoner of *Merton* College. He was likewiſe incorporated Doctor of Phyſic, as he had ſtood at *Cambridge*, and reſided for ſome Years in that College, ſometime Junior, and then made Senior Reader of *Linacre*'s Lecture. In this calm Retirement, which he enjoyed for the Purſuit of his Studies, he reſolved upon publiſhing correct Editions of the antient *Greek* Aſtronomers, as well thoſe which had not yet been printed, as thoſe which had already ſeen the Light; and in order to qualify himſelf for a Work of this Nature, particularly of the Lives and Writings of the *Arabic* Aſtronomers, he began the Study of the *Arabic* Language when he was about 40 Years of Age, and he continued to make many conſiderable Improvements, and wrote on a Variety of Subjects for the Inſtruction and Entertainment of Poſterity till the Cloſe of his Life. He died *November* 3, 1643, at his Houſe oppoſite *Merton* College, in the 62d Year of his Age, and his Body was conveyed to the public School, where an Oration having been pronounced in Honour of him by Mr. *William Strode*, the Univerſity Orator, it was carried to *Merton* College Church, and depoſited on the left Side of Mr. *Henry Briggs*'s Grave, and an Epitaph was inſcribed upon his Monument in *Latin*; in *Engliſh*, to the following Purport, "If you deſire, Paſſenger, to know who, and how great a Man lies here, you muſt enquire elſewhere; I cannot

not ſufficiently inform you; but, that you may not be ignorant of the moſt remarkable Circumſtances relating to him, read the following Account of him: JOHN BAINBRIDGE, a Man of the cleareſt Character, and incomparable Learning, Profeſſor of Phyſic and Mathematics; as ſucceſsful in the Cure of Diſeaſes, as ſagacious in the Obſervations of the Stars; who was appointed by that excellent Judge of Men and Books, Sir *Henry Savile*, his firſt Profeſſor of Aſtronomy, and his worthy Collegue in thoſe Lectures of Mathematics, which he had founded in a magnificent Manner; who being educated at *Cambridge*, was entertained by the Univerſity of *Oxford* as her own Son, and honoured by her with a public Funeral, as an equal Ornament to both the Univerſities; and died, too early for the Intereſts of Learning, in 1643. Go now, Paſſenger, and learn, even from Foreigners, what elſe relate to his Character." Dr. *Smith* tells us, that as his unaffected Piety and Humanity procured him an univerſal Eſteem among his Cotemporaries, ſo his great Skill in the Mathematics, and polite Learning, exemplified in his Writings, will render his Character peculiarly honoured and eſteemed by Poſterity. Some of the principal Books he wrote were,

I. An aſtronomical Deſcription of the late Comet, from the 18th of *November*, 1618, to the 16th of *December* following. Printed at *London*, 1619.

II. A *Latin* Verſion of *Proclus*'s Sphere. *London*, printed in 1620.

III. A Treatiſe of the Canicular Year, or the natural Year of the *Egyptians*; which began with the heliacal Riſing of the Dog-ſtar, and of the canicular Days, and the riſing of that Star and the ſothiacal Period. Publiſhed at *Oxford* in 1648. Dr. *Bainbridge* wrote this Treatiſe at the Requeſt of Archbiſhop *Uſher*, but left it imperfect, being prevented either by the breaking out of the Civil War, or by Death; ſo that he was not able to finiſh his Demonſtration of the heliacal Riſing of the Dog-ſtar. But Dr. *Greaves* publiſhed that Treatiſe of our Author's with ſome Additions and Improvements; ſince which Time we have had none of our Author's Writings publiſhed, though many of his Diſſertations were prepared for, and committed to the Preſs, ſoon after his Deceaſe, *viz.* A Diſſertation concerning the Method of finding out the Differences of the Meridians, or Longitudes.

tudes. —— Another, concerning the Star of *Venus*. But thoſe Pieces are very inconſiderable in Compariſon of thoſe Manuſcripts he bequeathed to Archbiſhop *Uſher*, and which are now preſerved in the Library at *Trinity College*, *Dublin*: Amongſt others, mentioned by Dr. *Smith*, is a Theory of the Sun; a Theory of the Moon; a Diſcourſe concerning the Quantity of the Year; two Volumes of aſtronomical Obſervations; and 9 or 10 Volumes of miſcellaneous Papers, relating to the Mathematics: And that Gentleman obſerves, it would probably be of great Service to the Public, if any of the Mathematicians in *Ireland*, who have the Opportunity of examining thoſe Manuſcripts, would communicate to the learned World what they find of Importance to Aſtronomy: For though every intelligent Perſon muſt confeſs, that a great many notable Diſcoveries, unknown to him, have been made ſince his Time, in Aſtronomy, by *Gaſſendus*, *Hevelius*, *Ricciolus*, *Bulialdus*, *Caſſini*, and our Countrymen, Dr. *Ward*, *Hook*, *Flamſtead*, Dr. *Halley*, and, above all, Sir *Iſaac Newton*; yet it is not only a Pleaſure, but even an Advantage, to learn, from the Writings of the former Aſtronomers, what Obſervations they have made, and by what Steps and Methods that Science has been brought to Perfection; ſince their imperfect Notices, Conjectures and Hints, may give Occaſion for the Diſcovery of many Things which might otherwiſe never have been thought of.

The LIFE *of* SETH WARD.

SETH *WARD*, Biſhop of *Saliſbury*, Son of Mr. *John Ward* an Attorney, was born at *Buntingford* in *Hertfordſhire*, and baptized there, *April* 15, 1617. He was educated in Grammar Learning, at a School in the ſame Place, and thence removed to *Sidney College* in *Cambridge*, into which he was admitted in 1632, and applied himſelf, with great Aſſiduity, to his Studies, eſpecially to the Mathematics: He ſoon became a conſiderable Proficient, and took the Degrees of Batchelor and Maſter of Arts, and was made Fellow of the College. In 1640, he

he was appointed Prævaricator of the Univerſity; and when his Patron, Dr. *Samuel Ward*, Maſter of the College, was impriſoned, he attended him during his Confinement. He was ejected out of his Fellowſhip, for refuſing the Covenant; againſt which he ſoon after joined with Mr. *Peter Gunning*, Mr. *Iſaac Barrow*, afterwards Biſhop of St. *Aſaph*, and Mr. *John Barwick*, and in drawing up their noted Remonſtrance againſt it. ——— Being now obliged to leave *Cambridge*, he reſided for ſometime with his Relations in and about *London*, and, at other Times, with the celebrated Mathematician Mr. *William Oughtred* at *Aldbury* in *Surry*, under whom he proſecuted his mathematical Studies: And alſo viſited Lord *Wennan* of *Tame Park* in *Bedfordſhire*. About this Time, Mr. *John Greaves*, Savilian Profeſſor of Aſtronomy at *Oxford*, endeavoured to procure him for his Succeſſor in that Profeſſorſhip, from which himſelf had been ejected, which was accordingly done, and Mr. *Ward* diſcharged the Duties of that Place with great Applauſe, having about that Time entered himſelf of *Wadham College*, for the Sake of Dr. *Wilkins*, Warden of the College, and, *October* 23, the ſame Year, was incorporated Maſter of Arts at *Oxford*. In 1649, he was collated by Dr. *Brownrigg*, Biſhop of *Exeter*, to the *Præcentorſhip* of the Church of *Exeter*. *May* 1654, he took the Degree of Doctor of Divinity. In 1657, he was elected Principal of *Jeſus College* in *Oxford*. In 1659, he was choſen Preſident of *Trinity College* in that Univerſity, which Place he reſigned upon the Reſtoration, and was preſented to the Rectory of St. *Laurence Jewry*. In 1661, he became Fellow of the *Royal Society*, and Dean of *Exeter*; and, the Year following, was advanced to the epiſcopal See of that Church: And, *September* 12, 1667, was tranſlated to the Biſhoprick of *Saliſbury*. In 1671, he was made Chancellor of the Garter, and procured that Honour to be annexed to the See of *Saliſbury*, after it had been held by Laymen 132 Years. Some Years before his Death, he began to loſe his Memory, and the Uſe of his Reaſon, in a very great Meaſure; under which Circumſtances he died at *Knightſbridge*, near *London*, *January* 6th, 1689, and was interred in the Cathedral at *Saliſbury*, where his Nephew, Mr. *Seth Ward*, erected a Monument for him.

Mr. *Oughtred*, in his *Clavis Mathematica*, ſtiles him, a prudent, pious, and ingenious Perſon, and well ſkilled, not only in Mathematics, but likewiſe in all Kinds of Literature: But that by which he hath ſignalized his Name in all the learned World is, his celebrated Invention of an Approximation to the true Place of a Comet, from a given mean Anomaly founded upon an Hypotheſis, that the Motion of a Planet, though it be really performed in an ecliptic Orbit, may yet be looked upon as even, or equable, about the upper Focus of the Ellipſis, or that next the *Aphelion*: By this Means he rendered the Praxis of Calculation much eaſier than any that could be uſed in reſolving what has been commonly called *Kepler*'s Problem, where the coequate Anomaly was to be immediately inveſtigated from the mean Elliptic one, and this agrees very well with thoſe Orbits which are elliptical in a very ſmall Degree, as that of the *Earth* and *Venus*: But in others, that were more elliptical, as that of *Mercury*, *Mars*, *&c.* this Approximation ſtood in Need of a conſiderable Correction, which was made by *Bulialdus*, as we ſhall relate in his Life, which is next to follow. The principal of his Writings are as follow:

I. A philoſophical Eſſay, evincing the Being and Attributes of God.

II. His Prelection concerning Comets, wherein the Nature of Comets is diſcourſed of, a new Theory of them propoſed, and the Hiſtory of a late Comet which appeared in the Year 1652.

III. A brief Enquiry into the Grounds and Principles of *Bulialdus*'s philolaic Aſtronomy; wherein *Bulialdus*'s Error is detected, and the Method of calculating the double Inequality of the Planet's Motion is geometrically evinced.

IV. An Idea of Trigonometry, for the Uſe of the Students in the Univerſity of *Oxford*.

V. His geometrical Aſtronomy; in which a Method is propoſed for ſolving, geometrically, all the Phænomena of the primary Planets, whether they are conſidered in the elliptic or circular Hypotheſis.

VI. An epiſtolary Exercitation on the Philoſophy of *Hobbes*, with an Appendix, containing an Anſwer to many Objections

and

and Calumnies from that Author: Beſides theſe, he publiſhed many other Pieces in Divinity, which do not immedially fall under our Conſideration.

The LIFE of ISMAEL BULIALDUS.

ISMAEL BULIALDUS, Son of *Iſmael Bulialdus*, and Native of *Loudun*, a Town in the Province of *Poictou* in *France*, gave very early Proofs of his aſtronomical Genius, and future Time rendered him beloved and admired: *Ricciolus* ſtiled him, *Aſtronomus profundæ indaginis*. This Character he hath juſtly merited, as well by his Publication of the moſt valuable Works of antient Aſtronomers and Mathematicians, with Notes, *&c.* as by his other moſt learned Labours. He firſt publiſhed his Diſſertation entitled, *Philolaus, ſive de vero ſyſtemate mundi*: Or, his true Syſtem of the World, according to *Philolaus*, an antient Philoſopher and Aſtronomer. Afterwards, in the Year 1645, he ſet forth his *Aſtronomia Philolaica*, or his *Philolaic Aſtronomy*, grounded upon the Hypotheſis of the Earth's Motion, and the elliptical Orbit deſcribed by the Planet's Motion about a Cone; illuſtrated with various Methods of Demonſtration. To which he added *Tables* entitled, *Tabulæ Philolaicæ*, in which the Motions of *Saturn*, *Jupiter*, and *Mercury*, are more accurately repreſented than in the *Rudolphine Tables*, being, for the moſt Part, much eaſier than thoſe: A Work, ſays *Ricciolus*, that ought to be read by all Students of Aſtronomy, but not without Attention. He conſidered the Hypotheſis, or rather Approximation of Biſhop *Ward*, and found it not to agree with the Planet *Mars*; for he hath ſhewn, in his Defence of the Philolaic Aſtronomy againſt the Biſhop, that from four Obſervations made by *Tycho* on the Planet *Mars*, that Planet was in the firſt and third Quarters of the mean Anomaly, was more forward than he ought to be, according to *Ward*'s Hypotheſis; but in the ſecond and fourth Quadrant of the ſame it is not ſo far advanced as that Hypotheſis required: He therefore ſet about a Correction of the Biſhop's Hypotheſis, and made it to anſwer more

more exactly to the Orbits of the Planets, which were moſt excentric, and introduced what is called, by *Street* in his *Caroline Tables*, the Variation; for thoſe Tables were calculated from this Correction of *Bulialdus*, and exceeded all, in Exactneſs, that went before.

It is remarkable, that the Ellipſis, which he has choſe for a Planet's Motion, is ſuch a one, which, if cut out of a Cone, will have the Axis of the Cone paſſing thro' one of its *Foci*, *viz.* that next the Aphelion.

This Correction of *Bulialdus* is, in the Judgment of Dr. *Gregory*, a very happy one, if it be not ſet above its due Place; and he accounted no more than a Correction of an Approximation to the true Syſtem: For ſo much it hath effected, that we at Length are able to gather the coequate Anomaly, *a Priori*, and directly from the Mean, and that the Obſervations are well enough anſwered at the ſame Time; which Thing, in *Mercator*'s Opinion, no Man hath done before in the elliptic Hypotheſis: For which Reaſon, this Correction is very juſtly applied to aſtronomical Calculation.

He alſo wrote a learned Treatiſe concerning the Nature of ſpiral Lines; as alſo, two Admonitions to Aſtronomers. The 1ſt, concerning a new Star in the Neck of the Whale, appearing at ſome Times, and diſappearing at others. The 2d, concerning a nebulous Star in the Northern Part of *Andromeda*'s Girdle, not diſcovered to any of the Antients. This cloudy Star did alſo ſometimes appear, and ſometimes not. Theſe Phænomena appearing, new and very ſurprizing, he ſtrongly recommends to all who are curious in Aſtronomy.

We have no Account in biographical Authors of the Life of this great Man, nor the Time of his Deceaſe.

The LIFE of JOHN WILKINS.

JOHN WILKINS, Biſhop of *Cheſter*, was the Son of Mr. *Walter Wilkins* a Citizen of *Oxford*, born at *Fawlſey*, near *Daventry* in *Northamptonſhire*, in the Houſe of his Mother's Father, the celebrated Mr. *Dod*. He was educated in Grammar Learning under Mr. *Edward Sylveſter*, a Man eminent for his Skill in the *Greek* Language, who taught a private School in *All-Saints* Pariſh in *Oxford*, and was entered a Student in *New-Inn*, in that Univerſity, in *Eaſter* Term, 1627, when but 13 Years of Age; but, making no long Stay, he was removed to *Magdalen Hall*, under the Tuition of Mr. *John Tombes*. *October* 20, 1631, he took the Degree of Batchelor of Arts; and *June* 11, 1634, that of Maſter. Having entered into holy Orders, he became Chaplain to *William*, Lord *Say*, and afterwards to *Charles*, Count *Palatine* of the *Rhine*, with whom he continued for ſome Time. In 1638, he publiſhed his Diſcovery of a new World; or an Attempt to prove, that there may be another habitable World in the Moon. In 1640, he publiſhed his Diſcourſe concerning a new Planet, tending to prove that it is probable, our Earth is one of the Planets. This Diſcourſe contains the ten following Propoſitions, *viz.* I. That the ſeeming Novelty and Singularity of this Opinion can be no ſufficient Reaſon to prove it erroneous. II. That the Places of Scripture which ſeem to intimate the diurnal Motion of the Sun, or Heavens, are fairly capable of another Interpretation. III. That the Holy Ghoſt, in many Places of Scripture, does plainly conform his Expreſſions to the Error of our Conceptions, and does not ſpeak of ſundry Things as they are in themſelves, but as they appear unto us. IV. That diverſe learned Men have fallen into great Abſurdities, while they have looked for the Grounds of Philoſophy from the Grounds of Scripture. V. That the Words of Scripture, in their proper and ſtrict Conſtruction, do not any where affirm the Immobility of the Earth. VI. That there is not any Argument from Scripture, Principles of Nature, or Obſervations in Aſtronomy, which can ſufficiently evidence the Earth to be in the Center of the Univerſe. VII. It is probable that the Sun is the Center of the World. VIII.

That there is not any ſufficient Reaſon to prove the Earth incapable of thoſe Motions, which *Copernicus* aſcribes unto it. IX. That it is much more probable, that the Earth does move, than the Heavens. X. That this Hypotheſis is exactly agreeable to common Appearances. In 1648, he likewiſe publiſhed a Book entitled, *Mathematical Magic*; or, *the Wonders that may be performed by mathematical Geometry*. In two Volumes, reprinted in 1680. Beſides theſe of an aſtronomical and mathematical Nature, he publiſhed an Eſſay towards a real and philoſophical Language, in 1668; of which, ſome Account is given in the *Philoſophical Tranſactions*, N°. 35. He alſo publiſhed ſundry Tracts in Theology, natural Religion, and civil Polity; which, for their Piety and Moderation, went thro' ſeveral Editions. — About the Year 1656, he married *Robina*, Widow of *Peter French*, ſometime Canon of *Chriſt-Church*, and Siſter to *Oliver Cromwell* Protector of *England*, which Marriage being contrary to the Statutes of *Wadham College*, becauſe they prohibit the Warden thereof from marrying, he obtained a Diſpenſation from *Oliver* to retain the Wardenſhip: Notwithſtanding he was likewiſe made Maſter of *Trinity College*, *Cambridge*, but ejected the Year following, upon the Reſtoration. He was then choſen Preacher to the honourable Society of *Gray's-Inn* in *London*, and preſented to the Rectory of St. *Laurence Jewry*, upon the Promotion of Dr. *Seth Ward* to the Biſhoprick of *Exeter*, and afterwards made Dean of *Rippon*, and, in 1668, Biſhop of *Cheſter*. He died at Dr. *John Tillotſon*'s in *Chancery-lane*, *London*, *Nov.* 19, 1672, and was buried the 12th of *December* following, in the Church of St. *Laurence Jewry*, Dr. *William Lloyd*, then Dean of *Bangor*, preached his funeral Sermon, wherein it was obſerved of him, that he was an excellent Mathematician, and ſkilful in experimental Philoſophy, and that both by his intellectual and moral Endowments he was an Ornament to the Univerſity, and an Honour to the *Britiſh* Nation.

The LIFE of JOHN HEVELIUS.

JOHN HEVELIUS, Conſul of *Dantzick*, was born in *Holland* in the Year 1612; joined to a remarkable Genius an indefatigable Aſſiduity in the Study of the Stars, from whence he acquired very great Proficiency in the aſtronomical Science, and from many new and maſterly Inventions, and Experiments, was able to communicate to Poſterity, many curious Obſervations, and demonſtrate the ſame with great Satisfaction to thoſe who were Students in this Part of Literature, and enobled his Name to Poſterity by many valuable Works, ſome of the Principal of which were his *Selenographia*, or an exact Deſcription of the Moon, wherein he engraved all its Phaſes, diſtinguiſhed by Names, all its Parts, and aſcertained their reſpective Bounds by the Help of Teleſcopes; containing, likewiſe, a Delineation of the ſeveral Spots therein viſible, and of the various Motions, Changes, and Appearances, diſcovered by the Teleſcope, as well in that as in the Sun and other Planets. —— His *Cometographia*, repreſenting the whole Nature of Comets, their Situation, Parallaxes, Diſtances, diverſe Appearances, and ſurprizing Motions, with a Hiſtory of all the Comets from the Beginning of the World down to the preſent Time, either noted by Hiſtorians, or obſerved by Philoſophers, or Aſtronomers; both the ſaid Works being enriched with curious Sculpture of his own finiſhing; to theſe he likewiſe added a Treatiſe of *Mercury*, diſcovered in the Sun at *Dantzick*, *May* 3, N. S. 1661, with the Hiſtory of a new Star, appearing in the Neck of *Cetus*, and another in the Beak of *Cygnus*; his Illuſtration of ſome Aſtronomical Diſcoveries of the late Mr. *Horrox* in his Treatiſe upon *Venus*, ſeen in the Sun on the 24th of *November*, O. S. 1639, being the nobleſt, and, ſince the Beginning of the World, 'till then unpractiſed, Obſervation, with a Diſcourſe of ſome rare Paraſelenæ and Parhelia, by him diſcovered at *Dantzick*. —— Likewiſe, his two Epiſtles to *Ricciolus*, concerning the Moon's Vibration, with Copper-plate Prints; together with other Aſtronomical Pieces which are mentioned in the *Philoſophical Tranſactions*, 1673. He put forth, the ſame Year, his *Machina Celeſtis*, conſiſting of Four Parts, *viz.* I. His *Prodomus*

domus to Aſtronomy, with an entire Catalogue of the fixed Stars; and a new Celeſtial Globe reformed. II. Containing all his celeſtial Obſervations, as well of Eclipſes as of the Occultations of the Planets and fixed Stars from the Year 1630 to the then preſent Time. III. Shewing his Obſervations of the Meridian Altitudes of the Sun, and of the Equinoxes and Solſtices, from the Year 1632 to that Time; as, likewiſe, ſpecial Obſervations of every Planet. The IVth and laſt, exhibits a Catalogue or Index of the Diſtances of the fixed Stars, taken by his large braſs Sextants and Octants, together with thoſe noted by the Landgrave of *Heſſe*, *Tycho*, *Gaſſendus*, and *Ricciolus*, *&c.* beſides a great Number of Epiſtles; for he continued his Studies and Publications on Aſtronomical Sciences for 50 Years; during which Time he held a Correſpondence with the Learned in that Profeſſion throughout *Europe*; on all which Accounts his Name will be tranſmitted to Poſterity, with the greateſt Honour. After a long, and valuable Life, he died in 1688, aged 76 Years.

The LIFE of LE PERE CHERUBIN.

LE PERE CHERUBIN juſtly merits a Place in a Work of this Nature, tho' he has been often omitted or very ſlightly mentioned by Biographers in general, ſo that we are not certain preciſely of the Time, or Place of his Birth, but that he flouriſhed about the Year 1650; that after he had acquired a proper Knowledge in the Languages, he was admitted a Capuchin Friar in the Convent of that Order in *Orleans*, where his Genius for aſtronomical Subjects ſoon became very conſpicuous, which were greatly improved by cloſe Application, and gave many conſiderable Proofs of his Attainments in this Study by many uſeful Works; the moſt conſiderable of which was a large and elegant Volume in *French*, entitled *Dioptrique Oculaire*, or Occular Dioptrics, concerning the Theory, Uſe, and Mechaniſm of Teleſcopes, divided into three Parts; the Firſt containing the Doctrine of Optics and Dioptrics, or of ſimple Viſion direct,

direct, and that which is made by Rays refracted. —— The Second treats of the Theory of Teleſcopes, in all its Kinds; which is introduced by a general Hiſtory of the Invention and Antiquity of Teleſcopes, and by a Diſcourſe concerning the Difference of the antient Glaſſes from the Modern. —— The third and laſt Part is, moreover, divided into two diſtinct Parts, *viz.* the Poſitive, and Mechanical: The Poſitive, teaching the actual Conſtruction of Teleſcopes, and their Uſes in the Obſervation of celeſtial Objects: The Mechanical, ſhewing the Way of poliſhing and forming all Sorts of Glaſſes that ſerve for Teleſcopes; giving, likewiſe, an Account of ſeveral Diſcoveries that, by their Means, had been made by modern Aſtronomers. This Work is adorned with moſt curious and elegant Sculptures of Inſtruments of the Author's own deſigning, and was printed with an anſwerable Letter, in Folio, at *Paris*, 1671. By this Account, it appears about what Time he flouriſhed; but our Hiſtorians and Biographers do not inform us of the Time or Place of his Death.

The LIFE of WILLIAM OUGHTRED.

WILLIAM OUGHTRED was an eminent *Engliſh* Mathematician, in the 17th Century, was born at *Eaton* in the Year 1573, as appears from a Picture of his, by *Haller*, where he is ſaid to be *Anno Ætatis* 73, 1646, and educated in the School there; whence he was elected to *King*'s *College*, *Cambridge*, in 1592, and where he took the Degree of Bachelor of Arts in 1596, and Maſter in 1599. He was Fellow of that College, and, in that Society, continued about twelve Years; all the Time which could be ſpared there, from his academical Studies, he employed upon mathematical Sciences; and by inciting, aſſiſting, and inſtructing others, he brought many to reliſh that noble and uſeful Part of Learning. In 1673, he took holy Orders, and was preſented to the Rectory of *Aldbury*, near *Guildford* in *Surry*, where he lived a retired and ſtudious Life, ſeldom travelling ſo far as *London* once in a Year; his

Recreation being a Diverſity of Studies: "As oft (ſays he) as I was tired with the Labours of my own Profeſſion, I have allayed that Tedioufneſs by walking in the pleaſant, and more than *Elyſian Fields* of the diverſe and various Parts of human Learning, and not of the Mathematics only." About the Year 1628, he was appointed, by the Earl of *Arundel*, Tutor to his Son *William* in the Mathematics. Beſides his cloſe Application to Study, he kept a Correſpondence, by Letters, with ſome of the moſt eminent Scholars of his Time upon mathematical Subjects: The Originals of which were preſerved, and communicated to the *Royal Society*, by *William Jones*, F. R. S. and Mr. *Lloyd* tells us, that the choiceſt Mathematicians of his Time owed much of their Skill to him, whoſe Houſe was full of young Gentlemen that came from all Parts, to be inſtructed by him. He was much requeſted to have lived in *Italy*, *France*, and *Holland*, when he was little obſerved in *England*, being generally eſteemed an Adept in the Languages, ſolid in Arithmetic, Aſtronomy, and the Sphere, of all Meaſures, Muſic, *&c.* exact in his Stile as in his Judgment, handling his mathematical Inſtruments with as great Accuracy at 80, as others would at 30, owing, as he ſaid, to Temperance and Exerciſe; principling his Friends and Acquaintance with plain and ſolid Truths, as he did the World with great and uſeful Arts, and advancing new Inventions in every Thing but Religion, which he endeavoured to promote in its primitive Purity, maintaining, that Prudence, Meekneſs, and Simplicity were the great Ornaments of his Life. Moſt of his Books were publiſhed with *Latin* Titles; but the Principal of all was that which he publiſhed in 1631, under the Title of *Arithmeticæ in Numero & Speciebus Inſtitutio.* This Treatiſe he propoſed ſhould ſerve as a general Key to the Mathematics: It was afterwards reprinted, with conſiderable Alterations and Additions, in the Year 1648, under the real Title of *A Key to the Mathematics.* It was alſo publiſhed in *Engliſh*, with an additional Tract of the Reſolution of all Kinds of affected Equations in Numbers. Alſo another, on Compound Intereſt. A Third, on the eaſy Art of delineating all Manner of plain Sun-dials: *Alſo*, a Demonſtration of the Rule of falſe Poſition. A third Edition of the ſame Work was printed in 1652, in *Latin*, 8vo. with the before-mentioned

Tracts,

Tracts, and the Addition of ſome others, *viz.* One on the Uſe of Logarithms, a Declaration of the 10th Book of *Euclid's Elements*, —— a Treatiſe of regular Solids, —— another of the Theorems contained in the Books of *Archimedes*. —— Another conſiderable Work of his was, a Treatiſe on *Circles of Proportion*, and a *horizontal Inſtrument*; publiſhed, in the Year 1633, in 4to. by his Scholar Mr. *William Foſter*. In the Year 1636, was printed, in *London*, his Deſcription and Uſe of the double horizontal Dial, in 8vo. In 1657 was publiſhed, his Treatiſe of Trigonometry, in *Latin*; and another in *Engliſh*: Together with Tables of Sines, Tangents, and Secants, with ſeveral other poſthumous Pieces.

Our Author, tho' undoubtedly a very great Mathematician, yet was far from having the happieſt Method of treating the ſeveral Subjects on which he wrote. His Stile was very conciſe, obſcure, and dry, and his Rules and Precepts ſo involved in Symbols and Abbreviations, as rendered his mathematical Writings very difficult to be underſtood.

The LIFE of JOHN GREAVES.

MR. *John Greaves*, a learned *Engliſh* Writer, in the 17th Century, born in 1602, was the eldeſt Son of Mr. *Geo. Greaves*, Rector of *Colmore* near *Alresford*, who was Maſter of an eminent Grammar-ſchool; his Son, in Conſequence thereof, was well inſtructed in the fundamental Rules of Literature, and was ſent to the Univerſity of *Oxford* in 1617. *July* 6, 1621, he took the Degree of Bachelor of Arts, and in 1624 became a Candidate for *Morton College*, and, on Account of his uncommon Skill in Philoſophy and polite Literature, was the Firſt of the Five who were elected: *June* 25, 1628, he took the Degree of Maſter of Arts. Having now read over all the *Greek* and *Latin* Writers with great Attention, he applied himſelf to the Study of natural Philoſophy and the Mathematics; and having contracted an intimate Friendſhip with Mr. *Henry Briggs*, *Savillian* Profeſſor of Geometry in the Univerſity of *Oxford*, and

and Dr. *John Bainbridge*, *Savillian* Profeſſor of Aſtronomy there, he was animated, by their Example, to proſecute the Study of the Mathematics with indefatigable Induſtry; and not content with having read over the Writings of *Copernicus*, *Regiomontanus*, *Purbach*, *Tycho Brahe*, *Kepler*, and other celebrated Aſtronomers of that and the preceding Age, he made the ancient *Greek*, *Arabian*, and *Perſian* Authors familiar to him, having before gained an accurate Skill in the *Oriental* Languages. His Reputation began now to be ſo conſiderable, that, upon ſeveral Teſtimonials of his great Abilities, he was choſen Profeſſor of Geometry in *Greſham College* at *London*, upon the Reſignation Mr. *Peter Turner*, and, at the ſame Time, held his Fellowſhip of *Morton College*. —— About this Time, he formed a Reſolution of travelling into foreign Countries; and it appears, that, in the Year 1635, he went to *Paris* and to *Leyden*, where he became acquainted with the celebrated *James Golius*; but he had a further Deſign of viſiting the *Eaſtern* Countries, and accordingly went for *Leghorn* in 1637, from whence he proceeded to *Rome*, where he accurately ſurveyed the venerable Remains of Antiquity: Here he, likewiſe, correſponded with the Keeper of the *Vatican* Library, *Athanaſius Kircher*, and *Gaſper Bertius*, a celebrated Aſtronomer, who informed him, that they had found by repeated Obſervations with a large Inſtrument of *Clavius*, that the Altitude of the Pole of *Rome* was 41° 46′. From *Rome* he went to *Padua*, where he was introduced to the Acquaintance of the Profeſſors there: From hence he went to *Florence*, where he ſtaid a few Weeks, and afterwards returned to *Leghorn*, where he embarked for *Conſtantinople*, and arrived there in 1638: In *September* following he embarked for *Egypt*; but, being obliged to put into *Rhodes*, he went a-ſhore, and taking with him a braſs Aſtrolabe of *Gemma Friſius*, he found the Elevation of the Pole there to be 37° 50′. At length he arrived at *Alexandria*, where he ſtaid four or five Months, and made a great Number of uſeful Obſervations, ſeveral of which are noted down in a MSS. of his in the *Savillian* Library at *Oxford*, which was bought, with other MSS. of his, of the Widow of Dr. *Nich. Greaves*, our Author's Brother, by Mr. *Richard Stubbs*; and Dr. *Thomas Smith* ſent an Abſtract of that MSS. to the *Royal Society* in 1683. —— From *Alexandria*, Mr.

Greaves

Greaves went to *Grand Cairo* to meaſure the Pyramids, carrying with him a Radius of 10 Feet, moſt accurately divided into 10,000 Parts; while there, he adjuſted the Meaſure of the Foot, obſerved by all Nations, in one of the Rooms under the ſaid Pyramid, with his Name, *John Gravius*, under it. About 1639, he returned to *Leghorn*, from whence he proceeded to *Florence*, where he was received with great Civility by *Ferdinand* II. Grand Duke of *Tuſcany*, to whom he inſcribed a *Latin* Poem. From *Florence*, Mr. *Greaves* went to *Rome*, to repeat his Obſervations which he had made there before, and to make new Ones; but his Stay there was ſhort, as he had, by this Time, a Deſire of returning to his native Country, where he arrived in the Summer of the Year 1640. ——— *November* 14, 1643, upon the Deceaſe of Dr. *John Bainbridge*, he was choſen *Savilian* Profeſſor of Aſtronomy at *Oxford*, and principal Reader of *Linacre*'s Lecture in *Merton College*. ——— In 1645, he propoſed a Method for reforming the Calendar, by omitting the Intercalary-day for 40 Years to come. This Paper was publiſhed, by Dr. *Thomas Smith*, in the *Philoſophical Tranſactions*, *October* 1699. ——— In 1646, he publiſhed, at *London*, in *October*, his *Pyramidographia*, or, *a Deſcription of the Pyramids of Egypt*; and, in 1647, his Diſcourſe of the *Roman* Foot and *Denarius*; from whence, as from two Principles, the Meaſures and Weights uſed by the Antients may be deduced: This he dedicated to his truly noble and learned Friend, *John Selden*. Soon after this, he was ejected, by the Parliament Viſitors, from the Profeſſorſhip of Aſtronomy, and Fellowſhip of *Merton College*; and the Soldiers committed many Outrages, broke open his Cheſt, and deſtroyed many of his Manuſcripts, which greatly affected him. He then retired to *London*, where, after ſome Time, he married, and proſecuted his Studies with great Vigour, as appears from ſundry of his philoſophical and theological Works. But this was but a tranſient Happineſs to him; for he died at *London*, *October* 8, 1652, not full 50 Years of Age, leaving his aſtronomical Inſtruments to the *Savilian Library* in the Univerſity of *Oxford*, where they are repoſited.

The LIFE of MARIA CUNITIA.

MARIA CUNITIA, deſcended from an antient and honourable Family in *Sileſia*; her Father's Name was *Henricus Cunitius*; ſhe diſcovered, in her early Years, a remarkable Genius for the moſt noble and ſublime Studies, which were cultivated and incouraged by her Father, by affording her every proper Aſſiſtance in ſome Meaſure ſuitable to her diſtinguiſhing Talents, and the high Expectations he had formed from thence. Her firſt Attempts were chiefly to acquire a Knowledge in the oriental Languages, in which ſhe became ſo great a Proficient as to merit the Character of one eminently ſkilful in the Languages, and of ſuch Hiſtory as greatly depended on that Kind of Knowledge; but is by no Means looked upon as her greateſt Attainments; for, like another *Hypatia*, ſhe excelled in many Branches of mathematical Learning, and was an Adept in Aſtronomy, to which ſhe applied herſelf with great Aſſiduity, in the Study of the moſt valuable Writings on theſe Sciences, in which her ſingular Penetration, and conſequent Improvement, ſoon became very conſpicuous by ſeveral ingenious and uſeful Works: One entitled, *Urania Propitia:* Wherein ſhe hath ſet forth aſtronomical Tables of wonderful Facility and Exactneſs, founded upon *Kepler*'s Hypotheſis, inveſtigating and explaining the celeſtial Phænomena by a moſt eaſy and compendious Way of Calculation, expreſſing and performing, by explicit Numbers, what the *Rudolphine* Tables contain implicitly in Logarithmical Numbers, and thence require to be effected. This Book was dedicated, by her and her Huſband (*Elias à Leonibus*) to *Ferdinand* the Third, Emperor of *Germany*, and printed in Folio, by *Joannes Seyffertus*, 1650, in *Latin* and *High Dutch*. But, notwithſtanding her Merit ſhines with ſuch peculiar Luſtre as to reflect Dignity on her Sex, Hiſtory does not inform us of the Time, or Place of her Death, nor of any peculiar Honours paid to her Worth: No Monument we find rear'd to her Fame, and all our Biographers paſs her over without the leaſt Notice.

The LIFE of Sir JONAS MOORE.

SIR *JONAS MOORE*, born about the Year 1620, at *Whitby* in *Lancaſhire*, after enjoying the Advantages of a liberal Education, bent his Studies principally to the Mathematics, animated and encouraged thereto by a regard to the public Good; as his Talents were, in ſome Meaſure, anſwerable to his great Deſigns, ſo his eminent Skill in the Mathematics, which was publicly known, introduced him to the Favour and Eſteem, and very conſiderable Employments under his Majeſty King *Charles* II. which he diſtinguiſhed with Honour and Dignity. Some Years before his Death, he was choſen one of the Governors of *Chriſt's Hoſpital*, where he ſoon found an Opportunity of exerting his Abilities in a Manner ſomewhat anſwerable to his Wiſhes, *viz.* that of ſerving the riſing Generation: And conſidering with himſelf the Advantage and Benefit which the Nation might receive from a mathematical School, if rightly conducted, he made it his utmoſt Care to promote the Improvement of it. —— His Majeſty had, indeed, of his own Bounty, by the Mediation of his Royal Highneſs, been pleaſed to order a liberal Allowance for the Maintainance of a ſelect Number of the ableſt and fiteſt Youths of the ſaid Hoſpital, to be annually choſen, as alſo for that of a Maſter to inſtruct them in ſuch Parts of the Mathematics as are requiſite in a ſkilful Seaman.

The School was ſettled; but there ſtill wanted a methodical Inſtitution from which the Youths might receive ſuch neceſſary Helps as their Studies required: A laborious Work, from which great and aſſiduous Employments Sir *Jonas* might juſtly have exempted himſelf, had not a predominant Regard to a more general Uſefulneſs engaged him to devote all the leiſure Hours of his declining Years to the Improvement of ſo uſeful and ſo important a Seminary of Learning.

Having thus engaged himſelf in the Proſecution of this generous Deſign, the firſt Thing to be determined was, his Method; and this is ſuppoſed to be exhibited in his *general Syſtem of Mathematics*, divided into eight Parts, *viz.* Part I. Containing;

ing, Arithmetic as well natural and decimal, as in Species, or the Principles of Algebra. II. Practical Geometry, together with the firſt ſix Books of *Euclid*'s Elements; as alſo, the 11th and 12th ſymbolically demonſtrated. III. Trigonometry, plain and ſpherical. IV. Coſmography, or, a Deſcription of the Heavens. V. Navigation, or Sailing, by a plain, or *Mercator*'s Chart; as alſo, by the Arch of a great Circle, *&c.* VI. The Doctrine of the Sphere, grounded on the Motion of the Earth, according to the old *Pythagorean* and *Copernican* Syſtem. VII. Aſtronomical Tables, with Tables of Logarithms, natural and artificial, Sines and Tangents, and verſed Sines. VIII. A new Geography, or a Deſcription of the moſt eminent Countries and Coaſts of the World, with Maps of them, and Tables of their Latitude and Longitude, by Sir *Jonas Moore*, Knt. late Surveyor General of his Majeſty's Ordnance, and *F. R. S.* printed in two large 4to. Volumes, and publiſhed at *London* in 1681, by his Sons-in-Law, *William Hanway* and *John Pottinger*. In the Preface to this Work, the ſaid Editors furniſh us with many Particulars relative to the great Care, Labour, and Expence, in the progreſſive finiſhing the ſeveral Parts of this Work, which was in great Meaſure accompliſhed in the Life-time of Sir *Jonas*, and for that Purpoſe he kept a Correſpondence with, and received conſiderable Aſſiſtances from other eminent Mathematicians, particularly Mr. *Flamſtead*, and ſome of the Figures for illuſtrating the Work borrowed from Doctor *Barrow* and others.

Sir *Jonas* was juſt ready to enter upon the fifth Part, which treats of Navigation, and conceived himſelf within View of the much deſired Concluſion of this Work, when it pleaſed the divine Providence to put a Period to his Labours, which happened according to his own Deſire, *viz.* that of ending his Days in his Majeſty's Service, and the Promotion of mathematical Knowledge.

The Author's known Abilities had raiſed in the Minds of the Public (eſpecially thoſe who had a Taſte for theſe Studies) great Expectations; and many Solicitations from Perſons of Rank, beſides thoſe of the Governors, were uſed to facilitate it; but nothing conſiderable done till Mr. *Hanway* came over from *Ireland*, who, with the other Son-in-Law, ſpared no Coſt nor

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Pains to have the Whole executed in the beſt Manner, and to call in proper Aſſiſtants, where it was wanting, for the illuſtrating any Part of it: To whoſe Merit the Public are, in ſome Meaſure, indebted, that the Work was ſo well compleated, and that the Public have long reaped Advantage from it, theſe Anecdotes of ſo valuable a Life we have been obliged to collect from the Editor's Preface to his Works, not having been able to procure any Intelligence from the voluminous Works of biographical Writers, which is another egregious Inſtance how little they have attended to the Merit and Characters of the greateſt Men, whoſe Fate in *England* has generally been to have but little Honour while living, and, when dead, to be buried in Oblivion.

The LIFE of JOHANNES DOMINICUS CASSINI.

JOHANNES DOMINICUS CASSINI, a moſt excellent Aſtronomer, deſcended from a noble Family in *Piedmont* in *Italy*, born the 8th of *June*, 1625: In his early Years, he diſcovered an uncommon Genius and Diſpoſition for Learning, which was improved by proper Care in his Parents and Tutors: After he had laid a proper Foundation for his Studies at Home, he was ſent to continue them in a College of Jeſuits. He had an uncommon Turn for *Latin* Poetry, which he exerciſed ſo very early, that ſome Poems of his were publiſhed when but eleven Years of Age. At Length he turned his Thoughts to the Study of Aſtronomy, and meeting with ſome Books very opportunely on that Subject, he read, and made Obſervations upon them; and, from the Pleaſure and Satisfaction he felt in himſelf, his Propenſity was very ſtrong to proſecute that Study, and in a ſhort Time made ſo amazing a Progreſs, that, in the Year 1650, the Senate of *Bologne* invited him to be their public mathematical Profeſſor. He was not more than 15 Years of Age when he firſt went to *Bologne*, where he taught Mathematics, and made Obſervations upon the Heavens with great Aſſi-

duity and Diligence. ——— In the Year 1652, a Comet appeared at *Bologne*, which he obſerved with great Accuracy, and diſcovered, that Comets were not Bodies accidentally generated in the heavenly Regions, as had uſually been ſuppoſed, but of the ſame Nature, and, probably, governed by the ſame Laws as the Planets. ——— The ſame Year he ſolved an aſtronomical Problem, which *Kepler* and *Bullialdus* had given up as inſolvable: It was, to determine, geometrically, the Apogee and Excentricity of a Planet from its true and mean Place. ——— In the Year 1653, when the Church of *Bologne* was repaired and enlarged, he obtained Leave of the Senate to correct, and ſettle a Meridian Line. This Gnomon *Caſſini* made by placing the Braſs Plate, through the Hole of which the Rays of the Sun were to paſs, in the Roof of the Church, and drew a Meridian Line 120 Feet in Length upon the Pavement; which was admirably well repreſented in the Reverſe of a Medal ſtruck upon that Occaſion, which is repreſented by a curious Print thereof prefixed to the firſt Book of *Long's Aſtronomy*, and a larger Picture thereof may be ſeen in *Wright's Travels*. Theſe are ſaid to be ſome of his Performances in his younger Years.

In the Year 1657, he attended, as an Aſſiſtant, a Nobleman who was ſent to *Rome* to compare ſome Differences which had ariſen between *Bologne* and *Ferrara*, from the Inundations of the *Po*, and ſhewed ſo much Skill and Judgment in the Management of that Affair, that obtained him great Applauſe; and, in Conſequence of his incomparable Talents diſplayed in a Variety of intereſting and important Affairs, *Marius Chigi*, Brother of Pope *Alexander* VII. appointed him Inſpector-general of the Fortifications of the Caſtle of *Urbino*, and likewiſe of the Rivers in that eccleſiaſtical State, for ſeveral Years: But in all this Time, he did not neglect his aſtronomical Studies, but cultivated them with great Care. ——— He diſcovered many Particulars relative to *Mars* and *Venus*, eſpecially the Revolution of *Mars* round his own Axis: But his principal Point in View was to ſettle an accurate Theory of *Jupiter*'s Satellites, which, after much Labour and Watching, he happily effected, and publiſhed it, at *Rome*, among other aſtronomical Pieces. ——— *Picard* the *French* Aſtronomer, getting *Caſſini*'s Tables of *Jupiter*'s Satellites, found them ſo very exact, that he conceived the higheſt

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Opinion of his Skill, and publiſhed his Fame in the Royal Academy of Sciences: And *Lewis* XIV, enamoured with his Fame, invited him to be a Member of the Academy. *Caſſini*, however, could not leave his Station at *Bologne* without Leave of his Superiors; and therefore *Lewis* requeſted of Pope *Clement* IX, and of the Senate of *Bologne*, that *Caſſini* might be permitted to come into *France*: And Leave being obtained for ſix Years, *Caſſini* came to *Paris* in 1699, where he was immediately made the King's Aſtronomer. —— When this Term was near expiring, the Pope and Senate of *Bologne* inſiſted upon *Caſſini*'s Return, on Pain of forfeiting his Revenues and Emoluments, which had hitherto been remitted to him; but the Miniſter, *Colbert*, prevailed on him to ſtay, and he was naturallized the latter End of the Year 1673, about which Time he likewiſe entered into the Marriage State.

The Royal Obſervatory at *Paris* had been finiſhed ſome Time: The Occaſion of its being built was, briefly, this: In the Year 1638, the famous *Minim Merſennes* was the Author and Inſtitutor of a Society, where ſeveral ingenious and learned Men met together to talk upon phyſical and aſtronomical Subjects, among whom were *Gaſſendus*, *Des Cartes*, *Monmour*, *Thevenot*, *Bullialdus*, our Countryman *Hobbes*, *&c.* and this Society was kept up by a Succeſſion of ſuch Men for many Years. At length, *Lewis* XIV, conſidering that a Number of ſuch Men, acting in a Body, would ſucceed abundantly better in the Promotion of Science, than if they acted ſeparately, each in his particular Art or Province, eſtabliſhed, under the Direction of *Colbert*, in the Year 1666, the ROYAL ACADEMY of Sciences; and, for the Advancement of Aſtronomy in particular, erected the ROYAL OBSERVATORY at *Paris*, and furniſhed it will all Kinds of Inſtruments that were neceſſary to make Obſervations. The Foundation of this noble Pile was laid in the Year 1667, and the Building compleated in 1670. —— *Caſſini* was appointed to be the firſt Inhabitant of the Obſervatory, who took Poſſeſſion of it *September* 1671, when he devoted himſelf in good Earneſt to the Buſineſs of his Profeſſion. —— In the Year 1672, he endeavoured to determine the Parallax of *Mars* and the *Sun*, by comparing ſome Obſervations which he made at *Paris* with ſome which were made at the ſame Time in *America*. —— In

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the Year 1677, he demonſtrated the diurnal Motion of *Jupiter* round his Axis to be performed in 9 Hours and 58 Minutes, from the Motion of a Spot in one of his larger Belts. ——— In the Year 1684, he diſcovered four Satellites of *Saturn*, beſides that which *Huygens* had found out. ——— In the Year 1693, he publiſhed a new Edition of his Tables of *Jupiter*'s Satellites, corrected by later Obſervations. —— In the Year 1695, he took a Journey to *Bologne*, to examine the Meridian Line which he had fixed there in 1653, and he ſhewed, in the Preſence of ſeveral Mathematicians, that it had not varied in the leaſt during near 40 Years. —— In the Year 1700, he continued the Meridian Line through *France*, which *Picard* had begun, to the extreameſt Southern Part of that Country.

We are further informed, by his Son in his *Elements of Aſtronomy*, that he invented a new Hypotheſis, for ſolving all the Phænomena of the ſolar Motions, by a Curve ſomewhat differing from the Form of an Ellipſis: He ſuppoſed, that the *Earth* was placed in one of the Focus's of this Curve, and the Sun moved in ſuch a Manner about it, that, if two Lines were drawn from its Centre to the two Focus's of the Curve, the Rectangle made of theſe two Lines would always be equal to the Rectangle made by the greateſt and leaſt Diſtance of the *Sun* from the *Earth*; his Anomaly, true Place, and Equation of the Orbit, are all readily determined thereby, and to a very great Degree of Exactneſs, as appears from an Example he hath given us, Vol. I. p. 151. of his *Aſtronomy*.

After *Caſſini* had lived in the Royal Obſervatory more than 40 Years, and done great Honour to himſelf and his Royal Maſter, by many excellent and uſeful Diſcoveries, which he publiſhed from Time to Time, he died the 14th of *September*, 1712, aged 87 Years and a Half, and was ſucceeded by his Son, *John Caſſini*.

In the laſt Years of his Life he loſt his Sight, a Misfortune that likewiſe befel the great *Galileo*; whence the Author of the Eulogium on *Caſſini*, in *French*, obſerves, that theſe two Men were, in ſome Meaſure, ſimilar to *Tireſias* in the Fable, who was ſaid to be ſtruck Blind for having preſumed to pry into the Secrets of Nature, beyond what was permitted to Man.

The LIFE of JOHN BLAGRAVE.

JOHN BLAGRAVE was an eminent *Engliſh* Mathematician, born at *Bulmarſh-court* in *Berkſhire*; he received the Rudiments of his Education at *Reading*, from whence he removed to St. *John's College*, *Oxford*: He ſoon quitted the Univerſity and retired to *Southcote-lodge*, where he devoted himſelf to Study and Contemplation; his Genius ſeemed moſt to be turned to Mathematics, and, that he might make the greater Progreſs in this Science, he addicted himſelf to a retired Life. He employed himſelf chiefly in compiling ſuch Works as might render ſpeculative Mathematics accurate, and the practical Parts eaſy, and was very aſſiduous in recommending theſe Studies to Gentlemen of Abilities and Leiſure, as they were not mere Amuſements for Scholars, and ſpeculative Perſons, but of general Advantage in the neceſſary Affairs and Buſineſs of Life. Nor did he ſtop in barely recommending thoſe Studies by Arguments drawn from hence, but incouraged it by his Liberality and peculiar Marks of his Favour. There were many Acts indeed of his Beneficence in private Life, for the Incouragement of Learning, the Reward of Merit, and the Relief of Diſtreſs: Some of theſe were the Reſult of a quaint, humourous Diſpoſition, diſcovered eſpecially by his Legacies: One of which was, bequeathing 10 Pounds a Year for three virtuous Maids who had lived five Years with a Maſter, who were to appear before the Mayor of *Reading* on *Good Friday* and caſt Dice; ſhe who caſt the higheſt Number had the 10 Pound-purſe, which generally procured the Girl a Huſband; and the other two were to have the Chance of caſting the ſucceeding Year, and even a third Year if unfortunate. He likewiſe demiſed, and bequeathed a ſtipend to eighty poor Widows who ſhould attend annually on *Good Friday* and hear a Sermon, for which he left 10*s.* to the Parſon. He took particular Care likewiſe to provide for thoſe of his Family, to reward the Diligence and Fidelity of his Servants, and provide amply for their Support. So that Knowledge and a great Genius were joined with a laudable Deſire of doing good, and promoting the Happineſs of Mankind. We have no mention made of the

Time of his Birth, or Age; but Hiſtory mentions, that Mr. *Blagrave* died at his own Houſe near *Reading*, *Auguſt* 9, 1611, and lies interred in the Church of St. *Lawrence*, with a fine Monument, to his Memory, repreſenting a Man under an Arch to the Middle, holding one Hand on a Globe, and the other on a Quadrant. He is habited in a ſhort Cloak, a Caſſock, and Ruff, ſurrounded with Books: On each Side are the Figures of two Women, preſenting him with mathematical Inſtruments: With this Inſcription.

Johannes Blagrave, totus Mathematicus, cum matre Sepultus.

His Works indicated his indefatigable Studies in the mathematical Sciences, which were principally four Books, *viz.*

I. A mathematical Jewel; ſhewing the making, and moſt excellent Uſe of an Inſtrument ſo called; for leading the direct Path-way through the whole Art of Aſtronomy, Coſmography, Geography, *&c.* printed at *London* in Folio, 1585.

II. Of the Making and Uſe of the familiar Staff: So called, as it is adapted to walk with, and to perform the geometrical Menſuration of all Altitudes, 4to. 1590.

III. The Uſe of the Aſtrolabe, 4to. 1596.

IV. The Art of Dialling, in two Parts, in 4to. 1609.

The LIFE of FRANCIS BLONDEL.

FRANCIS BLONDEL is famous in Hiſtory for his uncommon Skill in the Sciences of Mathematics and Architecture, and for the honorary Dignities conferred on him in Conſequence thereof; for when he was but young, with reſpect to Years, he was ſuch an Adept in his Profeſſion, as to be choſen *Regius* Profeſſor of Mathematics and Architecture, at *Paris*. —— Not long after, he was appointed Governor to *Lewis-Henry de Lomenix*, Count *de Brienne*, whom he accompanied in his Travels from *July*, 1652, to *November*, 1655 (of which he publiſhed an Account.) —— He had many honourable Em-

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ployments conferred on him both in the Army and Navy: —— Entruſted with the Management of ſeveral Negotiations with foreign Princes: —— He arrived at the Dignity of Marſhal *de Camp*, and Councellor of State, and had the Honour to be appointed mathematical Preceptor to the *Dauphin*. He was Director of the Academy of Architecture, and a Member of the Royal Academy of Sciences. In all which, he ſupported his Character with Dignity and Applauſe. He drew the Deſigns of the new Gates, ſince the *Dutch* War in 1672, and wrote ſome of the Inſcriptions on them; for he was no leſs verſed in the Knowledge of the *Belles Lettres* than in that of Geometry, as may be ſeen by the Compariſon he publiſhed between *Pindar* and *Horace*: It is very remarkable that, in moſt, if not all his polemical Tracts, he aimed at explaining and recommending Authors, more than expoſing their Foibles and diſplay his own Vanity; and in the leſs important miſcellaneous Pieces which he wrote, he conſtantly paid a Regard to the Improvement, as well as Entertainment of his Readers. In his *Latin* Account of his Travels he has interſperſed a great Variety of judicious Obſervations on the Laws, Cuſtoms, Manners, *&c.* of the Nations he had viſited; and thus made the Hiſtory peculiarly beneficial to Readers. He died *February* 1, 1686, in an advanced Age: But Hiſtory does not preciſely mention where.

His principal mathematical Works were,

I. Notes on the Architecture of *Savot*.
II. A Courſe of Architecture, in 3 Vol. Fol.
III. The Art of throwing Bombs.
IV. The Hiſtory of the *Roman Calendar*.
V. A new Method of Fortification.

The LIFE of JOHN ALPHONSO BORETTI.

JOHN ALPHONSO BORETTI, a famous Philoſopher and Mathematician, born at *Naples* the 28th of *January*, 1608; he was Profeſſor of Philoſophy and Mathematics in ſome of the moſt celebrated Univerſities in *Italy*, eſpecially at *Florence* and at *Piſa*, where he became highly in Favour with the Princes of the Houſe of *Medicis*; but having been concerned in the Revolt of *Meſſina*, he was obliged to retire to *Rome*, where he ſpent the Remainder of his Life under the Protection of *Chriſtiana*, Queen of *Sweden*, who honoured him with her Friendſhip, and, by her Liberality towards him, ſoftened the Rigour of his hard Fortune. He continued two Years in the Convent of the regular Clergy of St. *Pantaleon*, called *the pious Schools*, where he inſtructed the Youth in mathematical Studies. And this Study he proſecuted with the utmoſt Diligence for many Years afterwards, as is evident by his Correſpondence with ſeveral ingenious Mathematicians of that Age, and the frequent Mention of him by others who have endeavoured to do Juſtice to his Memory. He wrote a Letter to the learned Mr. *John Collins*, wherein he diſcovers his great Deſire and Endeavours to promote the Improvement of thoſe Sciences; ſpeaks of his Correſpondence with, and great Affection to Mr. *Henry Oldenburg*, Secretary of the Royal Society; —— of Dr. *Wallis*; of the late learned Mr. *Boyle*, and regretted the great Loſs thereby ſuſtained to the common Wealth of Learning: ——— Mr. *Baxter*, in his *Enquiry into the Nature of the human Soul*, makes frequent Uſe of our Author's Book *De Motu Animalium*, and tells us, that he was the firſt who diſcovered that the Force exerted within the Body prodigiouſly exceeds the Weight to be moved without, or that Nature employs an immenſe Power to move a ſmall Weight: But he impartially acknowledges that Dr. *James Keil* had ſhewn our Author was miſtaken in his Calculation of the Force of the Muſſel of the Heart; he nevertheleſs ranks him with the moſt authentic Writers, and ſeldom miſtaken; and having remarked

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that it is ſo far from being true, that great Things are brought about by ſmall Power, that, on the Contrary, a ſtupendous Power is manifeſted in the moſt ordinary Appearances of Nature. He tells us, that the ingenious *Borelli* firſt obſerved this in animal Motion; and that Dr. *Stephen Hales*, by a Courſe of Experiments in his vegetable Statics, had ſhewn the ſame in the Force of the aſcending Sap in Vegetables.

After a Courſe of unwearied Labours, we find *Borelli* died at *Pantaleon* of a Pleuriſy, *Dec.* 31, 1679, aged 72 Years.

Borelli, beſides ſeveral Books on phyſical Subjects, publiſhed the following mathematical ones, *viz.* I. *Euclid* reſtored, 4to. II. The Vth, VIth, and VIIth Book of *Apollonius*'s Conics; with ſome Tracts of *Archimedes*, Folio. III. The Theory of the ſecondary Planets, or Moons of *Jupiter*, deduced from phyſical Cauſes, 4to. IV. Concerning the Force of Concuſſion, 4to. V. Of the natural Motions of Bodies, reſulting from Gravity. VI. Various Obſervations of lunar Eclipſes. VII. *Apollonius*'s Elements of Conic Sections, and thoſe of *Archimedes*. VIII. Obſervations on the unequal Strength of the Eyes. IX. Obſervation on the Eclipſe of the Moon of the 11th of *January*, 1675. X. An hiſtorical and meteorological Account of the Burning of *Mount Ætna*, in the Year 1669.

ERRATUM.

At the Beginning of this Life, for *Boretti* read *Borelli*.

The LIFE of THOMAS HARIOT.

THOMAS HARIOT, an *Engliſh* Mathematician, was born at *Oxford* in the Year 1560, and after he had been inſtructed in Grammar-learning in that City, he became a Commoner in St. *Mary's Hall*, where he took a Bachelor of Arts Degree in 1579; he had then ſo diſtinguiſhed himſelf by his uncommon Skill in Mathematics, as to be recommended, ſoon after, to Sir *Walter Raleigh*, as a proper Preceptor to him in that Science, who accordingly became his firſt Patron, took him into his Family, and allowed him a handſome Penſion: In 1585, he was ſent over by Sir *Walter*, with his firſt Colony, to *Virginia*,

nia, where, being ſettled, he was employed in diſcovering and ſurveying that Country, in obſerving what Commodities it produced, together with the Manners and Cuſtoms of its Inhabitants, which he publiſhed an Account of under the Title of, *a brief and true Report of the New-found-land of* Virginia: Which was re-printed in the 3d Volume of *Hakluyt*'s *Voyages*. Upon his return to *England*, he was introduced, by his Patron, to the Acquaintance of *Henry* Earl of *Northumberland*, who, finding him to be a Gentleman of an affable and peaceable Diſpoſition, and well read in many valuable Parts of Learning, allowed him a generous Penſion, as he did afterwards to Mr. *Hues*, (well known by his Treatiſe upon the Globes) and to Mr. *Walter Warner*, who is ſaid to have made ſome accurate Obſervations on the Circulation of the Blood, and to have communicated ſome Hints thereof to the famous Mr. *Harvey*; ſo that in 1606, when the Earl was committed to the Tower for Life, *Hariot*, *Hues*, and *Warner* were his conſtant Companions, and commonly called the Earl of *Northumberland*'s three *Magi*, with whom the Earl did frequently converſe; as did alſo Sir *Walter Raleigh*, who was then in the *Tower*, to divert and ſooth them in their melancholy Confinement. Mr. *Hariot* removed ſometime afterward to *Sion College*, and died in *London*, *June* 2d, 1621, of a Cancer in his Lip. A Manuſcript of his entitled, *Ephemeris Chrytometrica*, is preſerved in *Sion College* Library; and his *Artis Analyticæ Praxis* was printed, after his Death, in a thin Folio, and dedicated to *Henry* Earl of *Northumberland*. *Des Cartes* is ſaid to be obliged to this Book for a great many of his Improvements in Algebra. ——— He was univerſally eſteemed on Account of his Learning; when he was but a young Man, *Hakluyt* ſtiles him *Juvenis in diſciplinis Mathematicus excellens*; and, by *Camden*, *Mathematicus inſignis*. Mr. *George Chapman* likewiſe ſtiles him, his worthy and moſt learned Friend, whoſe Judgment, and Knowledge, ſays he, I know to be incomparable, yea, to be admired as well for his moſt blameleſs Life, as the wiſe Diſpoſition and Improvement of his Time: And Dr. *Richard Corbet*, afterward Biſhop of *Oxford*, in his Poem to Sir *Thomas Ayleſbury*, ſpeaks of

——— *Deep* Hariot's *Mine*,
In which there is no Droſs, but all Refine.

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Theſe Encomiums we the rather mention, as ſome Authors have attached to his Character, that of *Deiſt*, and that he undervalued the Authority of the Scriptures; which does not appear at all probable, from the high Eſteem he was in with Perſons of reverend and diſtinguiſhed Characters.

The LIFE of LAURENCE ROOKE.

LAURENCE ROOKE ſprung from a good Family of that Name, at *Monks Horton* in *Kent*, but was himſelf born at *Deptford* in 1623, in that County. He was educated at *Eaton School*, and from thence removed to *King's College* in 1639: He ſeems to have been a Valetudinarian while at the College; for we find, that on the 29th of *February*, 1643, he was admitted to his Batchelor's Degree in Arts, by Proxy; and in 1647, he commenced Maſter of Arts, and then retired into the Country: But in the Year 1650, he went to *Oxford*, and ſettled in *Wadham College*, for the Sake of having the Company, and receiving Improvement from Dr. *Wilkins*, and Mr. *Seth Ward* the Aſtronomy Profeſſor; and likewiſe that he might accompany Mr. *Boyle* in his chymical Operations.

After the Death of Mr. *Foſter*, he was choſen Aſtronomy Profeſſor in *Greſham College*; upon the 23d of *July*, 1652, he made ſome Obſervations upon the Comet at *Oxford*, that appeared in the Month of *December* that Year, which, the Year following, were printed by Mr. *Seth Ward*; and in the Year 1655, Dr. *Wallis* publiſhed his Treatiſe *De Sectionibus Conicis*, which he dedicated to thoſe two Gentlemen.

On the 7th of *Auguſt*, 1657, Mr. *Rooke* was permitted to exchange the Aſtronomy Profeſſorſhip for that of Geometry: This might ſeem very ſtrange, as Aſtronomy ſtill continued to be his favourite Study; but it appears to be from a Conveniency of the Lodgings, which opened behind the Reading-hall. —— Mr. *Rooke* having thus ſucceſſively enjoyed thoſe two Places ſome Years before the Reſtoration in 1658, moſt of thoſe Gentlemen who were wont to aſſemble at *Oxford*, coming to *London*, joining

ing with other of their Acquaintance, uſually met at *Greſham College* to hear Mr. *Rooke*'s Lectures. After the Royal Society came to be formed and ſettled into a regular Body, Mr. *Rooke* was very zealous and ſerviceable in promoting that great and uſeful Inſtitution, but did not live till it received its Eſtabliſhment by the Royal Charter. The Marquis of *Rocheſter*, who then reſided at *Highgate*, had taken Mr. *Rooke* to his Seat: But while there, he over-heated himſelf and caught Cold, which coſt him his Life. One very unfortunate Accident attended his Death, that it happened on the very Night which he had, for ſome Years, expected, wherein to finiſh his accurate Obſervations on the Satellites of *Jupiter*. And when his Illneſs prevented his Obſervation, Dr. *Pope* ſays, he ſent to the Society his Requeſt, that ſome other Perſon, properly qualified, might be appointed for that Purpoſe; ſo intent was he to the laſt, for making thoſe curious and uſeful Diſcoveries, in which he had been ſo long engaged. Mr. *Rooke* died in his Apartment, at *Greſham College*, the 27th of *June*, in 1662, at the Age of 41, and made a Noncupatory Will, leaving what he had to Dr. *Ward*, permitting him to receive what was due to him upon Bond, *&c.* and could be eaſily had; but no Bonds were to be put in Suit. He was buried very decently, by Biſhop *Ward*, at the Church of St. *Mary Outwich*, in *Biſhopſgate-ſtreet*, and his Corps attended by all the Fellows of the Royal Society then in *London*. Few Perſons have left behind them a more agreeable Character than Mr. *Rooke*, from all who were acquainted with him, or his Endowments; but in nothing more, than for his Veracity; for what he aſſerted poſſitively may be relied on: But if his Opinion was aſked, concerning any Thing that was dubious, his uſual Anſwer was, *I have no Opinion*. Mr. *Hooke* has given this copious, though conciſe Character of him: "I never was acquainted with any Perſon who knew more, and ſpoke leſs, being, indeed, eminent for the Knowledge and Improvement of Aſtronomy." Dr. *Wren*, and the Lord Biſhop of *Exeter* deſcribes him, as a Man of profound Judgment, a vaſt Comprehenſion, prodigious Memory, and ſolid Experience. His Skill in the Mathematics was reverenced by all the Lovers of thoſe Studies, and his Perfection in many other Sorts of Learning deſerves no leſs Admiration; but, above all, as another Writer characterize

rizes him, his extenſive Knowledge had a right Influence on the Temper of his Mind, which had all the Humility, Goodneſs, Calmneſs, Strength, and Sincerity of a ſound, unaffected Philoſopher. Theſe Accounts give us his Picture only in Minuature: But his Succeſſor, Dr. *Iſaac Barrow*, has drawn it in full Proportion, in his Oration at *Greſham College*, which is too long to inſert in this Place.

His Writings were principally:

I. Obſervations on Comets.

II. Directions to Seamen going to the *Eaſt* or *Weſt-Indies*.

III. The Method of obſerving the Eclipſes of the Moon.

IV. A Diſcourſe concerning the Obſervations of the Eclipſes of the Satellites of *Jupiter*. —— Theſe are printed in the *Tranſactions* of the Royal Society, beſides which he publiſhed ſome other Papers of his Experiments, *&c.*

The LIFE of CHRISTOPHER WREN.

CHRISTOPHER WREN deſcended from an antient Family in *Bincheſter*: He was born at *Eaſt Knoyle*, in *Wiltſhire*, on the 20th of *October*, 1632, and, while very young, diſcovered a ſurprizing Genius for Learning, and particularly the Mathematics. He was ſent to *Oxford*, and admitted a Gentleman-commoner at *Wadham College* at about 14 Years of Age, and the Advancement he there made in mathematical Knowledge, before he was 16 Years old, is very remarkable, as related by the celebrated Mr. *Oughtred*. ——— He took the Degree of Bachelor of Arts on the 18th of *March*, 1650, being then in his 19th Year: In the Beginning of *November*, 1653, he was choſen a Fellow of *All Souls College*; and, upon the 11th of *December* following, took his Degree of Maſter of Arts, before he left *Wadham College*; and ſoon after he became a Member of that excellent Society who then met at *Oxford* for the Improvement of natural and experimental Philoſophy.

Upon Mr. *Rooke*'s removal to the Geometry-profeſſorſhip in *Greſham College*, he was choſen to ſucceed him as Profeſſor of

Aſtronomy, *Auguſt* 7, 1657, in the 25th Year of his Age. In his Oration made on that Occaſion, among other Things, he propoſes ſeveral Methods whereby to account for the Shadows returning backward ten Degrees on the Dial of King *Ahaz*, by the Laws of Nature. ——— His Lectures, which were read on *Wedneſdays* in Term-time, uſed to be attended by many eminent and learned Men, who were principally the Auditors of Mr. *Rooke*. ——— One Subject of thoſe Lectures was upon Teleſcopes, to the Improvement of which he had greatly contributed. ——— Not long after, he made ſome Diſcoveries relating to the Air, of which Mr. *Hooke* has given us the following Account: "The Inſtrument for finding the different Preſſure of "Air upon the Parts of the Earth ſubjacent, was firſt obſerved "by the Hon. Mr. *Boyle*, who, upon the Suggeſtion of Sir "*Chriſtopher Wren*, erected a Tube of Glaſs ſo filled with Mer-"cury as is now uſually done in the common Barometer, in "order to find out whether the Preſſure of the Moon, accord-"ing to the *Carteſian* Hypotheſis, did affect the Air; inſtead "of finding the Fluctuation which might cauſe the Phænomena "of the Tides, diſcovered the Variation of the Air's Preſſure to "proceed from different Cauſes, and at different Times, from "what that Hypotheſis would have predicted." This Property of the Air, for ought appears, was never diſcovered till that Time, which is little more than 100 Years ago. Mr. *Derham*, who publiſhed it, thinks theſe Obſervations were made at *Oxford*, about the Year 1658. ——— In that Year Mr. *Wren*, in one of his Lectures at *Greſham College*, read a Deſcription of the Body, and different Phaſes of the Planet *Saturn*; which Subject he propoſed to inveſtigate while his Colleague, Mr. *Rooke*, then Profeſſor of Geometry, was carrying on his Obſervations upon the Satellites of *Jupiter*: And in the Month of *July*, that Year, he communicated ſome Demonſtrations concerning Cycloids to his Friends, and, among others, to Dr. *Wallis*, which were afterwards publiſhed by the Doctor at the End of his Treatiſe on that Subject. ——— About the ſame Time alſo, he ſolved the Problem propoſed by the famous Monſ. *Paſcal*, under the feigned Name of *Jean de Montfret*, to all the *Engliſh* Mathematicians, and returned another to the Mathematicians in *France* formerly propoſed by *Kepler*, and then ſolved like-

likewiſe by Mr. *Wren*, of which they never gave any Solution. ——— In the Year 1660, he invented a Method for the Conſtruction of ſolar Eclipſes.——*November* 28, that Year, he with ten others, formed themſelves into a Society, to meet every *Wedneſday*, for the Improvement of natural and experimental Philoſophy. ——— Mr. *Wren* did not continue long at *Greſham College*, for, on the 5th of *February* following, being choſen *Savilian* Profeſſor of Aſtronomy at *Oxford*, in the Room of Dr. *Seth Ward*, he reſigned his *Greſham* Profeſſorſhip the 8th of *March* following, and upon the 16th of *May*, 1661, entered upon the other.

September 12, the ſame Year, he was created Doctor of the Civil Law, in which he appears to have had ſuch a competent Knowledge as to have greatly exceeded the Expectations of his Friends.

Among his other Accompliſhments, he had gained ſo conſiderable a Skill in Architecture, that he was ſent for, the ſame Year, from *Oxford*, by Order of King *Charles* II. to aſſiſt Sir *John Denham*, Surveyor-general of his Majeſty's Works.

May 20, 1663, he was choſen a Fellow of the Royal Society, being one of thoſe who were firſt appointed by the Council after the Grant of their Charter; and not long after, it being expected that the King would make the Society a Viſit, the Lord *Brounker*, then Preſident, by Letter, deſired Dr. *Wren*'s Advice, who was then at *Oxford*, what Experiments would be moſt proper for his Majeſty's Entertainment. To whom the Doctor, in his Anſwer, dated *July* 30, 1663, recommends principally the *Torcellian* Experiment, and the Weather-Needle, as being not bare Amuſements, but uſeful, and likewiſe neat in their Operation. The noble Inſtitution of this illuſtrious Body, Dr. *Wren* greatly promoted, by many curious and uſeful Diſcoveries in Aſtronomy, natural Philoſophy, and other Sciences, related in the Hiſtory of the Royal Society, where the ingenious Author Mr. *Thomas Sprat*, who was then a Member of it, has given the following Account of them, taken from the Regiſters and other Books of the Society to the Year 1665, although that Hiſtory was not publiſhed till 1667.

The

The first Instance (says he) which I shall mention to which he may lay peculiar Claim, is the *Doctrine of Motion*, which is the most considerable of all others for establishing the first Principles of Philosophy by geometrical Demonstrations. Dr. *Wren* produced before the Society an Instrument to represent the Effects of all Sorts of Impulses made between two hard globous Bodies, either of equal or of different Bigness and Swiftness, following or meeting each other, or the one moving and the other at rest. From these Varieties arose many unexpected Effects, of all which he demonstrated the true Theories, after they had been confirmed by many Experiments. These he proposed as the Principles of all Demonstration in natural Philosophy. Nor can it seem strange, that these Elements should be of such universal Use, if we consider, that Generation, Corruption, Alteration, and all the Vicissitudes of Nature are nothing else but the Effects arising from the Meeting and intestine Motion of little Bodies of different Figures, Magnitudes and Velocities.

The second Work which he has advanced, is *the History of Seasons*, which will be of admirable Benefit to Mankind if properly attended to. His Proposal was, to comprehend a Diary of Wind, Weather, and other Conditions of the Air, as to Heat, Cold, and Weight; and also a general Description of the Year, whether healthful or contagious to Men or Beasts; with an Account of epidemical Diseases, of Blasts, Mill-dews, and other Accidents belonging to Grain, Cattle, Fish, Fowl, and Insects: And because the Difficulty of a constant Observation of the Air, by Night and Day, seemed invincible, he therefore devised a Clock to be annexed to a Weather-cock which moved a Rundle covered with Paper, upon which the Clock moved a black-lead Pencil, so that the Observer, by the Traces of the Pencil on the Paper, might certainly conclude what Winds had blown in his Absence. After the like Manner, he contrived a Thermometer to be its own Register; and because the usual Thermometers were not found to give a true Measure of the Extention of the Air, by reason that the accidental Gravity of the Liquor, as it lay higher or lower in the Glass, weighed unequally on the Air, and gave it a farther Construction or Extention, over and above that which was produced by

Heat

Heat and Cold, therefore he invented a circular Thermometer, in which the Liquor occaſions no Fallacy, but remains always in one Height, moving the whole Inſtrument like a Wheel on its Axis.

He contrived an Inſtrument to meaſure the Quantity of Rain that falls: This, as ſoon as it is full, will pour out itſelf, and, at the Year's End, diſcover how much Rain has fallen on a given Space of Land, in order to the Theory of Vapours, Rivers, Seas, *&c.*

He deviſed many ſubtle Ways for the eaſier finding the Gravity of the Atmoſphere, the Degrees of Drought and Moiſture, and many of its other Accidents. Amongſt theſe Inſtruments, there are Balances which are uſeful to other Purpoſes, that ſhew the Weight of the Air by their ſpontaneous Inclination.

He made great Additions to the new Diſcoveries on Pendulums, and among other Things ſhewed, that there may be produced a *natural* STANDARD *for Meaſure* from the Pendulum for vulgar Uſe.

He has invented many Ways to make aſtronomical Obſervations more accurate and eaſy. He has fitted and hung Quadrants, Sextants, and Radii more commodiouſly than formerly. He made two Teleſcopes to open with a Joint like a Sector, by which Obſervers may infallibly take a Diſtance to half Minutes, and find no Difference in the ſame Obſervations reiterated ſeveral Times.

He has added many Sorts of Retes, Screws, and other Devices, for Improvement of Teleſcopes for taking ſmall Diſtances, and apparent Diameters, to Seconds. He made Apertures for taking in more or leſs Light, as the Obſerver pleaſes, by opening and ſhuting like the Pupil of the Eye, the better to fit Glaſſes for crepuſculine Obſervations. ——— He has added much to the Theory of Dioptrics, much to the Manufacture of grinding good Glaſſes. He has attempted, and not without Succeſs, the making of Glaſſes of other Forms than ſpherical. ——— He has exactly meaſured and delineated the Spheres of the Humours in the Eye, whoſe Proportions one to the other were only gueſſed at before. This accurate Diſcuſſion produced the Reaſons why

we ſee Things erected, and that Reflection conduces as much to Viſion as Refraction.

He diſplayed a natural and eaſy Theory of Refraction, which exactly anſwered every Experiment. ——— He fully demonſtrated all Dioptrics in a few Propoſitions, ſhewing not only, as in *Kepler*'s Dioptrics, the common Properties of Glaſſes, but the Proportions by which the individual Rays cut the Axis, and each other, upon which the Charges of the Teleſcopes, or the Proportion of the Eye-glaſſes and Apertures, are demonſtrably diſcovered.

He made conſtant Obſervations on *Saturn*, and a Theory of that Planet truly anſwering all Obſervations, before the printed Diſcourſe of *Hugenius*, on that Subject, appeared.

He has eſſayed to make a true Selenography by Meaſure, the World having nothing yet but Pictures, rather than Surveys or Maps of the Moon. He has ſtated the Theory of the Moon's Libration, as far as his Obſervations could carry him. He has compoſed a lunar Globe, repreſenting not only the Spots and various Degrees of Whiteneſs upon the Surface, but the Hills, Eminencies, and Cavities moulded in ſolid Work. The Globe, thus faſhioned into a true Model of the Moon, as you turn it to the Light, repreſents all the menſtrual Phaſes, with the Variety of Appearances that happen from the Shadows of the Mountains and Valleys.

This lunar Globe was formed not only at the Requeſt of the Royal Society, but likewiſe by the Command of King *Charles* II. whoſe Pleaſure for the Proſecution and perfecting of it was ſignified by a Letter under the joint Hands of Sir *Robert Moray* and Sir *Paul Neile*, and his Majeſty's Approbation of it, when finiſhed, was ſuch, that he ordered it to be placed among the Curioſities of his Cabin, and beſtowed on him Marks of his royal Favour. He made Maps of the *Pleiades* and other teleſcopical *Stars*, and propoſed Methods to determine the great Doubt of the Earth's Motion, or Reſt, by the ſmall Stars about the Pole to be ſeen in large Teleſcopes.

In order to Navigation, he has carfully purſued many magnetical Experiments, of which the following is one of the nobleſt and moſt fruitful of Speculation: A large Terella is placed in the

the midſt of a plane Board with a Hole, into which the Terella is half immerſed, till it be like a Globe with the Poles in the Horizon. Then is the Plane duſted over, with Steel-filings, equally from a Sieve. The Duſt, by the magnetical Virtue, is immediately figured into Furrows that bend like a Sort of Helix, proceeding as it were out of one Pole and returning into the other. And the whole Plane is thus figured like the Circles of a Planiſphere.

It being a Queſtion at this Time among the Problems of Navigation very well worth reſolving, to what mechanical Powers ſailing againſt the Wind was reducible; he ſhewed it to be a Wedge. And he demonſtrated, how a tranſcient Force upon an oblique Plane would cauſe the Motion of the Plane againſt the firſt Mover; and he made an Inſtrument that mechanically produced the ſame Effect, and ſhewed the Reaſon of Sailing to all Winds.

The geometrical Mechanics of Rowing, he ſhewed to be a Vectis on a moving, or cedent Fulcrum. For this End, he made Inſtruments to find what the Expanſion of Body was towards the Hindrance of Motion in a liquid Medium, and what Degree of Impediment was produced, by what Degree of Expanſion, with other Things that are the neceſſary Elements for laying down the Geometry of Sailing, Swimming, Rowing, Flying, and the Fabrics of Ships.

He invented a very ſpeedy and curious Way of Etching. He ſtarted many Things towards the Emendation of Water-works. He likewiſe made ſome Inſtruments of Reſpiration, and for ſtraining the Breath from fuliginous Vapours, to try whether the ſame Breath, ſo purified, will ſerve again.

He was the firſt Inventor of drawing Pictures by microſcopical Glaſſes. He found out perpetual, at leaſt long lived Lamps, for keeping a perpetual regular Heat, in order to various Uſes, as hatching of Eggs, Inſects, Production of Plants, chymical Preparations, imitating Nature in producing Foſſils and Minerals, keeping the Motion of Watches equal in order to Longitudes and aſtronomical Uſes, and infinite other Advantages.

He was the firſt Author of the noble anatomical Experiment of injecting Liquor into the Veins of Animals; an Experiment now com-

commonly known, but long ſince exhibited to the Meetings at *Oxford*, and thence carried by ſome *Germans* and publiſhed abroad. By this Operation diverſe Creatures were immediately purged, vomited, intoxicated, killed, or revived, according to the Quality of the Liquor injected. Hence aroſe many new Experiments, and chiefly that of transfuſing Blood, which has been proſecuted in ſundry Inſtances that will probably end in extraordinary Succeſs.

This is a ſhort Account of the principal Diſcoveries which Dr. *Wren* preſented, or ſuggeſted to the Royal Society. Some of theſe, it muſt be acknowledged, were before invented, and by him improved: Others ſuggeſted by him, and carried to greater Perfection by the Induſtry of other Hands. We do not purpoſe to rob him, or them, of their due Honour; but ſo far as the Invention or Improvement appears to be his, the Mention of them is a juſt Tribute due to his Memory; which he was ſo far from uſurping the Fame of from other Men, that he often endeavoured to conceal his own Name.

In the Year 1665, he went over to *France*, where he not only ſurveyed all the Buildings of Note, but took particular Notice of what was moſt remarkable in every Branch of Mechanics, and, according to his own Expreſſions in a Letter, greatly enlarged his Knowledge and refined his Taſte in Architecture. Upon his return Home, he was appointed Architect, and one of the Committee for Repair of the Cathedral Church of St. *Paul*. Within a few Days after the Fire of *London*, 1666, he drew a Plan for a new City, and preſented it to the King, who produced it himſelf before his Council and manifeſted much Approbation of it: Which Model was likewiſe laid before the Parliament. This Model of Dr. *Wren*'s was ſo formed, that the chief Streets were to croſs each other at right Angles, with leſſer Streets between them; the Churches, public Buildings, *&c.* ſo diſpoſed, as not to interfere with the Streets, and four Piazza's placed at proper Diſtances. This Plan was engraved from the Author's own Draught by *H. Hulſbergh*, 1724; but though the Parliament, *&c.* did not agree to the Plan he propoſed, Hiſtory acknowledges it reflected a Luſtre on his Character: And, upon the Deceaſe of Sir *John Denham*, 1668, he ſucceeded him in the

the Office of Surveyor General of his Majesty's Works. And the Theatre at *Oxford* will be a lasting Monument of his great Abilities, besides St. *Stephen*'s Church at *Walbroke*, that of St. *Mary le Bow*, and the Cathedral of St. *Paul*, which have more immediately engrossed the Attention of the Public. The Variety of Business in which he was engaged, preventing his constant Attendance, he resigned his *Savilian* Professorship at *Oxford*, *April* 9, 1673, and the Year following he received, from his Majesty King *Charles*, the Honour of Knighthood.

Some Time after, he married the Daughter of Sir *Thomas Cogghill*, by whom he had one Son: She dying soon after, he married a Daughter of the Right Hon. *William*, Lord *Fitz-William*, by whom he had two Children, a Son named *William*, and a Daughter of her Name. —— In the Year 1680, he was chosen President of the *Royal Society*. —— In 1684, he was appointed Architect, and a Commissioner of *Chelsea College*. He sat twice as Representative in Parliament, *viz.* for *Plimpton* in *Devonshire* in 1685, and, in 1700, for *Melcombe Regis* in *Dorsetshire*. He was appointed Surveyor of the Abbey in 1698, and continued that Office 'till *April* 1718; on which Accounts he resided sometimes at *Hampton-Court*, and sometimes at St. *James*'s; but, in removing for his Winter Residence, he is said to have taken a Cold which he never recovered, but died the 25th Day of *February*, 1723, in the 91st Year of his Age. He died, as he lived, with great Calmness and Serenity; his Funeral attended by Persons of the greatest Distinction, and his Corpse deposited in a Vault under the South Wing of the Choir of St. *Paul*, with the following plain Inscription,

Here lieth
Sir CHRISTOPHER WREN, Knight,
The Builder of this Cathedral Church of St. *Paul*,
Who died in the Year of our Lord 1723,
And of his Age XCI.

The LIFE of Dr. ROBERT HOOKE.

DR. *Robert Hooke*, was an eminent Mechanic, Mathematician, Aſtronomer, and Optician, of the laſt Century; and we may very properly introduce the Life of this great Man with a Memorandum found in his Pocket-Diary, dated *April* 10, 1697, in his own Hand, *viz.*

" I began this Day to write the Hiſtory of my own Life, wherein I will attempt to comprize as many remarkable Paſſages as I can now remember, or collect out of ſuch Memorials as I have kept in Writing, or are in the Regiſters of the *Royal Society*, together with all my Inventions, Diſcoveries, Experiments, and Diſcourſes, which I have made from Time to Time, with the Succeſs and good Effect of them, *&c. &c.* according to real Truth and Matter of Fact." And accordingly we find the Time of his Birth, and ſome Circumſtances of his Youth particularly ſpecified. But the further Account of this, and the more important Memoires of his Life and Actions, on account of his Indiſpoſition, were left to the Care of, and ſince publiſhed by Mr. *Richard Waller*, which are prefixed to his Poſthumous Works, from whence we have given the following Abſtract: " Dr. *Robert Hooke* was born at *Freſhwater*, on the Weſt Side of the *Iſle of Wight*, the 18th of *July*, 1635: That being very weak and infirm, he was nurſed at home, and with much Care advanced to the State of Youth, and rendered capable of beginning ſuch an Education as his Father, who was a Clergyman, intended to give him: For his Father, notwithſtanding the Weakneſs of his Conſtitution, found he had a remarkable Genius, a ready Apprehenſion, a ſtrong Memory, and a ſurprizing Invention. After he had learned the *Engliſh*, he was ſoon Maſter of the *Latin* Grammar; but here he ſtopped for ſome Time, from the Interruptions of Illneſs, and his Father declined any Hopes of ſeeing him a Man and a Scholar. His Father now concluded to put him to a Watch-maker, a Limner, or ſome other Mechanical Profeſſion, for which he ſeemed qualified in ſome Meaſure by his natural Genius; but at this Time, when we find he was only 13 Years of Age, his

Father

Father died, *viz.* in *October* 1648." This is the Sum of what he has left under his own Hands. —— This early Propenſity to Mechanics might probably be aſſiduouſly improved by him for ſome ſucceeding Years, but we do not meet with any particular Account of him for an Interval of five or ſix Years, but that he was for ſome Time with Sir *Peter Lelly*, then with Mr. *Buſby* at *Weſtminſter-School*, where he applied himſelf to the *Latin* and *Greek*, in which he ſoon made a conſiderable Proficiency, and at the ſame Time got ſome Inſight into the Knowledge of the *Hebrew*. —— Before he left Dr. *Buſby* he fell ſeriouſly upon the Study of the Mathematics, in which he took the moſt regular Method, firſt making himſelf Maſter of *Euclid*'s Elements, and afterwards ſtudied their Application.

From *Weſtminſter School*, he went to the *Univerſity* of *Oxford* in 1653, and took the Degree of Maſter of Arts about 1660.

About the Year 1655, his Talents became more conſpicuous to the World; there being then a great Concourſe of People of diſtinguiſhed Learning, they took great Notice of his Facility in mechanic Invention, and publickly expreſſed their Approbation of them.

His firſt Invention, which merited, or at leaſt happily met with popular Eſteem, was a Draught of the Air-pump and all its Parts, as it was afterwards publiſhed by Mr. *Boyle*.

The ſame Year, as he himſelf informs us, he contrived and made many Trials about the Art of flying in the Air, and moving very ſwift on the Land and Water; but finding, by Trial, that the Muſcles of a Man's Body were not ſufficient for any Thing of this Kind, *&c.* he dropt the Attempt.

Soon after, upon ſome Acquaintance with Dr. *Ward*, he applied himſelf to the Improvement of the Pendulum, and, in 1656, and 1657, contrived a Way to continue the Motion of the Pendulum, ſo much commended by *Ricciolus* in his *Almageſtum*. —— The Succeſs he met with engaged him farther to think of improving it, for finding the Longitude; and the Method he had before tryed led him to the Uſe of Springs inſtead of Gravity, for the making the Body vibrate in any Poſture. This Attempt he ſeemed well ſatisfied might be improved, to anſwer the Deſign of it: and on this Account he communicated this Invention to diverſe of his Friends, particularly Mr. *Boyle*, and

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craved their Aſſiſtance herein; and a Patent was propoſed to be given him as a Reward, but unaccountably the Affair dropt. ——— However, this Matter produced the Diſcovery of that moſt uſeful and practicable Method of regulating Pocket-watches, by a ſpiral Spring applied to the Arbor of the Ballance, as they are at preſent made without any conſiderable Improvement. ——— About the Year 1656, he produced a Piece of Watch-work of his own Contrivance, to meaſure Time more exactly both at Sea and Land, — but there were ſome Deficiencies; ſo that about this Time many curious Experiments, Obſervations, and Enquiries were made by him, and Inſtruments contrived for that Purpoſe, as particularly the Barometer, of which he ingeniouſly acknowledges the firſt Riſe of the Invention was a Suggeſtion of Sir *Chriſtopher Wren*, in order to find whether the Hypotheſis of *Des Cartes*, for giving the Reaſon of the Tides from the Preſſure of the Moon upon the Air in its Paſſage by the Meridian were true or not.

About the Year 1657, as he informs us, he applied himſelf more particularly to the Study of Aſtronomy, and in 1658 and 1659, he contrived ſeveral aſtronomical Inſtruments for making Obſervations both by Sea and Land; which he afterwards produced before the *Royal Society*. He now contrived the *Circular Pendulum*, and the Uſe of it for continuing the Motion of another Pendulum, which he likewiſe ſhewed to the *Royal Society*, before they were conſtituted by Royal Charter.

In the Year 1660, this illuſtrious Society was founded, and Dr. *Hooke* was introduced into their Service, as Curator. In 1661 a Debate aroſe in the Society about the *Cauſe of the riſing of Water in ſlender glaſs Tubes higher than in larger*. This Diſcourſe was wrote and publiſhed, and Mr. *Hooke*'s Explication of this Phænomenon made him the more regarded. From this Time the Society's Journals gave ſufficient Teſtimonials of his Performance; to which we refer the Curious. Some of them are,

Experiments of breaking glaſs Bubbles inward, with Obſervations thereon, before the Society. ——— Other Experiments to explicate the Nature and Quality of the Air, *viz.* as to its Gravitation, its different Effects when rarified, condenſed and natural, with its Uſe as to the Life of Animals, and maintaining

a lucid Flame, or cauſe the Diſſolution of Bodies by Fire; a live Animal and Lamp being incloſed together in a Receiver, ſhewed the *Pabulum Vitæ*, and *Flamma* to be much the ſame. At which Time he made the Experiment of keeping a Dog alive, his *Thorax* being laid open, by blowing freſh Air into his Lungs;* which plainly ſhews the Uſe of the Air, and Difference between venal and arterial Blood.

He ſhewed what Addition of Weight is given to Fluids by aſcending and deſcending Bodies in them. ——— The different ſpecific Weight of hot and cold Water, with the Uſes to be made thereof. —— Of the Difference of Ice and Water, with the Refraction of other Fluids, by a particular Inſtrument adapted to that Purpoſe, which is deſcribed in his *Preface* to his *Micrography*. ——— Other Experiments and Contrivances, to ſhew the Force and Velocity of Bodies falling from ſeveral Heights, Pendulums of 200 Feet long, the Difference of the Barometer at ſeveral Heights; —— Experiments to improve Land-Carriages; Methods of conveying ſecret and quick Intelligence; ——— Inſtruments to meaſure Time exactly, to the Second of a Minute by the Sun or Stars; ——— to try the Strength of Gun-powder; ——— an Engine for cutting the Teeth of Watch-wheels, an Invention of great Accuracy and now in conſtant Uſe.

About this Time he fixed the Standard for the Thermometer from the Point of Freezing, and contrived a Way for making the Motions of the Barometer more ſenſible.

In *February*, 1663, he contrived a Way to ſupply freſh Air to the *Urinator* under the Diving-bell, by a Chain of Buckets, and a leaden Box for his Head when he went out of the Bell, to be ſupplied with freſh Air from the Bell.

In *July*, 1664, he produced an Experiment to ſhew the Number of Vibrations of an extended String, made in a determinate Time, requiſite to give a certain Tone or Note, by which it was found that a *Wire*, making 272 Vibrations in one Second of Time, ſounded *G Sol Re Ut* in the Scale of all Muſic. Other Experiments were made of the Diviſion of a Monichord.

He likewiſe made ſeveral Experiments of the Velocity of Bodies ſinking and riſing in Water, in order to aſcertain that Contrivance,

* Dr. *Sprat*'s Hiſtory of the *Royal Society*. P. 232.

trivance, which was after made Public, of measuring the Sea's Depth with the Sounding-ball.

At several Meetings of the *Society* in 1664, he produced his microscopical Observations, and read the Explications and Discourses made upon them, which were after published in his *Micrographia*, and greatly admired.

In this Year, Sir *John Cutler* gave a Salary of 50*l. per Ann.* at the Direction of the *Royal Society*, for reading mechanical Lectures. Mr. *Hooke* was accordingly chose, with an additional Salary. These Lectures, and other Collections, were afterwards published.

The generous Ardor of this *Society* continued till the Close of this Year, and some Part of 1665, when, by Reason of a great Mortality, they were obliged to desist their weekly Meetings, till the 14th of *March* 1666.

In this Interim, the Members retired to several Places in the Country: Mr. *Hooke* accompanied Dr. *Wilkins* and some other Gentlemen to *Banstead Downs*, where several Experiments were made during this Recess, an Account of which was brought in to the *Society*.

At their first Meeting in *March*, Mr. *Hooke* produced a very small Quadrant for observing accurately to Minutes and Seconds; it had an Arm moving on it, by Means of a Screw lying on the Limb of the Quadrant.

On *May* 23, Mr. *Hooke* read a Paper, explicating the Inflexion of a direct Motion into a Curve, by a supervening and attractive Principle, which was approved and registered.

August 1, he read his Observations of the Comet in 1664, afterwards published: ——— This produced a Contrivance, to shew that the circular Pendulum was made of two strait Lines crossing each other.

The dreadful Conflagration was now another great Hinderance to the *Society*'s Proceedings, so that they removed to *Gresham*: And on the 9th of *Sept.* 1666, he produced a Model for the rebuilding of the City, which was by many competent Judges highly approved.

October 31, 1666, he shewed his inclining Pendulum, with the Uses thereof, to regulate the Motions of a Clock as exactly as by a long one.

On

On the 9th of *January*, 166$\frac{6}{7}$, he having been ſollicited to proſecute his Obſervations of the Earth's Parallax, formerly by him propoſed, he preſented a large Account of the Reſult of theſe his Obſervations to the *Royal Society*, which were afterwards printed in his Attempt to prove the Motion of the Earth, 1667, being the firſt of his *Cutlerian* Lectures publiſhed.

On the 6th of *February* following, he produced his new Lamp, contrived ſo as to ſupply the Oil as it waſted, in juſt Proportion: The farther Deſcription and Explication of which, with many curious Remarks, were publiſhed in 1667.

On the 17th of *June* (and ſome following Days) 1667, he read to the *Society* ſeveral Diſcourſes of the Cauſes, Powers, and Effects of Earthquakes, affirming, that great Hills and Mountains in the World have been raiſed by them, of which Subject he at ſeveral Times afterwards read many other Diſcourſes and Lectures.

In *July*, 1667, he tried ſeveral Experiments upon himſelf, in an exhauſted Receiver big enough to contain a Man: This was then thought to be the only Experiment of the Kind that had ever been tried.

About the ſame Time, he contrived a new Micrometer, of leſs Charge and Difficulty than that invented by Mr. *Gaſcoigne*, with Screws. —— And the *December* following, he produced ſome farther Improvements of that Inſtrument.

January 16, 1667, he produced his new Contrivance of promoting the Vibration of Pendules, ſo as effectually to prevent all Cheques, which he recommended as a new and great Improvement.

April 9, 1668, he produced two Inſtruments, whereby the Senſe of Hearing might be promoted.

May 14, he exhibited ſome Experiments, to ſhew the Degree of the Penetration of Liquors in Oil of Vitriol and Fair-Water.

In this, and ſome following Months, he read ſome Diſcourſes about the meaſuring a Degree of the Earth; he propoſed diverſe Methods of performing it, and he delivered it as his Opinion, that one of the exacteſt Ways of Meaſuring was by making accurate Obſervations of the Heavens, to a Second, by a perpendicular Tube: And then to take exact Diſtances by Angles, to

a Second alſo, which appears to be the Method obſerved by the *French* not long after: —— We find alſo, that he invented a Sort of travelling Calaſh for that Purpoſe, which ſhould deſcribe, upon Paper, not only the Menſuration of the Way gone over, but the ſeveral Aſcents and Deſcents, together with the Turnings and Windings of the Calaſh, or the Points of the Compaſs upon which the Perſon travelled; with other Contrivances of this Kind, mentioned in his Journal, which we have not the Pleaſure to find were ever publiſhed.

In *January* 7, $16\frac{68}{100}$, he firſt propoſed a Drop of Mercury for an univerſal Standard; and in *April* following ſhewed, an Experiment with a Solution of Copper, to repreſent the Appearance of Clouds and other aerial Meteors, by dropping into it ſeveral Salts, *&c.* —— and, at the ſame Time, ſhewed the Uſe of introducing the Pictures of Objects into a dark Room for Painting, and contrived a Box for that Purpoſe like what is now uſed for taking perſpective Views.

In the Year 1671, ſeveral Diſcourſes and Papers paſſed between the learned Mr. *Newton* and Mr. *Hooke* concerning a new Theory of Light and Colours, which was afterward printed.

About this Time he made a Propoſition for perfecting all Sorts of Optic-glaſſes, the Secret of which was delivered in an Anagram to the Preſident, Lord *Brounker*.

Soon after commenced the Diſpute between him and *Hevelius*, concerning the Preference of plain and teleſcopical Sights for aſtronomical Inſtruments, which appears to have been managed with too much Warmth; which occaſioned many other judicious Gentlemen to enter into the Enquiry, and, in ſome Meaſure, facilitate a greater Harmony, *&c.*

In 1674, Mr. *Hooke* produced an Engine, or Inſtrument, to perform any arithmetical Operation, which met with great Eſteem.

The latter End of the ſame Year, the *Royal Society* kept their weekly Meeting at *Greſham College* again; and on the 15th of *January*, 1674, he ſhewed a Way to determine how ſmall an Angle the unaſſiſted Eye is able to diſcern, by which it was found, that none of the Perſons preſent could ſee a much leſs Angle than that of one Minute.

After

After this Time, a Variety of magnetical Experiments were made by him: He propoſed a Theory of the Variation, which was afterward publiſhed.

On the 4th of *February* following, he read ſeveral Obſervations and Diſcoveries relative to the Structure of the Muſcles in Animals.

March 18, he made an Experiment of a new Property of Light, having before read ſome Diſcourſes on this Subject.

Mr. *Oldenburgh*, the Secretary of the *Royal Society*, dying in the Time of their Receſs, Mr. *Hooke* was deſired to accept the Place, which he did the 25th of *October*, 1677, and the ſame Day produced his new and curious Water-poiſe, an Account of which is publiſhed in the *Philoſophical Tranſactions*, N°. 197.

February 167⅞, on Account of Monſ. *Gallet*'s Obſervations of the oval Figure of *Mercury* in the Sun, he gave ſundry Reaſons for the prolated oval Figure of the Planets: Soon after printed.

He made and preſented many curious Obſervations on Animalculæ in Pepper-water, and other Seeds ſteeped in Water, confirming Monſ. *Lewenhoeck*'s Aſſertions, and propoſed ſome Improvement of Microſcopes.

He likewiſe produced ſome Inſtruments, more accurate than the former, for ſounding the Sea's Depth, and bringing up Water, or other Subſtances from the Bottom.

April 25, 1678, he ſhewed an Experiment, further to explain the Action of a Muſcle, which was, by a Chain of ſmall Bladders faſtened together, ſo as by blowing into one Pipe the whole might be ſucceſſively filled, and by that Means contracted, ſuppoſing the Fibres of the Muſcles, which ſeemed like a Neckace of Pearl in a Microſcope, might be filled with a very agile Matter, which he thought moſt likely to be Air; and likewiſe read ſeveral Diſcourſes, and ſhewed Experiments, in order to confirm his Theory of Springs and ſpringy Bodies. ——— He afterwards produced an Invention, to ſhew the true mathematical Form of all Manner of Arches, for Building, with the true Butment neceſſary to each of them, *&c.*

In *Auguſt*, 1678, his Grace the Duke of *Norfolk*, having given the *Arundelian* Library to the *Royal Society*, Mr. *Hooke* was choſen an Aſſiſtant, or Librarian.

In the Beginning of the Year 1679, ſeveral Experiments were repeated, with ſundry Improvements, to examine into the Uſe of the Air in Reſpiration, by including Animals in common, rarified, and condenſed Air; as likewiſe concerning the Neceſſity of Air to maintain Fire, *&c.* ſome Contrivances were exhibited to explain the different Gravitation of the Air, and to ſhew that Vapours preſs only according to their own Gravity, and not according to the Space they take up in the Atmoſphere. ——— Experiments were alſo made by him, this Year, of the Mixture of Metals, in which there was obſerved a real Penetration, the *Compoſitum* being ſpecifically heavier than either of the Metals before Mixture: And alſo tried ſome Experiments to ſhew whether the Earth moved with a diurnal Motion, or not.

In 1680, he produced a new invented Level; and in *November* he read Obſervations upon the Comet then appearing. ——— He likewiſe ſhewed a Contrivance, by a *Statera*, to examine the attractive Power of the Magnet at ſeveral Diſtances.

In 1681, he read ſeveral Lectures of Light, and luminous Bodies. ——— He likewiſe produced a new Sea-quadrant, for making Obſervations with more Accuracy than could be done by any Inſtrument hitherto known. ——— After this, he demonſtrated a very expeditious Way for drawing the Rhumb-lines exactly true upon a Globe, by an Inſtrument grounded upon the ſame Principle with the other.

In 1682, he ſhewed an Inſtrument to deſcribe all Sorts of *Helices* upon a Cone, whereby to divide any given Length into almoſt any Number of equal given Parts: This he apprehended very uſeful for perfecting aſtronomical and geographical Inſtruments: ——— This he applied to the deſcribing all Variety of Ellipſes. ——— He likewiſe added ſome farther Diſcourſes on Light: —— Another on Memory; and how we come by the Notion of Time.

After this Time he became more reſerved and backward in reading Lectures, or ſhewing Experiments: But at Length was prevailed on to read a few more Lectures, *viz.* on the unequal diurnal Motion of the Earth, ——— gave a Deſcription of ſeveral Ways of making a portable Sea-barometer. —— Other Lectures he read on the Methods of improving ſounding Inſtruments, *&c.*

In

In 1691, he was, by Archbiſhop *Tillotſon*, advanced to the Degree of Doctor in Phyſic. ——— Sometime after, he read a Lecture about the prolated ſpheroidical Figure of the Sun, and other Phænomena thereof: ——— Of the *Maculæ* and *Faculæ*, *&c.* —— of making a Helioſcope by four reflecting Planes in a 24 foot Tube; or a Teleſcope for viewing Planets and fixed Stars, by two Reflexions in a Tube of 40 Feet, with Monſieur *Huygen*'s 120 foot Glaſs, which was much approved.

The laſt Lecture our Author mentions him to read was, *June* 27, 1698, *viz.* upon *Huygen*'s *Coſmotheoros*, and ſhewed a Module of *Saturn* and his Ring.

From this Time he viſibly declined, and his Sight ſo greatly failed him, that he could not read at all: But waiting his approaching End, he died on the 3d of *March*, 1703, aged 67.

As we have given ſo particular an Account of his Experiments, which were moſt conſiderable in themſelves, or brought neareſt to Perfection, moſt of which were publiſhed ſeparately, or together, in his Life-time, almoſt every Year affording ſome new Productions from his Pen, it would be intirely needleſs to enumerate all his Publications: The curious Reader may ſee them particularized in *Ward*'s *Life of the Profeſſors of* Greſham *College*, in N°. 35; beſides his poſthumous Works, and ſeveral Manuſcripts highly eſteemed and preſerved by *William Jones*, Eſq; and others of his Friends, a Variety of his curious Diſcoveries hath been publiſhed, from Time to Time, in the *Philoſophical Tranſactions*.

As to his Perſon, he made but a mean Appearance, being very ſmall and ſomewhat crooked; but he had an active, penetrating, indefatigable Genius, ſparing no Pains in Queſt of the Truth in Relation to whatever came under his Conſideration, of which he made a practical Improvement. In his Life, he always expreſſed a great Veneration for the eternal and immenſe Cauſe of all Beings, as may be ſeen in many Parts of his Writings: For he ſeldom received any remarkable Benefit from God, without thankfully acknowledging the Mercy: And whenever he made any conſiderable Diſcovery in Nature, invented any uſeful Contrivance, or found out any difficult Problem, he did not omit ſetting down, in his Diary, his Acknowledgments to

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omnipotent Wiſdom. The Scriptures he likewiſe ſtudied in the original Language, regarding them as the Rule of his Faith and Practice.

The LIFE *of* JOHN COLLINS.

JOHN COLLINS, an eminent Accomptant and Mathematician, was the Son of a non-conformiſt Divine, was born at *Wood Eaton* near *Oxford*, on the 5th of *March*, 1624; at ſixteen Years of Age he was put Apprentice to a Bookſeller at *Oxford*; but his Genius became ſo remarkable for the Study of mechanical and mathematical Sciences, that he was taken under the Tuition of Mr. *Marr*, a Favourite of King *Charles* I. at that Time Clerk of his Majeſty's Kitchen: But ſoon after ſeparated, by Royal Donation, to his Studies, and drew ſeveral Dials, which were placed at different Parts, and in different Poſitions, in the Royal Gardens: And under him Mr. *Collins* made no ſmall Progreſs in the Mathematics. But the inteſtine Wars and Troubles increaſing, he was obliged to quit that Situation, and then choſe to go Abroad, with Intention to proſecute his favourite Study; and, upon his Return, he took upon him the Profeſſion of an Accomptant, and publiſhed, in the Year 1652, a large Work entitled, *An Introduction to Merchant's Accompts*, which ſhewed no ſmall Talents in that Branch of Literature. This was followed by many other Publications on different Branches of Accompts, —— and in the Year 1658, he publiſhed a Treatiſe called, *The Sector on a Quadrant*, containing the Deſcription and Uſe of four ſeveral Quadrants, each accommodated to the making of Sun-dials, *&c.* to which he afterwards added an Appendix, concerning reflected Dialing, from a Glaſs placed at any Reclination. ——— In 1659, he publiſhed his *Geometrical Dialling*; and the ſame Year he likewiſe publiſhed his *Mariner's plain Scale new plained.* He now became a Fellow of the *Royal Society* in *London*, and explained and demonſtrated to them the Rule, given by the learned Jeſuit *De Billy*,

Billy, for finding the Number of the *Julian* Period for any Year aſſigned, the Cycles of the Sun and Moon, with the *Roman* Indictions for the Years being given. To this he added ſome well contrived Rules, for the ready finding on what Day of the Week any Day of the Month falls, for ever, and other uſeful and neceſſary Calendar Rules, which are publiſhed in the *Philoſophical Tranſactions*, N°. 46, for *April* 1669: And alſo, a curious Diſſertation concerning the Reſolution of Equations in Numbers, in the *Tranſactions*, Number 69, for *March* 1671: And has likewiſe given a moſt elegant Conſtruction of a famous Problem, namely, the Diſtances of three Objects, and the Angles made at a fourth Place in that Plane, by obſerving each Object, being given, to find the Diſtance of thoſe Objects from the Place of Obſervation. ——— But though theſe Studies engroſſed the principal Part of his Attention, he was not ignorant of, nor unconcerned about the commercial Intereſt of *Great-Britain*, and wrote ſeveral Tracts highly acceptable to the Public, *viz.* a Plea for bringing over *Iriſh* Cattle, and keeping out the Fiſh caught by Foreigners: ——— For the Promotion of the *Engliſh* Fiſhery: ——— For the working the Tin-mines: ——— A Diſcourſe of Salt and Fiſhery. ——— But, in 168½, he returns again, as it were, to his former Studies, and wrote a Letter to the learned Dr. *Wallis*, wherein he delivered his Thoughts concerning ſome Defects in Algebra: And it is to him that the World is indebted for the Publication of Dr. *Barrow*'s optical and geometrical Lectures; his Abridgment of *Archimedes*'s Works; of *Apollonius*'s Conics; Mr. *Branker*'s Tranſlation of *Rhomius*'s Algebra, with Dr. *Pell*'s Additions, *&c.* which were procured by his frequent Sollicitations.

His Fame, as an Accomptant, placed him in an honourary Point of View, and occaſioned Application to be made to him in ſeveral difficult and important Affairs. While *Anthony*, Earl of *Shaftſbury*, was Lord Chancellor, he was nominated to ſettle ſome intricate Accompts in a Cauſe depending in Chancery: ——— Aftewards choſen Accomptant to the *Royal Fiſhery* Company: ——— Was appointed to inſpect the Ground for cutting a River between the *Iſis* and the *Avon*; but here, unhappily, he contracted a Diſorder by drinking Cyder, when he was too warm,

which ended in his Death, the 10th of *November* 1683, aged 59.

It was a conſiderable Time after, that his Papers were all delivered into the Hands of the learned and ingenious *William Jones*, Eſq; F. R. S. among which were found Manuſcripts, upon mathematical Subjects, of Mr. *Briggs*, Mr. *Oughtred*, Dr. *Barrow*, Mr. *Iſaac Newton*, and Dr. *Pell*. From a Variety of Letters from theſe, and many other celebrated Mathematicians, it is evident, that Mr. *Collins* ſpared neither Pains nor Coſt to procure what was requiſite to promote real Science: And even many of the late Diſcoveries in phyſical Knowledge owe its Improvement to him; for whilſt he excited ſome to make known every new and uſeful Invention, he employed others to improve them. Sometimes he was peculiarly uſeful, by ſhewing where the Defect was in any uſeful Branch of Science, pointing out the Difficulties attending ſuch Enquiry; and, at other Times, ſetting forth the Advantages, and keeping up a Spirit and warm Deſire for Improvement. Mr. *Collins* was likewiſe the Regiſter of all the new Improvements made in the mathematical Science, the Magazine to which the Curious had frequent Recourſe: It was on this Account that the Learned ſtiled him the *Engliſh Mecænas*.*

The LIFE *of* JOHN PELL.

JOHN PELL, an eminent Mathematician, deſcended from an antient reputable Family in *Lincolnſhire*, his Father was Miniſter at *Southwick* in *Suſſex*, the Place of our Author's

* It is proper the Reader ſhould be informed, that the Quadrants of which Mr. *Collins* wrote the Deſcription were not of his own Invention, but (as he tells us himſelf) were at firſt contrived by his Friend Mr. *Thomas Harvie*, and afterwards perfected by Mr. *Henry Sutton*, who alſo made them; and have been ever ſince called *Sutton's Quadrants*; and which for their remarkable Accuracy, extenſive Uſe, and moderate Price, will ever be preferable to all other Quadrants on Wood.

thor's Birth, *March* 1, $16\frac{10}{11}$. His Father dying when he was young, his Mother took very early Care of his Education, and he was ſent to receive the firſt Rudiments of Grammar Learning to the Free-ſchool at *Steyning*, under the Care of Mr. *John Jefferies*, where he made ſo great Proficience that he was ſent to the Univerſity at *Cambridge*, as properly qualified, at the Age of thirteen; and though he underſtood the *Latin*, *Greek*, and *Hebrew* Languages extremely well, yet he never ſtood at any Election of Scholars, or Fellows of his College. His Perſon was handſome, and his Conſtitution ſtrong; and therefore ſcarce ever uſing Recreations, he proſecuted his Studies with great Vigour. In 1630 he took the Degree of Maſter of Arts, and the Year following he went to finiſh his Studies in the Univerſity of *Oxford*, where he was received with great Eſteem. In 1632 he married *Ilhamaria*, ſecond Daughter of Mr. *Henry Reginolles* of *London*, by whom he had four Sons and four Daughters. Beſides the *Latin*, *Greek*, and *Hebrew*, he had now made himſelf Maſter of the *Arabic*, *Italian*, *French*, *High* and *Low Dutch*. And in *December*, 1643, he went to *Amſterdam*, where he was appointed Profeſſor of the Mathematics, next after *Martin Hortenſius*, and read, with great Applauſe, public Lectures upon *Diophantus*: As his learned Collegue, *Gerrard John Voſſius*, teſtifies in his Book *De Scientiis Mathematicis*, where he ſtiles him, a Perſon of various Erudition, and a moſt accute Mathematician. In 1646, the Prince of *Orange* ſent for him to be Profeſſor of Philoſophy and Mathematics in the *Schola Illuſtris* at *Breda*, founded that Year by his Highneſs. While he lived at *Breda* he had under his Tuition *William*, Lord *Brereton*, who made a great Progreſs in Algebra under our Author. In 1652, Mr. *Pell* returned to *England*, and, in 1654, was ſent by *Cromwell*, then *Lord Protector*, to the Proteſtant Cantons of *Switzerland*, where he chiefly reſided at *Zurich*, with the Title of *Ablegatus*; but afterwards received Orders to continue there as Reſident. *June* 23, 1658, he took his Leave of the Cantons of *Switzerland* in a *Latin* Oration, and returned to *England*, which happened ſoon after the Death of *Cromwell*. However, his Negotiations Abroad gave a general Satisfaction, as it appeared he had done no ſmall Service to the Intereſt of King *Charles* II. and the Church of *England*. *March* 31, 1661, he was ordained

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ed a Deacon, and in *June* following a Prieſt, by Dr. *Robert Sanderſon*, Biſhop of *Lincoln*; and, the ſame Year, preſented by Dr. *Gilbert Sheldon*, Biſhop of *London*, to the Rectory of *Fobbing* in *Eſſex*; and afterward appointed one of his domeſtic Chaplains: And it was expected he would have been promoted to much higher Rank in the Church; but his Improvement in the Study of philoſophical and mathematical Sciences were ſo much the Bent of his Genius, that he did not purſue his private Advantage. The Truth is, he was a ſhiftleſs Man, as to worldly Affairs, and his Tennants and Relations impoſed upon him, and cozened him of the Profits of his Livings, and even kept him ſo indigent that he wanted Neceſſaries: And a little before his Death, he was caſt into the *King's Bench* Priſon for Debt; but was ſoon after releaſed by the Benevolence of ſome who valued his diſtinguiſhing Talents. He was then invited, by Dr. *Whiſtler*, to live in the College of Phyſicians, where he continued for about a Year; and then was obliged, by his ill State of Health, to accept the Invitation of a Grand-child of his, at *Weſtminſter*, but had a happy remove, by Death, *December* 12, 1685, in the 74th Year of his Age, and was interred at the Expence of Dr. *Richard Busby*, Maſter of *Weſtminſter-ſchool*, and *John Sharp*, Rector of St. *Giles's*, in the Vault called the *Rector's*.

The principal Part of his Works were as follow:

I. His *Controverſia, cum Chriſtiano Longomontano de vera Circuli Menſura*, at *Amſterdam*, 1646, 4to.

II. His Idea of Mathematics, *London*, 1651, 12mo.

III. A Table of 10,000 ſquare Numbers, *&c.* with an Appendix concerning the Endings, or laſt Figures of ſquare Numbers, *London*, 1672, Folio.

He likewiſe publiſhed his inaugural Oration at *Breda*. — His Demonſtration of the ſecond and tenth Books of *Euclid*. — His Alterations and Additions to *Rhomius*'s Algebra, in 1688. —— With many others on miſcellaneous Subjects, Letters, *&c.* which are ſome of them preſerved in Manuſcript in the Library of the Lord *Brereton* in *Cheſhire*.

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The LIFE of WILLIAM, *Lord* BROUNKER.

WILLIAM, Lord *BROUNKER*, Lord Viſcount of *Caſtle Lyons*, of the Kingdom of *Ireland*, deſcended from noble Parentage, and was Grandſon of Sir *Henry Brounker*, Preſident of *Munſter*, *&c.* born, *A. D.* 1620; the Strength of whoſe natural Capacity, which very early diſcovered itſelf in an Ability and Propenſity for Learning, added no ſmall Luſter to the Dignity of his Birth, and his Education was ſuitable to both; for, being properly qualified by grammatical Learning, he was ſent over, at the Age of Sixteen, to the Univerſity of *Oxford*, where he made a thorough Proficiency in the Knowledge of many difficult and uſeful Languages, and applied his Studies to ſeveral important Sciences. He firſt entered on the Study of natural Philoſophy, more particularly the Nature of Man, and many metaphyſical Enquiries relative thereto, and applied them to the Subject of Phyſic in general, in which he gave ſuch Proofs of his Skill, that he was created Doctor of Phyſic in that Univerſity, *June* 23, 1646: Nor was his Genius and Studies confined to this Science, mathematical Subjects he always eſteemed as meriting his aſſiduous Enquiries, and therefore applied himſelf to it with ſuch Vigour as to make a prodigious Progreſs therein. And, accordingly, *July* 30, 1662, he was choſen Preſident of the *Royal Society*, which he continued 15 Years. *November* 5, he produced his Solution of Dr. *Goddard*'s third mercurial Experiment: —— The 12th, he moved, that the Experiments concerning the Meaſure of the firſt Velocity of Bodies might be proſecuted, of which his Lordſhip was deſired to be Curator. ——— During his Preſidentſhip he was never backward to the Performance of any Experiments, and as vigilant in making every Improvement upon them as his Penetration and Skill would enable him; but never aſſuming, or forward to controul the Sentiments of others. ——— By his Study he likewiſe acquired a ſingular Knowledge in the municipal Laws of the Nation; for, after the Reſtoration, he was advanced to ſeveral Offices of Honour and Truſt, appointed Chancellor of

his Majeſty's Courts, and Keeper of the Great Seal; and was one of the Lords Commiſſioners for executing the Office of Lord High Admiral, and Maſter of the Hoſpital of St. *Catherine*'s near the *Tower* of *London*: But none of theſe diverted his Studies from the mathematical and philoſophical Sciences. Mr. *Wood* tells us, that he greatly promoted the Intereſt and Reputation of that Society, by his Learning and Experience. He made ſeveral Improvements in the Art of Gunnery, which he illuſtrated by Experiments, particularly of the recoiling of Guns, which were afterwards publiſhed by Dr. *Thomas Sprat*, in his *Hiſtory of the Royal Society*. ——— He wrote ſeveral Letters to Dr. *James Uſher*, Archbiſhop of *Armagh*; and likewiſe maintained a Correſpondence with Dr. *John Wallis* on mathematical Subjects, publiſhed in his *Commercium Epiſtolicum*. He likewiſe wrote a Piece upon the ſquaring the Hyperbola, which was the 1ſt Treatiſe on that Subject, publiſhed in the *Philoſophical Tranſactions*, Number 134. He died at his Houſe in St. *James*'s *Street*, *Weſtminſter*, *April* 5, 1684, aged 64 Years, and was interred on the 14th of the ſame Month, in a Vault in the Choir, belonging to the Hoſpital above-mentioned.

The LIFE of CHRISTIAN HUYGENS.

CHRISTIAN HUYGENS, a very great Mathematician and Aſtronomer, was born at the *Hague* in *Holland*, *April* 14, 1629, and was Son of *Conſtantine Huygens*, Lord of *Zulichem*, who had ſerved three ſucceſſive Princes of *Orange* in the Quality of Secretary. He ſpent the greateſt Part of his Life in cultivating the Mathematics, and not in the ſpeculative Part only, but in making this Science ſubſervent to the Purpoſes of Life: He had made no inconſiderable Progreſs therein even at nine Years of Age, as he had alſo in Muſic, Arithmetic, and Geography; in all which he was, with much Care and Pains, inſtructed by his Father, who, all the while, did not ſuffer him to neglect the *Belles Lettres*. ——— At thirteen Years of Age, he was put upon the Study of Mechanics; for he had diſcovered

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a wonderful Curioſity that Way, in examining Machines, and the like; and, two Years after, had the Aſſiſtance of a Maſter in Mathematics, under whom he made a ſurprizing Progreſs. In the Year 1645, he went to ſtudy *Law* in the Univerſity of *Leyden*, under the learned Civilian *Vinnius*; yet did not attach himſelf ſo cloſely to this Study, but he found Time to continue his mathematical Studies under that famous Profeſſor *Van Schooten*. He left this Univerſity at the End of one Year, and went to *Breda*, where an Univerſity had juſt been founded, and put under the Direction of his Father: And here he made the *Law* his chief Study, for 2 or 3 Years. But in the Year 1651, he gave the World a Specimen of his Genius for Mathematics, by a *Latin* Treatiſe on that Science. ——— After his Return to the *Hague*, in 1649, he went to *Holſtein* in *Denmark*, in the Retinue of *Henry*, Count of *Naſſau*, and was extremely deſirous of going to *Sweden* in order to ſee *Des Cartes*; but the ſhort Stay of the Count in *Denmark* would not permit him. In the Year 1655, he travelled into *France*, and took the Degree of Doctor of *Law* at *Angers*. In 1658, he publiſhed his *Horologium Oſcillatorium* at the *Hague*. — He had exhibited, in a preceding Work, the Model of a new invented Pendulum; but, as ſome Perſons, envious of his Reputation, were labouring to deprive him of the Honour of the Invention, he wrote this Book to explain the Conſtruction of it, and to ſhew, that it was very different from the Pendulum of Aſtronomers, invented by *Galileo*: And as *Galileo* had endeavoured to explain ſome of the ſurprizing Appearances of the Planet *Saturn*, and having obſerved two Stars which attended it, and afterwards amazed to find them diſappear, *Chriſtian Huygens*, being extremely deſirous to account for theſe Changes, laboured with his Brother *Conſtantine* to bring the Teleſcopes to greater Perfection, and made himſelf Glaſſes by which he could view Objects at a greater Diſtance than any that had been yet contrived. With theſe he applied himſelf to obſerve all the Places and Appearances of *Saturn*, and drew a Journal of all the different, and very varying Aſpects of that Planet. He diſcovered a Satellite attending it; for none of the Five were then known: And, after a long Courſe of Obſervation, perceived that the Planet was ſurrounded with a ſolid and permanent Ring, which never changes its Situation.

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These new Discoveries advanced him to great Esteem amongst the Astronomers of his Time.

In the Year 1660, he took a second Journey into *France*, and, the Year after, passed over into *England*, where he communicated his Art of polishing Glasses for Telescopes, and was made *Fellow of the Royal Society*.

About this Time, the Air-pump was invented, which received considerable Improvements from him: ——— This Year also, he discovered the Laws of the Collision of elastic Bodies, as did, afterwards, our own Countrymen and celebrated Mathematicians, *Wallis* and *Wren*, with whom *Huygens* had a Dispute about the Honour of this Discovery. ——— After some Months Stay in *England*, he returned to *France* again, in 1663, where his Merit became so conspicuous, that *Monsieur Colbert* resolved to fix him at *Paris*, by settling a considerable Pension on him: Accordingly, in 1665, Letters were sent to him to the *Hague*, whither he was returned, written in the King's Name, to invite him to *Paris*, with the Promise of a large Stipend, and other considerable Advantages. *Huygens* consented to the Proposal, and retired to *Paris*, from thence, to the Year 1681, he resided there, where he was made a Member of the *Royal Academy of Sciences*: And all this Time was spent in mathematical Pursuits. He wrote several Works which were published from Time to Time, and invented, and perfected several useful Instruments and Machines: But continual Application began then to impair his Health, and though he had gone for the Benefit of his native Air twice, *viz.* in 1670 and 1675, for the same Purpose, he was now obliged to betake himself to it altogether: Accordingly, he left *Paris*, with all the Emoluments of Royal Favour; yet resolved to employ the Remainder of his Life in those arduous and useful Studies, which was continued to him till the 8th of *June*, 1695, when he died in the 67th Year of his Age, while his *Cosmotheoros*, or *Latin* Treatise, concerning a Plurality of Worlds, was printing. However, he provided in his Will for its Publication, and entrusted it to his Brother *Constantine*: But his Engagements at Court were so great, that it retarded the Publication, and he died before it was quite finished, which was in 1698. Mr. *Huygens* had left, by Will, to the University of *Leyden*, his mathematical Writings, and requested Messr. *de Volder* and *Fullenius*,

lenius, the former Profeſſor of Natural Philoſophy and Mathematics at *Leyden*, and the other at *Franeker*, to examine his Works, and publiſh what they ſhould think proper: and this they proſecuted in a conſiderable Degree in a Volume publiſhed, intitled, *Opuſcula Poſthuma quæ Continent Dioptricam, Commentarios de vitris figurandis, Diſſertationem de Corona et Parheliis, Tractatum de motu et de vi centrifuga, Deſcriptionem, Automati Planetarii.* Mr. *Huygens* has alſo written, in *Low-Dutch*, the ſecond of the Tracts it contains, relating to the Art of forming and poliſhing Teleſcope Glaſſes, to which he had greatly applied himſelf: But Dr. *Boerhaave*, Profeſſor of Phyſic at *Leyden*, had taken the Pains to tranſlate it into *Latin*. In the Year 1704, were publiſhed, in Quarto, his *Opera Varia*. This Collection is generally bound in 4 Volumes; the 1ſt contains, his Pieces of Mechanics. The 2d, thoſe relating to Geometry. The 3d, thoſe on Aſtronomy. The 4th, Miſcellaneous Tracts. Mr. *Graveſande* had the Care of this Edition, in which he has inſerted ſeveral Additions to the Pieces contained in it, extracted from Mr. *Huygen*'s Manuſcripts. In the Year 1728, were printed, in two Volumes in Quarto, at *Amſterdam*, his *Opera Reliqua:* which new Collection was publiſhed alſo by Mr. *Graveſande*. The 1ſt Tome contains his Treatiſes of *Light* and *Gravity:* the 2d, his *Opuſcula Poſthuma*; which had been printed in the Year 1703 —— In Juſtice to this illuſtrious Author it muſt be obſerved, that his DIOPTRICS is fraught with the moſt valuable Diſcoveries in the Conſtruction and Theory of optical Inſtruments; and that his *Automaton*, or *Planetarium* is the moſt compleat and artful Invention, as well as the Original of all that have ſince been made: In ſuch curious and uſeful Reſearches was Mr. *Huygens*'s whole Life ſpent: He loved a quiet ſtudious Life, and this, perhaps, had the Aſcendant ſo far as to keep him in a ſingle State, tho' he was chearful in his Temper, an amiable and worthy Man, and all that knew him will do him the Honour, to ſay, that *he was as good as he was great.*

The LIFE of ISAAC BARROW.

ISAAC BARROW, an eminent Mathematician and Divine, deſcended from an antient Family of that Name in *Suffolk:* His Father, Mr. *Thomas Barrow*, was a reputable Citizen in *London:* and his Mother, *Anne*, Daughter of *William Buggin*, of *North-Cray* in *Kent* Eſq; He was born in *London* in *October*, 1630, and, as his Father very early deſigned him for a Scholar, he was placed in the *Charter-Houſe-School* for the firſt 2 or 3 Years: Thence removed to *Felſtead* School in *Eſſex*, where he quickly made ſuch a Progreſs in Learning, that his Maſter appointed him a Tutor to the Lord Viſcount *Fairfax* of *Emely* in *Ireland*, who was then his Scholar, during his Stay at *Felſtead:* he was admitted, *December* 15, 1643, being then fourteen Years of Age, a Penſioner of *Peter-Houſe* in *Cambridge*, under his Uncle Mr. *Iſaac Barrow*, then Fellow of that College: When he was qualified for the Univerſity, he was entered a Penſioner in *Trinity College*, the 5th of *February* 1645; in 1647, he was choſen a Scholar of the Houſe; and tho' he always continued a ſtaunch Royaliſt, yet, by his Merit and prudent Behaviour, he preſerved the Reſpect and Commendation of his Superiors. He applied himſelf, with great Diligence, to the Study of all Parts of Literature, eſpecially Natural Philoſophy; and tho' he was yet but a young Scholar, his Judgment was too great to reſt ſatisfied with the ſhallow and ſuperficial Philoſophy then taught in the Schools: he applied himſelf, therefore, to the reading and conſidering the Writings of the Lord *Verulam*, *Galileo*, *&c.* who ſeemed to offer ſomething more ſolid and ſubſtantial. In 1648, Mr. *Barrow* took the Degree of Bachelor of Arts: The Year following, he was elected Fellow of his College, meerly out of Regard to his Merit; for he had no Friends to recommend him, being of the oppoſite Party: And as he found the Times not favourable to Men of his Opinion in Church and State, he turned his Thoughts to the Profeſſion of Phyſic, and made a conſiderable Progreſs in the Knowledge of Anatomy, Botany, and Chemiſtry: But afterward, upon more mature Deliberation, and with the Advice of his Uncle,

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he applied himſelf to the Study of Divinity, to which he was in ſome Meaſure obliged by his Oath on his Admiſſion to Fellowſhip. But, by reading *Scaliger* on *Euſebius*, he perceived the Dependance of Chronology on Aſtronomy, which put him upon reading *Ptolomy*'s *Almageſt*; and finding that Book and all Aſtronomy to depend on Geometry, he made himſelf Maſter of *Euclid*'s *Elements*, and from thence proceeded to conſult the Writings of many other antient Mathematicians. He likewiſe made a ſhort Eſſay towards acquiring the *Arabic* Language, but made no great Proficiency therein, his Genius and Diſpoſition for Poetry diverting him from thoſe ſeveral Speculations. In 1652, he commenced Maſter of Arts, and on the 12th of *June*, in the following Year, was incorporated into that Degree at *Oxford*: And when Dr. *Duport* reſigned the Chair of *Greek* Profeſſor, he recommended his Pupil, Mr. *Barrow*, to ſucced him: who juſtified his Tutor's Opinion of him by an excellent Performance of the *Probation Exerciſe*: But being looked upon to favour *Arminianiſm*, another was preferred; which Diſappointment, as it aroſe from that Source, helped to determine him in his Reſolution of travelling Abroad: Accordingly, in the Year 1655, he went into *France*, leaving behind him moſt of his Books.

The ſame Year, after his Stay in *France* a few Months, and tranſmitting ſome Obſervations he had made to his Friends, he went into *Italy*, and ſtayed ſome Time at *Florence*, where he had the Advantage of peruſing ſeveral Books in the great Duke's Library, and of converſing with Mr. *Filton*, his Librarian. He then purpoſed to viſit *Rome*, but, the Plague then raging in that City, he took Ship at *Leghorn*, *November* 6, 1656, for *Smyrna*: In this Voyage, they were attacked by a Corſair of *Algiers*, who, perceiving the ſtout Defence the Ship made, ſheered off and left them. And upon this Occaſion, Mr. *Barrow* gave a remarkable Inſtance of his natural Courage and Intrepidity. At *Smyrna* he was moſt heartily received by the *Britiſh Conſul*, Mr. *Bretton*, upon whoſe Death he wrote an Elegy to the *Engliſh* Factory. From thence he proceeded to *Conſtantinople*, where he met with a friendly Reception from Sir *Thomas Brandiſh*, the *Engliſh* Ambaſſador. This Voyage from *Leghorn* to *Conſtantinople* he has deſcribed in a *Latin* Poem. At *Conſtantinople* he read over the Works of St. *Chryſoſtom*, once Biſhop of that See, whom he

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preferred to all the other Fathers. Having ſtayed in *Turkey* about a Year, he returned from thence to *Venice*, from whence he came home in 1659, thro' *Germany* and *Holland*, and has left a Deſcription of ſome Parts of thoſe Countries in his Poems. Soon after Mr. *Barrow* returned to *England*, he was epiſcopally ordained by Biſhop *Brownrig*, notwithſtanding the unſettled State of the Times, and the declining Condition of the Church of *England*. Upon King *Charles* the ſecond's Reſtoration, his Friends expected he would have been immediately preferred, on Account of his having ſuffered, and deſerved ſo much; but it came to nothing, which made him wittingly ſay,

Thy Reſtoration, Royal Charles, *I ſee,*
By none more wiſh'd, by none leſs felt, than me.

However, he wrote an Ode upon that Occaſion, in which he introduces *Britannia* congratulating the King upon his Return. In 1660, he was choſen *Greek* Profeſſor of the Univerſity of *Cambridge*: His Oration, ſpoken upon that Occaſion, is preſerved among his *Opuſcula*. When he entered upon this Province, he deſigned to have read upon the *Tragedies* of *Sophocles*, but, altering his Intention, he made Choice of *Ariſtotle*'s *Rhetoric*. The Year following, which was 1661, he took the Degree of Bachelor in Divinity: and in *July* 1662, he was elected Profeſſor of Geometry in *Greſham College*: in this Station, he not only diſcharged his own Duty, but ſupplied likewiſe the Abſence of Dr. *Pope*, the Aſtronomy Profeſſor. Among his Lectures, ſome were upon the Projection of the Sphere, which are loſt; but his *Latin* Oration, previous to his Lectures, is ſtill extant. The ſame Year, he wrote an *Epithalamium* on the Marriage of K. *Charles* and Q. *Catherine*, in *Greek* Verſe. About this Time Mr. *Barrow* was offered a good Living; but the Condition annexed, of teaching the Patron's Son, made him refuſe it, as thinking it too like a ſimonical Contract. Upon the 20th of *May*, 1663, he was elected Fellow of the *Royal Society*. In the ſame Year, Mr. *Lucas* having founded a Mathematical Lecture at *Cambridge*, Mr. *Barrow* was ſo powerfully recommended by Dr. *Wilkins* to that Gentleman's Executors, that he was appointed the firſt Profeſſor; and, the better to ſecure the End of ſo noble

ble and uſeful a Foundation, he took Care that himſelf and his Succeſſors ſhould be obliged to leave, yearly, to the Univerſity, ten written Lectures. We have ſtill extant, his *Prefatory Oration*, ſpoken in the public mathematical School, *March* 14, 1664: But tho' his two Profeſſorſhips were not Inconſiſtent, he choſe to reſign that of *Greſham College*, which he accordingly did *May* 20, 1664. He had likewiſe been invited to take Charge of the *Cottonian* Library; but, after ſome Conſideration, he declined it, and reſolved to ſettle in the Univerſity. In 1669, he alſo reſigned the mathematical Chair to his very worthy Friend and learned Succeſſor Mr. *Iſaac Newton*, being determined to quit the Study of the Mathematics for that of Divinity. He was Fellow of *Trinity College* when he was collated by his Uncle the Biſhop of St. *Aſaph*, to a ſmall *Sine Cure* in *Wales*; and by Dr. *Seth Ward* to a Prebend in that Cathedral; the Profits of both which he applied to charitable Uſes, and afterward reſigned, when he became Maſter of his College. This Year, 1670, he was created Doctor in Divinity, by Mandate. In 1672, Dr. *Pearſon*, Maſter of *Trinity College*, on the Death of Biſhop *Wilkins*, being tranſlated to the Biſhopric of *Cheſter*, Dr. *Barrow* was appointed to ſucceed him, by the King's Patent, 1673: And his Majeſty was pleaſed to ſay, upon that Occaſion, he had given it to the beſt Scholar in *England*. He gave the higheſt Satisfaction to that Society, whoſe Intereſt he conſtantly and carefully conſulted. In 1675, he was choſen Vice-chancellor of the Univerſity: In the mean Time, he abated nothing of his Studies in order to increaſe his Stock of Sermons, and to finiſh his Treatiſe of the Pope's Supremacy: He underſtood Popery well, as militant in *England*, triumphant in *Italy*, diſguiſed in *France*, and would have been forwardeſt in ſuppreſſing the Progreſs of it: But this great and learned Divine and Mathematician died of a Fever the 4th of *May*, 1677, and was buried in *Weſtminſter-abbey*, where a Monument was erected to him by a Subſcription of his Friends; his Epitaph was written in *Latin*, by his dear Friend Dr. *Mapletoft*. In *Engliſh* thus:

" *Iſaac Barrow*, Doctor in Divinity, and Chaplain in Ordi-
" nary to King *Charles* II. a God-like and truly good Man;
" if Piety, Probity, Fidelity, the moſt extenſive Learning, and
" no leſs Modeſty, together with moſt holy and ſweet Manners

" can confer that Title. He was Profeſſor of Geometry in " *Greſham College*, *London*, and of the *Greek* Tongue and " Mathematics at *Cambridge*; an Ornament to all his Chairs, " to the Church, and to the Nation, he added Luſtre to *Tri-* " *nity College*, as Maſter, and improved it by laying the Foun- " dation of a truly Royal Library: Riches, Honours, and what- " ever Men eagerly purſue, he did not deſpiſe, but neglect, as " being born to greater and more noble Views: To glorify God " was his principal Aim, and to imitate him by doing Good to " all Men, even Poſterity witneſſeth: To whom, being dead, " he yet preacheth. The reſt, and even greater Things than " theſe may be found in his Writings. Go, Reader, and " imitate him. He died the 4th of *May*, 1677, in the 47th " Year of his Age." ——— Many others have attempted to do Juſtice to his Conduct and Behaviour, as the moſt Amiable imaginable, always ready to communicate Knowlege; as free and open in his Converſation, in which he generally ſpoke to the Importance, as well as Truth of any Queſtion propoſed; facetious in his Talk upon fit Occaſions, and ſkillful to accommodate his Diſcourſe to different Capacities; indefatigable in various Studies; of clear Judgment on all Arguments, and ſteady Virtue under all Difficulties; of a calm Temper in factious Times, and of large Charity in midling Circumſtances; eaſy and contented in his Station, and, with the ſame Decency and Moderation, maintained his Character under the Temptations of Proſperity: In ſhort, he was the greateſt Scholar of his Time; and he was highly eſteemed, as having ſhewn a Compaſs of Invention equal, if not ſuperior to any of the Moderns, Sir *Iſaac Newton* only excepted. ——— His Works were principally,

I. *Euclidis Elementa. Cantab.* publiſhed in *October* 1655.

II. *Euclidis Data. Cantab.* in *October* 1657.

III. *Lectiones Opticæ* XVIII, 1669, 4to.

IV. *Lectiones Geometricæ* XIII, *Lond.* 1670, 4to

V. *Archimedis Opera*, *Appollonii Conicorum Libri* IV. *Theodoſii Sphericorum Lib.* III. *nova Methodo Illuſtrata, et Succincte Demonſtrata. Lond.* 1675, which were publiſhed in his Life-time: Beſides three other Volumes on mathematical and aſtronomical Subjects, in *Latin*, which were publiſhed after his Deceaſe.

All

All his Works, which he wrote in *Engliſh*, were publiſhed in three Volumes Folio, by Dr. *John Tillotſon*, *Lond.* 1683.

Dr. *Barrow* has left alſo many other curious Papers, on mathematical Subjects, written in his own Hand, which were communicated by Mr. *Jones*, to Mr. *Ward*, the Author of the *Lives of the Greſham Profeſſors*: Where the Reader may ſee a more particular Detail of his Works.

The LIFE of JOHN BAPTISTE DU HAMEL.

JOHN BAPTISTE DU HAMEL, was an eminent *French* Mathematician and Divine, deſcended from a reputable Family in lower *Normandy*. Hiſtorians have only mentioned that he was born in the Year 1624. He paſſed through his firſt Studies at *Caen*, and his Courſe of Rhetoric and Philoſophy at *Paris*, and gave the greateſt Proof of an uncommon Genius in his early Years. ——— At the Age of eighteen Years, he had made a ſurprizing Progreſs in the Knowledge of aſtronomical and mathematical Sciences, when he publiſhed his firſt Production, in which he explained, in a very eaſy and intelligible Manner, *Theodoſius*'s three Books upon Spherics, illuſtrated by 2 or 3 ſimple Figures: To which he added, a Treatiſe of Trigonometry, extremely ſhort, yet perſpicuous, and deſigned it as an Introduction to Aſtronomy. In one of his latter Works he mentions this Book, as an Inſtance of his Vanity in his younger Years: But, as *Fontenelle* remarks, there are few Perſons of that Age capable of given ſuch an Inſtance of Vanity. At nineteen Years of Age, he entered himſelf into the Congregation of the Oratory, where he continued ten Years, and left it in order to be Curate of *Neuilli* upon the *Marne*: He nevertheleſs applied himſelf intenſely to Study, and diſtinguiſhed himſelf greatly by publiſhing Works upon Aſtronomy and Philoſophy. In 1666, *Monſieur* propoſed to *Lewis* XIV. a Scheme for eſtabliſhing a Royal Academy of Sciences, which his Majeſty

jesty approved of, and appointed our Author Secretary of it.—— In 1668, he attended *Monsieur Colbert de Croissy*, Plenipotentiary for the Peace of *Aix la Chapelle*, and, upon the Conclusion of it, accompanied him in his Embassy to *England*, where he formed an Acquaintance with the most eminent Persons in this Nation in these Sciences, particularly *Boyle*, *Ray*, *Willis*, *&c. &c.* From hence he went over to *Holland* in order to enlarge his Acquaintance, and advance himself in these Sciences. In this Tour, he acknowledges to have made many useful Observations, and to have laid a Foundation for improving his future Studies. —— In 1678, his *Philosophia Vetus & Nova, ad usum Scholæ accommodata in regia Burgundia Pertractata*, was printed at *Paris*, containing a judicious Collection of the antient and modern Opinions in Philosophy, *&c.* His Works in this Way now became very numerous, which were collected and printed at *Nuremburg* in 1681, under the Title of *Opera Philosophica et Astronomica*, and were highly valued at that Time. He afterwards published an Account of the Foundation of the Royal Academy of Sciences, and its Transactions, from 1666 to 1700, and is now the most esteemed of any of his Works relating to Philosophy. —— He likewise published many Pieces on theological Subjects: The last and most approved was printed at *Paris* in 1706, in Folio, intitled, *Biblia Sacra Vulgatæ Editionis*, *&c.*

He died at *Paris* on the 6th of *August*, 1706, through the Decline of Age, being almost 83 Years old. He had quitted his Cure at *Neuille* in 1663, yet he went every Year to visit his old Flock, and the Day he spent there was spent as an *Holy Day* by the whole Village. He was highly esteemed by the most eminent Prelates of *France*, though he enjoyed but very small Preferments. He was *Regius* Professor of Philosophy, in which he was succeeded by *Monsieur Varignon*. He was a Man of great Modesty, Affability, Piety, and Integrity: He was averse to all Contests, and exempt from Jealousy and Affectation. His Knowledge in the *Latin* Tongue was superior to most, in which Language he principally wrote his Lucubrations with great Purity and Elegance: So that his Character is venerated by the Lovers of Science and Literature.

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The LIFE of JAMES GREGORY.

JAMES GREGORY, an eminent Mathematician, was born at *Aberdeen* in 1639, and, being educated in that Univerſity, made great Proficiency in claſſical Learning, but took the greateſt Pleaſure in philoſophical Reſearches, and, for that Reaſon, he made the Writings of *Kepler*, *Deſcartes*, and other Authors, (who had diſtinguiſhed themſelves by their mathematical Works) his principal Study, and began early to make Improvements upon their Diſcoveries in Optics. ——— The firſt of theſe Improvements was, the Invention of the Reflecting Teleſcope, which ſtill bears his Name, and, which was ſo happy a Thought, that it has given Occaſion to the moſt conſiderable Improvements made in Optics ſince the Invention of the Teleſcope. ——— He publiſhed the Conſtruction of this Inſtrument in 1663, at the Age of 24, and coming next Year to *London*, he became acquainted with Mr. *Collins*, and endeavoured to perfect his Scheme by proper Glaſſes; but, as he could not ſucceed for want of a proper Artiſt to grind a plate of Metal for the Object Speculum into a true parabolic Concave, which the Deſign required, he was much diſcouraged thereby, that he ſuſpended his Deſign 'till he had proſecuted his intended Tour of *Italy*, which was then eſteemed the Mart of mathematical Learning. ——— He had not been long abroad, when the ſame inventive Genius, which had before ſhewed itſelf in practical Mathematics, carried him to ſome new Improvements in the ſpeculative Part. ——— The ſublime Geometry on the Doctrine of Curves, and the Doctrine of ſquaring the Circle, were but in its infant State, when our Author diſcovered a new analytical Method of ſumming up an infinite converging Series, whereby the Area of the Hyperbola, as well as the Circle, may be computed to any Degree of Exactneſs. He was then at *Padua*, and getting a few Copies of his Invention printed there, in 1667, he ſent one to his Friend Mr. *Collins*, who communicated it to the *Royal Society*, where it met with the Commendation of Lord *Brouncker* and Dr. *Wallis*. Our Author reprinted it at *Venice*, and publiſhed it in the Year 1668,

together with another Piece, wherein he firſt of any one entertained the Public with a Method for the Transformation of Curves: An Account of this Piece was alſo read by Mr. *Collins* before the *Royal Society*, of which Mr. *Gregory*, on his Return, was choſen a Member, *Jan.* 14th. He then communicated an Account of the Controverſy he had had in *Italy* about the Motion of the Earth, which was denied by the moſt celebrated Aſtronomers in that Country. ——— The ſame Year his Quadrature of the Circle being attacked by the celebrated Mr. *Huygens*, a pretty warm Controverſy aroſe: Mr. *Gregory*'s Defence was publiſhed in the *Philoſophical Tranſactions*, N°. XLIV. for *Feb.* 1669. ——— This Controverſy (as too often happens) was managed with too great Warmth, which might probably terminate the ſooner, and afford leſs Satisfaction to the Readers.

It likewiſe happened about this time, that Mr. *Gregory* received a Letter from Mr. *Collins*, of the Series invented by Sir *Iſaac Newton*, who, therein, had accurately effected that which our Author was ſtiffly contending againſt Mr. *Huygens* to be utterly impoſſible: that is, the *Ratio* of the Diameter of a Circle to the Circumference expreſſed in a Series of ſimple Terms independent of each other, and entirely freed from the magic Vinculum of Surds, in which they had, 'till then, been indiſſolubly held.

But tho' our Author had not the better in this Diſpute, he was, on many Accounts, in high Eſteem with the *Royal Academy* at *Paris*: that, in the Beginning of the Year 1671, it was reſolved by that Academy to recommend him to their Grand Monarch, for a Penſion; and the Deſign was approved even by Mr. *Huygens*, his Antagoniſt, and a Petition was preſented, but without Succeſs.

In 1672, Sir *Iſaac Newton*, from his wonderful Diſcoveries in the Nature of Light, having contrived a new reflecting Teleſcope, and made ſeveral Objections to Mr. *Gregory*'s, this gave Birth to a Diſpute between thoſe two great Philoſophers, which was carried on this, and the following Year, in the moſt amicable Manner on each Side: Mr. *Gregory* defending his own Conſtruction ſo far, as to give his Antagoniſt the whole Honour of having made the catoptric Teleſcopes preferable to the Dioptric, on Account of his having diſcovered, that the Imperfections

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in these Instruments were not so much owing to a Defect in the Object Speculum, as to the different Refrangibility of the Rays of Light. —— In the Course of this Dispute, our Author described a burning Concave Mirrour, which was approved by Sir *Isaac*, and is still in good Esteem. — All this while he attended the proper Business of his Professorship with great Diligence, which led him to farther Improvements in the Invention of infinite Series, which he occasionally communicated to his intimate Friend and Correspondent Mr. *Collins*, who might have had the Pleasure of receiving many more, had not our Professor's Life been cut short by a Fever, in *Dec.* 1675, at the Age of 36 Years.

He possessed one, and that the most distinguishing as well as the most amiable *Quality*, or Disposition, in the Character of a true Philosopher: He was content with his Fortune in his Professorship, very moderate, and without any anxious Ambition for more; resolved to make that agreeable, by giving a Relish to such Enjoyments as were within his Reach: A pleasant Instance of which we have in a small Treatise, published by him, in 1672, entitled, *The great Art of weighing Vanity.*

But the most shining Part of Mr. *Gregory*'s Character is, that of his mathematical Genius as an Inventor; in this View, particularly, he merits a place in these Memoirs: For, besides those Inventions we have already mentioned, he was the first of any who gave a geometrical Demonstration of Lord *Brouncker*'s Series for squaring the Hyperbola, as it had been explained by *Mercator* in his *Logarithmotechnia.* He was likewise the first who demonstrated the meridian Line to be analagous to a Scale of Logarithmic Tangents of the half Compliment of Latitude; of great Use in Navigation. —— He also invented, and demonstrated geometrically, by the Help of the Hyperbola, a very swift converging Series for making the Logarithms: and therefore recommended by Dr. *Halley* as very proper for Practice. —— He also sent to Mr. *Collins* the Solution of the famous *Keplerian* Problem by an infinite Series. —— He found out a Method of drawing Tangents to Curves geometrically, without any previous Calculations. —— He gave a Rule for the direct and inverse Method of Tangents, which stand upon the same Principle (of Exhaustions) with that of Fluxions, and differs not much from it in the Manner of Application.

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——He likewiſe gave a Series for the Length of the Arc of a Circle from the Tangent; and *Vice Verſa*. Theſe, with others for certifying or meaſuring the Length of the elliptic and hyperbolic Curves, were ſent to Mr. *Callins*, in Return for ſome received from him of Sir *Iſaac Newton*'s; and their Elegancy being admirable, and above whatever he had produced before, and after the Manner of Sir *Iſaac Newton*, plainly indicated he had improved himſelf greatly by that Maſter, whoſe Example he followed in delivering his Series in ſimple Terms, independent on each other. We are aſſured, that, at his Death, he was preparing a general Method of Quadrature, by infinite Series, like that of Sir *Iſaac*. This appeared by his Papers, which came into the Hands of his Nephew, Dr. *David Gregory*, who publiſhed ſeveral of them: And he himſelf aſſured Mr. *Collins*, he had found out the Method of making Sir *Iſaac*'s Series. This being the Study he followed with the greateſt Application, he enjoyed the Pleaſure of ſeeing the Propriety and Excellency of what had been firſt inveſtigated, and diſcovered by others, and of making ſome farther Progreſs on the Strength of his own Genius.

The following are the principal Works publiſhed by Mr. *Gregory*, which contain the chief of his Inventions.

1. *Optica Promota*, which includes the Conſtruction of his Teleſcope. And beſides the principal Problems in Optics contained in 59 Propoſitions, he added an Appendix of 30 others on the Theory and moſt uſeful Parts of practical Aſtronomy. Printed in 1683, in 4to.

2. His *Vera circuli, & Hyperbolæ Quadratura:* Containing, his Method of transforming Curves. Printed at *Padua* in 1667, 4to. of which a more correct Copy was printed the Year following.

The reſt of his Inventions make the Subject of ſeveral Letters and Papers, printed either in the *Philoſophical Tranſactions:* The *Commerc. Epiſtoli Joh. Collins & Alior*, 1715, 8vo. and in the Appendix to the *Engliſh* Edition of Dr. *David Gregory*'s *Elements of Optics*, 1735, 8vo. by Dr. *Deſaguliers*.

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The LIFE of JAMES OZANAM.

JAMES OZANAM, an eminent Mathematician, was born in the *Sovereignty* of *Dombes* in *France*, in 1640; his Father was in affluent Circumſtances, poſſeſſed of Fortune ſufficent to encourage the Genius, and promote the Happineſs of his Children: He was of *Jewiſh* Extraction, but embraced the Chriſtian Religion, from Conviction, and was likewiſe diſtinguiſhed by ſeveral Offices, which he held in the Parliaments of *Provence*. Our Author was the youngeſt Son, and, by the Laws of that Country, the principal Part of the Eſtate devolved to the Eldeſt: But this proved an Incitement to the Father, to beſtow on him a liberal Education: His View was, indeed, to qualify him for ſome dignified Station in the Church, that he might enjoy ſome Advantages from his great Intereſt: But when our Author had made a conſiderable Proficiency in Learning, he found no Diſpoſition for the Eccleſiaſtical State; and ſome mathematical Books opportunely falling into his Hands, he was ſo inſpired with a Love of that Science, that, though he had no Maſter to inſtruct him, he made conſiderable Progreſs in that Study, and wrote a Piece in Mathematics before he advanced to the Age of twenty Years. He nevertheleſs continued the Study of Divinity, in Obedience to his Father's Inclination, for about four Years; but upon his Father's Deceaſe, he intirely quitted that Science, and betook himſelf wholly to the Mathematics. He afterwards went to *Lyons*, where he taught the ſeveral Branches of that Science, with great Applauſe, but to no great Advantage: He acknowledged, that about this Time he was ſeduced to an unreaſonable Paſſion for Gaming, which however did not proceed from avaricious Principles; for, upon many Occaſions, he was remarkable for Generoſity of Temper, which very remarkably turned to his Advantage in the following peculiar Inſtance: Two Foreigners, to whom he taught Mathematics at *Lyons*, having expreſſed ſome Uneaſineſs at being diſappointed of ſome Bills of Exchange, in order to go to *Paris*, he aſked them, what Money they wanted? And being told fifty Piſtoles,

he lent them the Sum immediately, without accepting a Note. Theſe Foreigners, when they came to *Paris*, gave an Account of this to Monſ. *Dagueſſeau*, Father of the Chancellor. That Magiſtrate, being touched with a Senſe of ſo generous an Action, engaged them to ſend for Mr. *Ozanam* to *Paris*, with a Promiſe that he would aſſiſt him to the utmoſt of his Power: He was thereupon invited, and prevailed on to accept it; and he ſoon after undertook the Journey, in which ſome Incidents occurred no leſs favourable to him than entertaining: For upon the Road to *Paris*, it is ſaid, he accidentally met with a Gentleman who diſcovered this favourite Paſſion, and then remonſtrated on the Unſuitableneſs of it to a Perſon of his Character, and, withal, aſſured him of the Advantages he might reaſonably hope to enjoy, if he would entirely lay aſide the Practice: He aſſured him that, as he was then going to *Paris*, accompliſhed as he was, he might ſoon raiſe his Reputation and his Fortune, and marry, at 35 Years of Age, honourably and happily, if he would renounce Gaming, which, with ſome other Particulars, were verified in the Event. ——— He was ſcarce arrived at *Paris*, where he was received with great Marks of Eſteem, when his Mother, falling ſick, ſent for him to come to ſee her: Upon which he haſtened, but ſhe died before an Interview, and his eldeſt Brother had taken Care to ſecure to himſelf all the Eſtate and Effects. Our Author returned therefore to *Paris*, breaking off a Correſpondence with his Family, from whom he enjoyed nothing but a Name. However, the Gentleman's Advice had made no ſmall Impreſſion on him, and he abandoned his Inclination for Gaming, and devoted himſelf entirely to the Mathematics. ——— He was young, handſome, and ſprightly; and this expoſed him to ſome Affairs of Gallantry; and it appears, that his Virtue was under no ſmall Temptation and Trial by a Perſon who reſided near him: But, with a manly Reſolution, he guarded againſt the Snare, and accordingly he reſolved to marry a Lady, who had inſpired him with a Paſſion for her by her good Nature, Modeſty, and Virtue; and he was not deceived in theſe Appearances, for he married her, had twelve Children by her, moſt of whom died young: He continued afterward to reſide at *Paris*, and taught the ſeveral Branches of

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the Mathematics, which produced a conſiderable Income, was highly eſteemed by Perſons of Character and Literature, and enjoyed perhaps an uncommon Degree of domeſtic Happineſs: But, ſubject to the Viciſſitudes of Life, in the Year 1701, and at the Age of 61, he loſt his Wife, and with her all his darling Satisfaction, and this reduced him to a very melancholy State. At this Time, in regard to his Merit, and probably to divert his melancholy, he was choſen in Quality of *Eleve* to the *Royal Academy of Sciences*, and was ſolicited to take under his Care and Tuition, two young Noblemen of the firſt Rank; but this latter he refuſed, from the ſtrong Apprehenſions he had of dying ſoon, though he was not then ill: And it is ſaid, he languiſhed till he died without any Sickneſs, *April* 3, 1717, in the 77th Year of his Age, after having devoted his Life, the Prime or principal Part thereof, to the Study of thoſe Sciences, in which the great Improvements he made, and his ſucceſsful and extenſive Propagation of that Knowledge, is abundantly evident from his Works. —— He knew too much of Aſtronomy to give into judicial Aſtrology, which ſome of his Cotemporaries were extremely fond of, and which he exploded on all proper Occaſions. He was of a chearful Temper amidſt his greateſt Diſtreſſes, of a generous Diſpoſition, great Simplicity of Manners, irreproachable in his Conduct to others, and of ſtrict exemplary Devotion; but he never aſſumed to know more of Religion than other People. ——— He uſed to ſay, "that it was the Buſineſs of "the Doctors of the *Sorbonne* to diſpute, of the Pope to de-"cide, and of a Mathematician to go to Heaven in a ſtrait "Line."

His Writings are as follow:

I. A Treatiſe of practical Geometry.

II. A Canon of natural and logarithmic Sines, Tangents, and Secants.

III. A Treatiſe of Lines of the firſt Order, the Conſtruction of Equations, *&c.*

IV. The Uſe of the Compaſſes of Proportion explained and demonſtrated.

V. An univerſal Inſtrument for readily reſolving geometrical Problems without Calculation.

VI. A

VI. A mathematical Dictionary.

VII. A general Method for drawing Maps and Charts, upon all Sorts of Planes.

VIII. A Courſe of the Mathematics, in 5 Vol. Octavo.

IX. A Treatiſe of antient and modern Fortification.

X. Mathematical and philoſophical Recreations, in 4 Vol. Octavo.

XI. A new Treatiſe of Trigonometry.

XII. An eaſy Method for meaſuring all Sorts of Superficies, *&c.* for the Uſe of Mechanics.

XIII. New Elements of Algebra, Octavo.

XIV. *Euclid*'s Elements, by *P. De Chales*, corrected and enlarged.

XV. *Boulanger*'s practical Geometry enlarged.

XVI. *Boulanger*'s Treatiſe of the Sphere, corrected and enlarged.

XVII. The Theory and Practice of Perſpective.

XVIII. A Treatiſe of Coſmography and Geometry: Beſides ſeveral Tracts publiſhed in the *Journal des Scavans*, and in the *Memoirs des Trevoux*.

The LIFE *of* PHILIP DE LA HIRE.

PHILIP *de la* HIRE, an eminent *French* Mathematician and Aſtronomer, was born at *Paris* on the 18th of *March*, 1640: His Father, *Laurence de la Hire*, who was Painter in Ordinary to the King, and Profeſſor in the Academy of Painting and Sculpture, intended him for the ſame Profeſſion; and with that View had him inſtructed in the Principles of Deſign, and ſuch Branches of Mathematics, as related thereto, but died when *Philip* was no more than ſeventeen Years of Age. Our Author, ſoon after falling under an Indiſpoſition of Body, projected a Journey into *Italy*, both for the Recovery of his Health and for his Improvement in Arts and Sciences; and he was not deceived in his Expectations, for he acquired both a

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Knowledge of thoſe curious Antiquities with which *Italy* every where abounds, and yet made great Proficiency in the Science of Geometry, which he even preferred to Painting, to which he devoted himſelf with great Aſſiduity: And after about four Years Abſence, on his Mother's Importunity, he returned again to *Paris*, where he renewed his mathematical Studies with the utmoſt Intenſeneſs, and publiſhed ſeveral Works, which gained him ſuch high Reputation, that he was made a Member of the *Academy of Sciences*. In 1678, Monſieur *Colbert* having formed a Deſign of procuring a better Chart, or Map of the Kingdom, than any which had hitherto been taken, Monſieur *de la Hire* was nominated, with Monſieur *Picard*, to make the neceſſary Obſervations for that Purpoſe. He went to *Bretagne* in 1679, to *Guyenne* in 1680, to *Calais* and *Denmark* in 1681, and to *Provence* in 1682: Yet, in theſe Preregrinations, did not confine his Attention to the main Object of them; but philoſophiſed upon every Thing that occurred, and particularly made Obſervations on the Variations of the magnetic Needle; —— upon Refractions; —— and upon the Height of Mountains as determined by the Barometer.

In 1683, he was employed in continuing the famous Meridian Line, which Monſieur *Picard* had began in 1669: Our Author continued it to the North Boundary of *Paris*, while Mr. *Caſſini* continued it to the South: But that great Miniſter, *Colbert*, dying, the Work was not fully compleated.

He was then employed in taking the neceſſary Surveys, for thoſe grand Levels which *Lewis* XIV. had projected, which was ſoon after executed.

Geometry, however, did not engroſs all his Time and Labour; he bent his Studies to various other Branches of Philoſophy and the Mathematics; and even Painting itſelf, which ſeemed for a conſiderable Time laid aſide, found a Place in thoſe Hours he ſet apart for Amuſement.

About the Year 1690, he was choſen a Profeſſor of the *Royal College*, and of the *Academy of Architecture*, to which Places his great Merit advanced him; and the Diverſity of his Studies and Employments cannot but give us a vaſt Idea of his Abilities, and of the Application of them. His Days were, indeed, generally

ſpent in Study, and good Part of the Night often in aſtronomical Obſervations; ſeldom ſeeking any other Relief from his Labours, but a Change of one for another. ——— He was twice married, and had eight Children. He had the exterior Politeneſs, Circumſpection, and Prudence of *Italy*; for which Country he had a ſingular Regard, and, on this Account, appeared too reſerved and contemplative, in the Opinion of ſome of the *French*: Nevertheleſs he obtained the Character of an honeſt, diſintereſted Man, and of a good Chriſtian. He died the 21ſt of *April*, 1718, aged 78 Years.

He was the Author of a great Number of Pieces on ſome of the principal Branches of geometrical and mathematical Science, *viz.*

I. *Nouvelle Methode en Geometrie pour les ſections des ſuperficies coniques & cylindriques*, 1673, 4to.

II. *De Cycloide*, 1677, 12mo.

III. *Nouveaux Elemens des ſections coniques: Les lieux Geometriques: La conſtruction ou effection des equations*, 1679, 12mo.

IV. *La Gnomonique*, &c. 1682, 12mo.

V. *Sectiones Conicæ in novem libros diſtributæ*, 1655, Folio.

This was conſidered as an original Work, and gained the Author a great Reputation all over *Europe*.

VI. *Tabulæ Aſtronomicæ*, 1687, and 1702, 4to.

VII. *Veterum Mathematicorum Opera Græcè & Latinè pleræque nunc primùm edita*, 1693, Folio. This Edition had been begun by Mr. *Thevenot*; who dying, the Care of finiſhing it was committed to Mr. *De la Hire*. It ſhews, that our Author's ſtrong Application to mathematical and aſtronomical Studies had not hindered him from acquiring a very competent Knowledge of the *Greek* Tongue. Beſides theſe and other ſmaller Works, there are a vaſt Number of his Pieces ſcattered up and down in Journals, and particularly in the Memoirs of the Academy of Sciences.

The

The LIFE of NICHOLAS MERCATOR.

NICHOLAS MERCATOR, an eminent Mathematician in the 17th Century, was born in *Holſtein* in *Denmark*. Biographers have not preciſely mentioned the Time of his Birth; but ſo far as we are able to aſcertain it, from his Writings and Cotemporaries, it muſt be about the Year 1640: From his Works we likewiſe learn, that he had an early and liberal Education, ſuitable to his diſtinguiſhed Genius, by which he was enabled to extend his Searches in the mathematical Science, and to make very conſiderable Improvements: For it appears, from his Writings as well as from the Character given of him by other Mathematicians, that his Talent rather lay in improving, and adapting any Diſcoveries and Improvements to Uſe, than Invention, as will by and by more fully appear. However, the Greatneſs of his Genius for the mathematical Studies was very conſpicuous, and introduced him to public Regard and Eſteem where he reſided, and facilitated a Correſpondence with ſuch as were eminent in thoſe Sciences both in *Denmark*, *Italy*, and *England*. Some of his Correſpondents in *England* gave him an Invitation hither, which he ſome Time after accepted, and continued in *England* till his Death. He had not reſided here long before he was admitted F. R. S. and gave very frequent Proofs of his indefatigable Application to Study, and of his great Abilities in improving ſome Branch or other of the Sciences. But he is charged ſometimes with borrowing the Inventions of others, and adopting them as his own.——— Thus about the Year 1668, Lord *Brounker* publiſhed his Quadrature of the Hyperbola, *&c.* which is no other than Mr. *Newton*'s Series, which he diſcovered before: And ſoon after, this Quadrature of the Hyperbola was demonſtrated by Mr. *Nicholas Mercator*, by Means of the Diviſion firſt made uſe of by Dr. *Wallis* in his *Opus Arithmeticum*. Thus we may obſerve how far Mr. *Mercator* had any Pretence to the Diſcovery of the Quadrature of the Hyperbola, ſince Dr. *Wallis* had found the Diviſion long before, and alſo the Quadrature of every Part of the Quotient; which Mr. *Mercator* ſhould have acknowledged when he put

thoſe

thoſe two Inventions together. But it frequently happened both with reſpect to Inventions and Improvements, which were more remarkable (in this Science) about this Period of Hiſtory, than any other, that many of truly great mathematical Genius were willing to ſhine with borrowed Luſtre. Our Author, however, diſtinguiſhed himſelf by many valuable Pieces on philoſophical and mathematical Subjects. His firſt Attempt was, to reduce Aſtrology to rational Principles, which proved a vain Attempt. But his Writings of more particular Note are as follow:

I. *Coſmographia, ſive Deſcriptio Cœli & Terræ in Circulos, quâ fundamentum ſtermiter ſequentibus ordine Trigonometriæ Sphæricorum Logarithmicæ, Aſtronomicæ, Sphæricæ, Geographiæ, Hiſtiodromiæ, Gnomonicæ. Abſoluto compendio pulcherrima quævis & humanis uſibus aptiſſima, publico donantur a* Nicolao Hauffman *Holſato.* Dantzick, 1651, in 12mo, dedicated to the Senate of that City.

II. *Rationes Mathematicæ ſubductæ Anno* CIC ICC LIII: Copenhagen in 4to.

III. *De Emendatione Annuâ Diatribæ duæ, quibus exponuntur & demonſtrantur Cycli Solis & Lunæ, qui ex principiis Aſtronomiæ hactenus cognitis elici potuerunt accuratiſſimi:* in 4to.

IV. *Hypotheſis Aſtronomica nova & conſenſus ejus cum obſervationibus:* London 1664, in Fol.

V. *Logarithmotechnia, ſive Methodus conſtruendi Logarithmos nova, accurata, & facilis; ſcripto antehac communicata anno ſc.* 1667 *Nonis Auguſti; cui nunc accedit Vera Quadratura Hyberbolæ & Inventio ſummæ Logarithmorum. Auctore* Nicolao Mercatore *Holſato è Societate Regiâ. Huic etiam jungitur* Michaelis Angeli Riccii *Exercitatio Geometrica de Maximis & Minimis, hic ob argumenti præſtantiam & exemplarium raritatem recuſa:* London 1668, in 4to.

VI. *Inſtitutionum Aſtronomicarum Libri duo, de motu Aſtrorum communi & proprio, ſecundum hypotheſes veterum & recentiorum præcipuas; deque Hypotheſeon ex obſervatis conſtructione, cum Tabulis Tychonianis, Solaribus, Lunaribus, Lunæ-ſolaribus, & Rudolphinis Solis, Fixarum, & quinque Errantium, earumque uſu præceptis & exemplis commonſtrato. Quibus accedit Appendix de iis, quæ noviſſimis temporibus cœlitus innotuerunt:* London 1676, in 8vo. And ſome other miſcellaneous Tracts.

The

The LIFE of

Sir ISAAC NEWTON.

SIR *Iſaac Newton*, deſcended from an antient and honourable Family in *Lincolnſhire*, was born on *Chriſtmas-day*, O. S. 1642, at the Manor of *Woolſtrope* in that County, his Anceſtors enjoying the Title and Eſtate of that Lordſhip for more than 200 Years, his Father being the elder Son of Sir *John Newton*, Bart. and his Mother of the antient and opulent Family of *Aſcoughs* in that County. Our Author's Father dying when he was young, the Care of his Education devolved on his Mother, who, notwithſtanding ſhe married again after his Father's Death, in her great Wiſdom, took Care to improve his diſtinguiſhing Genius by an early and liberal Education. ——— In 1654, when he was but 12 Years of Age, ſhe ſent him to the Grammar-ſchool at *Grantham*, where he made great Proficiency in the Knowledge of Language, and laid the Foundation of his future Studies. In 1660, at the Age of 18, he was removed to *Trinity College*, *Cambridge*, where he principally devoted himſelf to the Study of the Mathematics, wherein Mr. (afterwards Doctor) *Iſaac Barrow*, then Fellow of that College, was very eminent. He began his Studies, in the uſual Method, with *Euclid*'s Elements: The moſt difficult Problems of which (from his penetrating Genius) ſoon became eaſy and familiar to him. He then proceeded to the Study of *Des Cartes*'s Geometry, with *Oughtred*'s Clavis, *Kepler*'s Optics, and *Schooten*'s Miſcellanies, in which he made ſeveral Improvements, which he inſerted in marginal Notes as he went along, which was his common Method of ſtudying: By Means of theſe Notes, and other original Papers of

We have thought it requiſite to diſtinguiſh the PRINCE of PHILOSOPHERS with an *Engraving*, (of an Octavo Size) which we have the Satisfaction to aſſure the Reader, is extremely like Sir *Iſaac*, as we are informed by thoſe who knew him many Years. ——— This Plate will be prefixed as a Frontiſpiece to the Volume of Biographia.

his, it is eaſy to ſhew, in ſome Meaſure, the Progreſs by which the Methods of Series and Fluxions were invented by him: And this continued to be his Employment and Study till 1664.—— The ſame Year, at the Age of 22, he took the Degree of Bachelor of Arts: And obſerving, at this Time, many Perſons of Genius engaged in the Buſineſs of improving Teleſcopes, by grinding Glaſſes in ſuch manner as might beſt ſubſerve to that Purpoſe, he applied himſelf to the grinding of Optic Glaſſes of other Figures than ſpherical, having as yet no Apprehenſion of the heterogeneous Nature of Light: But not ſucceeding at once in the Attempt, he procured a Glaſs Priſm, in order to try the celebrated Phænomena of Colours, diſcovered by *Grimaldi* not long before. He was much pleaſed at firſt with the vivid Brightneſs of the Colours produced by this Experiment; but, after a while, applying himſelf to conſider them in a philoſophical Way, with that Accuracy which was natural to him, he became immediately ſurprized to obſerve them in an oblong Form, which, according to the received Rule of Refractions, ought to be circular. At firſt, he thought the Irregularity might poſſibly be no more than accidental; but, as this excited his Enquiry, he ſoon invented an infallible Method of deciding the Queſtion, and the Reſult was, his new *Theory of Light and Colours.*

However, the Theory alone, unexpected and ſurprizing as it was, did not ſatisfy him; he rather conſidered the proper Uſe that might be made of it, for improving Teleſcopes, which was his firſt Deſign. To this End, having now diſcovered that Light was not homogeneal, but an heterogeneous Mixture of differently refrangible Rays, he computed the Errors ariſing from this different Refrangibility; and finding them to exceed, ſome hundreds of Times, thoſe occaſioned by the circular Figure of the Glaſſes, he threw aſide his Glaſs-works, and took the Nature of Reflectors into Conſideration. He was now ſenſible, that optical Inſtruments might be brought to any Degree of Perfection deſired, in Caſe there could be found a reflecting Subſtance which would poliſh as finely as Glaſs, and reflect as much Light as Glaſs tranſmits, and the Art of giving it a parabolical Figure be alſo attained: But, in this Enquiry, he met with conſiderable Difficulty, and it received, at leaſt for ſome Time, no ſmall Check, by the breaking out of the Plague in

1665.

1665. ——— He then retired from *Cambridge*, and was, in ſome Meaſure, ſecluded from Converſation and Books. However, his active Genius found ſome important Subjects for his mental Faculties, and, in the Midſt of his Solitude, ſtarted that Hint which gave Riſe to the Syſtem of the World, which is the main Subject of his *Principia*. ——— He was ſitting alone, in a Garden, when ſome Apples falling from a Tree, led his Thoughts to the Subject of Gravity; and reflecting on the Power of that Principle, he began to conſider, that as this Power is not found to be ſenſibly diminiſhed at the remoteſt Diſtance from the Center of the Earth to which we can riſe, neither at the Tops of the loftieſt Buildings, nor on the Summits of the higheſt Mountains, it appeared to him reaſonable to conclude, that this Power muſt extend much farther than is uſually thought: "Why not "as high as the Moon? ſaid he to himſelf, and if ſo, her Mo- "tion muſt be influenced by it: Perhaps ſhe is retained in her "Orbit thereby. However, though the Power of Gravity is "not ſenſibly weakened in the little Change of Diſtance, at "which we can place ourſelves from the Center of the Earth, "yet it is very poſſible that, as high as the Moon this Power "may differ in Strength much from what it is here." To make an Eſtimate what might be the Degree of this Dimunition, he conſidered with himſelf that, if the Moon be retained in her Orbit by the Force of Gravity, no doubt the primary Planets are carried about the Sun by the like Power: And by comparing the Periods of the ſeveral Planets with their Diſtances from the Sun, he found, that if any Power like Gravity held them in their Courſes, its Strength muſt decreaſe in the duplicate Proportion of the Increaſe of Diſtance. This he concluded, by ſuppoſing them to move in perfect Circles concentric to the Sun, from which the Orbits of the greateſt Part of them do not much differ. Suppoſing therefore, the Power of Gravity, which extended to the Moon, to decreaſe in the ſame Manner, he computed whether that Force would be ſufficient to keep the Moon in her Orbit. ——— But in this Computation (attempting it in a common Method, and abſent from Books) he did not make the Power of Gravity, deſcreaſing in a duplicate Proportion to the Diſtance, anſwerable to the Power which retained the Moon in her Orbit: Whence he concluded, that ſome other Cauſe muſt at leaſt join

with

with the Action of the Power of Gravity on the Moon. However, ſome Incidents ſuſpended any farther Thoughts on that Subject.

On his Return to *Cambridge*, in 1667, he was choſen Fellow of his College, and, in 1668, advanced to the Degree of Maſter of Arts. —— At this Time, *Nicholas Mercator*, who was born in *Holſtein*, but ſpent moſt of his Time in *England*, publiſhed his *Logarithmotechnia*, in which he gave the Quadrature of the Hyperbola by an infinite Series. This was the firſt Appearance, in the learned World, of a Series of this Sort drawn from the particular Nature of the Curve, and that in a Manner very new and abſtracted. ——— The famous Dr. *Barrow*, then at *Cambridge*, where Mr. *Newton*, who was about 26 Years of Age, reſided, recollected, that he had met with the ſame Thing in the Writings of that young Gentleman, and there not confined to the Hyperbola only, but extended by general Forms to all Sorts of Curves, even ſuch as are mechanical, to their Quadratures, their Rectifications, and their Centers of Gravity, to the Solids formed by their Rotations, and to the Superficies of thoſe Solids; ſo that ſuppoſing their Determinations to be poſſible, the Series ſtopped at a certain Point, or at leaſt their Sums were given by ſtated Rules. But if the abſolute Determinations were impoſſible, they could yet be infinitely approximated; which is the happieſt and moſt refined Method, ſays *Monſieur Fontenelle*, of ſupplying the Defects of human Knowledge, that Man's Imagination could poſſibly invent. To be Maſter of ſo fruitful and general a Theory, was a Mine of Gold to a Geometrician; but it was a greater Glory to have been the Diſcoverer of ſo ſurprizing and ingenious a Syſtem. So that Sir *Iſaac* finding, by *Mercator*'s Book, that he was in the Way to it, and that others might follow in his Track, ſhould naturally have been forward to open his Treaſures, and ſecure the Property, which conſiſted in making the Diſcovery. But he contented himſelf with the Treaſure he had found, without regarding the Glory. He modeſtly obſerves, in a Letter printed in the *Commercium Epiſtolicum*, that he thought *Mercator* had intirely diſcovered his Secret, or that others would, before he was of a proper Age for writing. ——— His Manuſcript upon infinite Series was communicated to none but Mr. *John Collins*, F. R. S. and the Lord *Broun-*

Brounker; and even this had not been done but for Dr. *Barrow*, who would not ſuffer him to indulge his Modeſty ſo much as he deſired. This Manuſcript was taken out of our Author's Study in 1669, intitled, *A Method which I formerly found out, &c.* and ſuppoſing this formerly to mean no more than three Years, he muſt then have diſcovered this admirable Method of his Series, when he was not 24 Years of Age. But what is ſtill more, this Manuſcript contains both the Diſcovery and Method of Fluxions, or thoſe infinitely ſmall Quantities, which have occaſioned ſo great a Conteſt between Mr. *Leibnitz* and him, or rather between *Germany* and *England*.

In 1669, he was choſen Profeſſor of the Mathematics in the Univerſity of *Cambridge*, upon the Reſignation of Dr. *Barrow*; and the ſame Year, and the two following Years, he read a Courſe of optical Lectures, in *Latin*, in the public Schools of the Univerſity: He had not finiſhed them when he was elected a Fellow of the *Royal Society* in *January* 1671-2, and having now brought his Theory of Light and Colours to a great Degree of Perfection, he communicated it to that Society firſt, to have their Judgment upon it, and it was afterwards publiſhed in their *Tranſactions* of *February* 19, 1672. In the ſame *Tranſactions* of *March* 28, 1672, N°. 81, he publiſhed an Account of a new *Catadioptrical Teleſcope* of his own Invention, which Account *Monſieur Gallois* inſerted in the *Journal des Sçavans*, with a Letter of *Monſieur Huygens*, ſhewing the Advantages of this Kind of Teleſcope. From this Time, till 1679, our Author maintained a Correſpondence, by Letters, with Mr. *Henry Oldenburg*, Secretary of the *Royal Society*; Mr. *John Collins*, Mr. *John Flamſtead*, and Dr. *Edmund Halley*; which Letters contain a Variety of curious and uſeful Obſervations, which are publiſhed in the *general Dictionary*, including near 20 Pages, to which therefore we ſhall refer the Reader.

In 1676, at the Requeſt of Mr. *Leibnitz*, he explained his Invention of infinite Series, and took Notice how far he had improved it by his Method of Fluxions, which, however, he ſtill concealed, and particularly, on this Occaſion, by a Tranſpoſition of the Letters that make up the two fundamental Propoſitions of it into an alphabetical Order.

In the Winter between 1676 and 1677, as Mr. *Jones* informs us, he inveſtigated the grand Propoſition, that by a centripetal Force, acting reciprocally as the Squares of the Diſtance a Planet muſt revolve in an Ellipſis about the Center of Force placed in the lower Focus of the Ellipſis, and, with a Radius drawn to that Center, deſcribe Area's proportional to the Times.

In 1680, he made ſeveral aſtronomical Obſervations upon the Comet that then appeared, which, for ſome conſiderable Time, he took not to be one and the ſame, but two different Comets. He was at an Uncertainty in this Matter, when he received a Letter from Mr. *Hooke* on the Nature of the Line deſcribed by a falling Body, ſuppoſed to be moved circularly by the diurnal Motion of the Earth, and perpendicularly by the Power of Gravity: This led him farther to enquire what was the real Figure in which ſuch a Body moved, and, as *Picart* had not long before, *viz.* in 1679, meaſured a Degree of the Earth with ſufficient Accuracy, by uſing his Meaſures, that Planet appearing to be retained in her Orbit by the ſole Power of Gravity, and conſequently that this Power decreaſes in the duplicate Proportion of the Diſtance, as he had formerly conjectured: Upon this Principle he found the Line deſcribed by a falling Body, to be an Ellipſis, of which the Center of the Earth is one Focus. And finding, by this Means, that the primary Planets really moved in ſuch Orbits as *Kepler* had ſuppoſed, he had the Satisfaction to find the Reſult of his Enquiries to anſwer ſome valuable Purpoſes: Accordingly, he drew up ſundry Propoſitions relative to the Motion of the primary Planets round the Sun, which were communicated to the *Royal Society* in 1683, and, with much Solicitation, printed in 1687, under the Title of *Philoſophiæ naturalis principia Mathematica*, containing, in the third Book, what is now denominated his *Cometic Aſtronomy*, or rather his *Syſtem of the World*.

In the Height of all theſe profound philoſophical Reſearches, the Privileges of the Univerſity being attacked by King *James* II. our Author appeared among the moſt hearty Defenders, and was, on that Occaſion, appointed one of their Delegates to the High Commiſſion Court, when he made ſuch a rational and vigorous

gorous Defence, that King *James* thought proper to drop the Affair, and continue their Privileges.

In 1688, our Author was choſen one of their Members for the Convention Parliament, in which he ſat till it was diſſolved.

Obſtructions being in a great Meaſure removed, he reaſſumes his former Studies, on the Motion of the primary Planets round the Sun, to which he was ſomewhat led by Converſation with Dr. *Halley* (who paid him a Viſit at *Cambridge*:) It gave Occaſion to his writing the above-mentioned Treatiſe of *Mathematical Principles of natural Philoſophy*, a ſecond Edition whereof was afterwards publiſhed at *Cambridge*, with great Additions, under the Care of Mr *Roger Cotes*, Profeſſor of Aſtronomy and experimental Philoſophy. *Monſieur de Fontenelle* tells us, that this Book, in which our Author had built a new Syſtem of natural Philoſophy upon the moſt ſublime Geometry, was wrote with ſo great Profoundneſs of Judgment, and withal ſo conciſe, that it required ſome Time and Skill thoroughly to underſtand it; on which Account, it was not ſo generally read and admired: But at Length, when its Worth came to be ſufficiently known, nothing was to be heard from all Quarters but one general Shout of Admiration. This Work ſeems to be the Production of a Genius, or of a celeſtial Intelligence, rather than a Man, ſays the Marquis *de l'Hoſpital*, one of the greateſt Mathematicians of the Age. And when he was viſited by ſome *Engliſh* Gentleman, it is ſaid, he aſked "if Mr. *Newton*, eat, drank, or "ſlept like other Men?" I repreſent him to myſelf (ſays he) as a celeſtial Genius, intirely diſengaged from Matter. The *Principia Mathematica* are founded chiefly on two Theories, *viz.* the Doctrine of central Forces, and that of the Reſiſtance of Mediums to Bodies moving in them, both almoſt entirely new, and treated according to our Author's ſublime Geometry. ——— *Kepler* had found from the celeſtial Obſervations of *Tycho Brahe*, I. That the ſame Planets deſcribed about the Sun equal Areas in equal Times. II. That their Orbits were Ellipſes, the Sun being in the common Focus. III. That in different Planets, the Squares of periodic Times were, as the Cubes of the tranſverſe Axes of their Orbits. From the firſt Phænomenon our Author demonſtrated, that the Planets were attracted towards

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the Sun in the Center; from the Second, that the Force of this Attraction was reciprocally as the Squares of the Diſtances of the Planet from this Center; and from the Third, that all the Planets were influenced by the very ſame centripetal Force.

Our Author's Merit became now ſo well known, that even Men of the higheſt Rank, as well as Genius, careſſed him: And in 1696, when the Earl of *Halliſax* undertook the great Work of recoining the Money, he made Choice of Mr. *Newton* for his Aſſiſtant; and, accordingly, he was appointed Warden of the Mint, in which Employment he did very ſignal Service to the Nation. About three Years after, he was promoted to be Maſter of that Office, a Place worth 12 or 1500*l. per Ann.* which he held till his Death; for which he appears to be peculiarly qualified, by his Tables of the Eſſays of Foreign Money, printed at the End of Dr. *Arbuthnot*'s Book. ——— Upon this Promotion, he appointed Mr. *William Whiſton*, then M. A. of *Clare Hall*, his Deputy in the mathematical Profeſſorſhip at *Cambridge*, giving him the full Profits of the Place, which, too, he procured for him in 1703.

The ſame Year, our Author was choſen Preſident of the *Royal Society*, in which Chair he ſat for 25 Years; and he had been choſen a Member of the *Royal Academy of Sciences* at *Paris* in 1699, upon the new Regulation made of admitting Foreigners into that Society.

In 1704, our Author publiſhed, in 4to, his Treatiſe of the *Reflections, Refractions, Inflections, and Colours of Light:* Which was afterward tranſlated into a Variety of Languages, and paſſed through ſeveral Editions. *Monſieur Fontenelle* obſerves, that the conſtant Object of this Work is the Anatomy of Light. ——— The ſmalleſt Ray of Light admitted into a perfectly dark Room, which yet can never be ſo ſmall but that it is, like a *Faſciculus*, compoſed of an infinite Number of Rays, is divided and diſſected, ſo as to leave the Elementary Rays, which compoſed it, diſtinct from each other, each tinged with a particular Colour, and incapable of being farther altered after this Separation. ——— The Whiteneſs of the whole Beam, before its Diſſection, aroſe from the Mixture of all the particular Colours of the original Rays. The primitive and coloured Rays could not poſſibly be ſeparated, if their Nature were not ſuch, that in paſſing through the ſame Me-

Medium, through the ſame Glaſs-priſm, they are refracted under different Angles, and by that Means appear diſunited, when received at convenient Diſtances. This different Refrangibility of red, yellow, green, blue, violet, and the infinite Variety of intermediate coloured Rays, a Property which had never been dreamed of, and to which no Conjecture could ever lead us, is the fundamental Diſcovery of our Author's Treatiſe. The different Refrangibility leads us to the different Reflexibility, and, which is ſtill more curious, Rays, falling upon a Surface under the ſame Angle of Incidence, are alternately refracted and reflected, with a Kind of Play, which could never have been diſtinguiſhed but by a very good Eye, aſſiſted by an excellent Judgment. Beſides (and in this Point only the firſt Notion was not our Author's) thoſe Rays, which paſs near the Extremity of a Body without touching it, are nevertheleſs thereby turned aſide out of the Right-line; and this he calls Inflexion. He ſhews likewiſe, that the Cauſe why Bodies appear of different Colours, ariſes from the Magnitude of the conſtituent Particles of Bodies. From all theſe Obſervations together, he has formed a Body of Optics ſo new, that this Science may be conſidered as entirely owing to our Author. ——— It has been remarked, that our Author's Hypotheſis of Light and Colours frees the Corpuſcularian Philoſophy from the Embarraſs of an Argument, which *Ariſtotle* brought againſt that Doctrine, of ſenſible Qualities being the Reſult of the Figures and Diſpoſitions of the inſenſible Parts, or Atoms: ——— But Sir *Iſaac*'s Hypotheſis, which makes Colours the innate Property of the Rays of Light, and that different Kinds of Rays originally and immutably aſſert a Colour peculiar to themſelves, entirely takes off the Force of this Argument.

In Reality, the Affair that chiefly employed his Reſearches for ſo many Years, was far from being confined to the Subject of Light alone: On the contrary, all that we know of natural Bodies ſeem to be comprehended in it: He had found out, that there was a mutual Action, a Diſtance between Light and other Bodies, by which both the Reflections and Refractions, as well as Inflexions of the former, were conſtantly produced. He has, indeed, opened a Way of paſſing from Optics to an entire Syſtem of Phyſics; and if we only look upon his Queries, as contain-

ing the History of a great Man's first Thoughts, even in that View they must be always entertaining and curious.

In 1705, he had the Honour of Knighthood conferred upon him by Queen *Ann*, in Consideration of his great Merit. —— In 1707, he published, at *Cambridge*, in Octavo, his *Arithmetica Universalis, sive de Compositione & Resolutione Arithmeticæ Liber.* —— In 1711, his *Analysis per Quantitatum Series, Fluxiones, & Differentias, cum Enumeratione Linearum tertii Ordinis*, was published at *London*, by *William Jones*, Esq; F. R. S. who met with the first of those Pieces amongst the Papers of Mr. *John Collins.* —— In 1712, several Letters of Sir *Isaac* were published in the *Commercium Epistolicum.*

Soon after the Accession of his Majesty King *George* I. our Author's Talents were so conspicuous that he was introduced to his Majesty, with peculiar Marks of Esteem; and that Year he was applied to, by Parliament, for his Opinion upon a new Method of discovering the Longitude at Sea, by Signals, which had been proposed by *Ditton* and *Whiston*, in order to procure their Incouragement. But his Remarks, and Reasons assigned for his Disapprobation of it, in a Paper delivered to the Committee, was so entirely Satisfactory, that the Project was thrown aside.

The following Year, *viz.* 1715, Mr. *Leibnits*, with a View of bringing the World more easily into the Belief, that Sir *Isaac* had borrowed his *Method of Fluxions* from his *differential* Method, attempted to try his mathematical Genius by the famous Problem of the Trajectories, which, though it was the most difficult Proposition the Wit of his Antagonist could propose, was nothing more than an Amusement to our etherial Genius, as he solved it the same Evening he received it, though he had been fatigued that Day with the Business of the Mint. But the Greatness of our Author's Abilities, and his Popularity on that Account, were very often likely to occasion Disputes as to their first Discovery or Improvement, which he carefully avoided whenever the Importance of Truth, or his own just Vindication did not render it necessary.

He was now more than ever at Court. The Princess of *Wales*, afterwards Queen Consort to King *George* II. had such a Taste for philosophical Enquiries, and so excellent an Understanding therein, that she frequently conversed with him on those Subjects,

jects, and propoſed ſuch Queries, as none but himſelf could anſwer to her Satisfaction. And ſhe was often heard to declare in Public, that ſhe thought herſelf happy in living at the ſame Time, and enjoying the Opportunities of Improvement by him. ——— He had then written a Treatiſe of ancient Chronology, or was about it in 1718, when he communicated to that Princeſs the chief Particulars of his Plan, which ſhe thought ſo new and ingenious, that ſhe deſired to have an Abſtract of the whole Work, which ſhe would never part with. Nevertheleſs, a Copy of it ſtole abroad, and was carried over to *France*, by the Abbé *Conti*, where it was tranſlated and printed, with ſome Obſervations upon it. ——— Upon this Sir *Iſaac* publiſhed in the *philoſophical Tranſactions*, N°. 389, v. 33, p. 315, *Remarks thereon*, which were afterwards tranſlated into *French* by the Obſervator. And the Abbe *Conti* and Father *Souciet* attacked our Author's Chronological Index. And a full Reply was ſoon after given to it by Dr. *Edmund Halley*, who was the King's Aſtronomer, eſpecially to that Part of it which related to Aſtronomy. ——— This Work at Length was publiſhed in *Engliſh*, and of the Few that were Judges there were Diverſity of Opinions. The main Deſign was evidently this, to find out, by following with Abundance of Sagacity ſome of the Tracks, however faint they are of the moſt ancient *Greek* Aſtronomy, what was the Poſition of the equinoctial Colures with reſpect to the fixed Stars, in the Time of *Chiron* the *Centaur*. As it is now known that theſe Stars have a Motion in Longitude of one Degree in 72 Years, and if it is once known through what fixed Stars the Colure paſſed in *Chiron*'s Time, by taking the Diſtance of theſe Stars from thoſe through which it now paſſes, we might determine what Number of Years is elapſed ſince *Chiron*'s Time. As *Chiron* was one of thoſe who went along with the *Argonauts* in their famous Expedition, this would therefore fix the Epocha of that Expedition, and conſequently that of the *Trojan* War; two great Events, upon which all ancient Chronology depends.

After having been ſo ſerviceable to all the learned Part of *Europe* in ſpeculative Sciences, he devoted himſelf more entirely to the Service of his Country, in Affairs to which he was more eſpecially called; but his Leiſure-time he devoted to gratify the Curioſity of his Mind: He thought no kind of Knowledge beneath

neath his Conſideration, and he knew how to improve himſelf by even a ſuperficial View of Things. After his Death there were found amongſt his Papers, ſeveral Writings upon Antiquity, Hiſtory, and Divinity, Subjects widely different from each other, and from thoſe for which he was ſo much diſtinguiſhed. He never ſuffered Time to paſs unemployed, nor ever ſpent it after a trifling Manner, or with ſlight Attention to what he was about. He all along enjoyed a ſettled and equal State of Health, until he was fourſcore Years of Age, a very eſſential Circumſtance of the extraordinary Happineſs he enjoyed. ——— He then began to be afflicted with an Incontinence of Urine, and yet the five Years following, which preceded his Death, he enjoyed long Intervals of Health, or was tolerably well, owing, next to Providence, to that Care and Regularity he obſerved with regard to his Diet. ——— The laſt twenty Days of his Life were attended with much Pain, at ſome Intervals, and it was concluded he had the Stone in his Bladder, and that he could not recover. In thoſe Fits of Pain, which were ſo violent that Drops of Sweat fell from his Face, he never cried out nor expreſſed the leaſt Impatience; and as ſoon as he had a moment's Eaſe, he would ſmile, and talk with his uſual Chearfulneſs. Till this Time he had always read and wrote ſeveral Hours in a Day: And on *Saturday* Morning, *March* 18, 1726, diſcourſed a long Time with Dr. *Mead*, his Phyſician, having then the perfect Uſe of all his Senſes and Underſtanding; but that Night he entirely loſt them, and did not recover them any more, and died on *Monday*, *March* the 20th, in the 85th Year of his Age. His Corpſe lay in State in the *Jeruſalem* Chamber, and on the 28th was conveyed into *Weſtminſter Abbey*, the Lord Chancellor, the Dukes of *Montroſe* and *Roxburgh*, and the Earls of *Pembroke*, *Suſſex*, and *Macclesfield* ſupporting the Pall. He was interred near the Entrance into the Choir, on the Left-hand, where a ſtately Monument is erected to his Memory, with the following Inſcription:

H. S. E.
Iſaacus Newton, Eques Auratus,
Qui animi vi prope divina
Planetarum motus, figuras,

Co-

Cometarum ſemitas, Oceanique æſtus,
Sua matheſi facem præferente,
Primus demonſtravit.
Radiorum lucis diſſimilitudines,
Colorumque inde naſcentium proprietates,
Quas nemo antea vel ſuſpicatus erat, perveſtigavit.
Naturæ, Antiquitatis, S. Scripturæ,
Sedulus, ſagax, fidus interpres,
Dei. Opt. Max. majeſtatem philoſophia aſſeruit,
Evangelii ſimplicitatem moribus expreſſit.
Sibi gratulentur mortales, tale tantumque extitiſſe,
HUMANI GENERIS DECUS.
Natus xxv. Decemb. MDCXLII. Obiit. xx. March,
MDCCXXVI.

His Character has been attempted by many, more eſpecially by *Monſieur Fontenelle*, Dr. *Pemberton*, and ſeveral others, the Subſtance whereof is as follows:

He was of a middling Stature, and ſomewhat inclined to be fat in the latter Part of his Life. His Countenance was pleaſing and venerable. He never made uſe of Spectacles, and during his whole Life never loſt but one Tooth. Biſhop *Atterbury* deſcribes him as having ſomething rather Languid in his Look and Manner, than lively and piercing. —— He was of a very meek Diſpoſition, and a great Lover of Peace. He would rather have choſen to remain in Obſcurity, than to have the Calm of Life ruffled by thoſe Storms and Diſputes, which Genius and Learning often draw upon thoſe that are eminent for them. In contemplating his Genius, it preſently becomes a Doubt which of theſe Endowments had the greateſt Share, Sagacity, Penetration, Strength, or Diligence; and after all, the Mark that ſeems moſt to diſtinguiſh it, that he himſelf made the juſteſt Eſtimation of it, declaring, if he had done the World any Service, it was owing to Induſtry and patient Thought, that he kept the Subject under Conſideration conſtantly before him, and waited till the firſt Dawning opened gradually into a full and clear Light: And hence, no Doubt, aroſe that Averſion he had to all Diſputes, a ſteady uninterrupted Attention, free

from thoſe frequent Recoilings inſeparable from many others, was his peculiar Felicity. He knew it, and he knew the Value of it; and ſpeaking of ſome Errors which he had too haſtily publiſhed, which occaſioned ſome Diſpute, he ſays, I blame my own Imprudence for parting with ſo real a Bleſſing as my Quiet, to run after a Shadow. Though, as *Fontenelle* juſtly obſerves, this little Foible at firſt proved the Occaſion of his much greater Sollicitude to be exact in his future Productions, and thereby proved the Inſtrument of much greater Uſefulneſs.

After all, notwithſtanding his anxious Care to avoid every Occaſion of breaking his intenſe Application to Study, he was far from being ſwallowed up and loſt in it; he could lay aſide his Thoughts, though engaged in the moſt intricate Reſearches, when his other Affairs required his Attendance, and, as ſoon as he had Leiſure, reſume the Subject at the Point where he had left it. This he ſeems to have done, not from any extraordinary Strength of Memory as by the Force of his inventive Faculties, to which every Thing opened itſelf again with Eaſe, if nothing intervened to ruffle him; the Readineſs of his Invention made him not think of putting his Memory much to the Rack: But this was the Offspring of a vigorous Intenſeneſs of Thought, out of which he was but a common Man. He ſpent, therefore, the Prime of his Life in thoſe abſtruſe Reſearches, when his Situation in a College gave him Leiſure, and even while Study was his proper Profeſſion: But, as ſoon as he removed himſelf to the Mint, he principally attended to the Buſineſs of that Office.

Dr. *Pemberton* obſerves, that he read but few modern Authors, or, at leaſt, but ſuperficially: But, as curſory as it might ſeem, it appears, he could form his Judgment of them with great Accuracy. He often cenſured handling geometrical Subjects by Algebraic Calculation, and therefore called his Book of Algebra *Univerſal Arithmetic*, in Oppoſition to *Des Cartes*'s Book of Geometry. ——— He frequently praiſed *Sluſius*, *Barrow*, and *Huygens*, for not being influenced by the falſe Taſte that then began to prevail. ——— He commended the laudable Attempt of *Hugh de Omerique*, to reſtore the ancient Analyſis; and very much eſteemed *Apollonius*'s Book *de Sectione Rationis*, for giving us a

clearer

clearer *Notion* of that Analyſis than we had before. ——— Dr. *Barrow* he eſteemed, as having ſhewn a Compaſs of Invention equal, if not ſuperior, to any of the Moderns. ——— Sir *Iſaac* commended *Huygens*'s Stile and Manner of Writing, and thought him the moſt Elegant of any mathematical Writer in modern Times, and the moſt juſt Imitator of the Ancients, of whoſe Taſte and Form of Demonſtration Sir *Iſaac* always profeſſed himſelf a great Admirer, and often cenſured himſelf for not following them more exactly than he did.

It is farther obſerved of him, that he ſeldom talked much of himſelf, or others; nor ever behaved in ſuch Manner as to give the moſt malicious Cenſurers the leaſt Occaſion to charge him with Vanity. ——— He was candid and affable, and always put himſelf upon a Level with his Company. He never thought either his Merit or Reputation ſufficient to excuſe him from any of the common Offices of ſocial Life; no Singularities, either natural or affected, diſtinguiſhed him from other Men. Though he was ſteadily attached to the Church of *England*, he was greatly averſe to the Perſecution of Nonconformiſts. He judged of Men by their Manners; and the true Schiſmatics, in his Opinion, were the vicious and immoral: Not that he confined his Principles to natural Religion; for he was thoroughly perſuaded of the Truth of Revelation, and, amidſt the great Variety of Books which he had conſtantly before him, that which he ſtudied with the greateſt Application was, the *Bible*. He did not neglect the Opportunities of doing Good, which the plentiful Revenues of his Patrimony, and a profitable Employment, improved by a prudent Oeconomy, put into his Power. "He thought a Legacy, ſays *Monſieur de Fontenelle*, was no Gift, and, therefore, left no Will; for he would even ſtrip himſelf, as often as he had Occaſion, to aſſiſt either his Relations or others, who ſtood in Need of it: The Inſtances of his Liberality, in both theſe Reſpects, were neither few nor inconſiderable." ——— He died poſſeſſed of Thirty-two Thouſand Pounds, which was in Eſtate, and is ſaid to devolve, as the Law directed, to his next of Kin. ——— When Decency, upon any Occaſion, required Expence and Shew, he was magnificient without grudging it; and, with a very

very good Grace, at all other Times, that Pomp, which ſeems great to low Minds only, was utterly retrenched, and the Expence ſaved for better Uſes. He never married; which was always attributed to his being ſo deeply immerſed in profound and continual Studies during the prime Part of his Life, and his other important Employments.

Mr. *Hume*, in his Hiſtory of *England*, ſpeaks of Sir *Iſaac* to the following Purport: "In *Newton* (ſays he) this Iſland may boaſt of having produced the greateſt and rareſt Genius that ever aroſe, for the Ornament and Inſtruction of the Species in philoſophical, aſtronomical, and mathematical Knowledge; cautious in admitting no Principles but ſuch as were founded on Experiment; but reſolute to adopt every ſuch Principle, however new or unſual; from Modeſty, ignorant of his Superiority above the reſt of Mankind, and thence leſs careful to accommodate his Reaſonings to common Apprehenſions, more anxious to Merit than acquire Fame. He was from theſe Cauſes long unknown to the World; but his Reputation at laſt broke out with a Luſtre which ſcarce any Writer before his Time ever attained: While *Newton* ſeemed to draw off the Veil from ſome of the Myſteries of Nature, he ſhowed at the ſame Time the Imperfections of the mechanical Philoſophy, and thereby reſtored her ultimate Secrets from that Obſcurity in which they had before lay, and in which, without his Aſſiſtance, would probably ever have remained.

And another ingenious Author, in a Kind of Rhapſody, ſays, the *Newtonian* Philoſophy alone, to what ſublime Sentiments does it lift the Mind! what noble Ideas does it give us of Immenſity, filled with innumerable Worlds revolving round innumerable Suns! thoſe Worlds themſelves the Centres of others, Secondary to them all, all attracting or attracted, enlightening or receiving Light, at Diſtances unmeaſurable! but all under one Law. ——— How do theſe Ideas tend to raiſe our Conceptions of the great Author, and firſt Cauſe of thoſe Worlds, and excite our Admiration!

The LIFE of JOHN FLAMSTEED.

JOHN FLAMSTEED, an eminent *Engliſh* Aſtronomer, was born at *Denby* in *Derbyſhire*, on the 19th of *Auguſt*, 1646: He was educated at the Free-ſchool of *Derby*, where his Father lived, and at 14 Years of Age was viſited with a ſevere Fit of Illneſs, which impaired his Conſtitution, and prevented his going to the Univerſity, for which he was intended; but this did not wholly obſtruct his Learning, as he applied himſelf, with as much Aſſiduity as he was capable of, to his Studies; and in the Year 1662, after he had made all the Improvements he could in the Grammar-ſchool, he purſued the moſt natural Bent of his Genius, which led him to the Study of Aſtronomy, and read, with great Attention, *Sacroboſco*'s Book *De Sphæra*, which laid the Ground-work of all that mathematical and aſtronomical Knowledge for which he became afterwards ſo juſtly celebrated. The particular Improvements he made in theſe Sciences are minutely ſpecified in a Manuſcript of his, written in 1677, intitled, *The Self-inſpections of J. F.* containing an Account of himſelf, his Actions and Studies for 21 Years; to which we may refer the Curious. Having tranſlated ſo much of *Sacroboſco*'s Book as he thought neceſſary, into *Engliſh*, he endeavoured to procure ſuch others as might contribute to his Improvement, among which was Mr. *Street*'s *Caroline Tables*: He ſet himſelf to calculate the Places of the Planets; he ſpent ſome Part of his Time alſo in aſtrological Studies; yet ſo as to make them ſubſervient to Aſtronomy; for he was never the leaſt captivated by the ſolemn Pretenſions of that vain Science: Having calculated, by the *Caroline Tables*, an Eclipſe of the Sun, which was to happen the 22d of *June*, 1666, he imparted it to a Relation, who ſhewed it to Mr. *Halton*, a Mathematician, who came to ſee Mr. *Flamſteed* ſoon after, and finding he was not well acquainted with many aſtronomical Performances, he ſent him *Ricciolus*'s *Almageſtum Novum*, and *Kepler*'s *Tabulæ Rudolphinæ*, to which he was before a Stranger: And he proſecuted his aſtronomical Studies, from this

Time, with all imaginable Vigour, and with all the Succeſs that could be wiſhed for. ——— In 1669, he collected ſome remarkable Eclipſes of the fixed Stars by the Moon, which would happen in 1670, and calculated them from the *Caroline Tables*, and ſent them to Lord Viſcount *Brounker*, Preſident of the *Royal Society*. This Piece, being read before that Society, was highly approved, and procured him Letters of Thanks from Mr. *Oldenburg* their Secretary, and Mr. *John Collins* one of their Members, with the latter of whom our Author held a Correſpondence ſeveral Years, by Letters, many of which were carefully kept in the Library of *William Jones*, Eſq; F. R. S. ſome Particulars of which we ſhall occaſionally inſert; from the Time, of the abovementioned Piece being read to the Society, he began to have Accounts ſent him of the principal mathematical Books which were publiſhed, either at home or abroad; and in *June*, 1670, his Father, obſerving he held Correſpondence with many ingenious Gentlemen, adviſed him to take a Journey to *London*, that he might be perſonally acquainted with them, which Offer he gladly embraced, and viſited Mr. *Oldenburg* and Mr. *Collins*, who introduced him to Mr. *Jonas Moore*, and preſented him with Mr. *Townley*'s *Micrometer*, and undertook to procure him Glaſſes for a Teleſcope. On his Return, he viſited Dr. *Barrow*, Mr. *Newton*, and Dr. *Wroe*, then Fellow of *Jeſus College*, of which he alſo entered himſelf a Student. ——— In the Year 1672, he excerped ſeveral Obſervations from Mr. *Gaſcoigne*'s and Mr. *Crabtree*'s Letters, which had not been made public, and which he tranſlated into *Latin*. He finiſhed the Tranſcript of Mr. *Gaſcoigne*'s Papers in *May*, 1672: Amongſt that Gentleman's Letters he found ſome in which Mr. *Gaſcoigne* ſhewed how the Images of remote Objects were formed in the diſtinct Baſe of a Convex Object-glaſs; from thence our Author got his Knowledge of *Dioptrics*, having read *Des Cartes*'s *Dioptrics* before to little Purpoſe, becauſe *Des Cartes* diſcourſes not of this Subject; his main Buſineſs being to ſhew how, by elliptical or hyperbolic Glaſſes, all the Rays of Light which fall on the Object, parallel to the Axis, may be collected into one Point of the Image in the diſtinct Baſe, ſuppoſing all the Rays of Light of the ſame Species, and liable to the ſame Law of Refraction, which

which Mr. *Isaac Newton* has demonstrated they were not, by many Experiments published in this Year's *Philosophical Transactions:* And this, says our Author, is the only Thing that I can perceive for which *Des Cartes*'s *Dioptrics* have been so celebrated. ——— The spare Hours of the remaining Year, Mr. *Flamsteed* employed in his Observations, as the Weather permitted, and in preparing Advertisements of the Appulses of the Moon and Planets to fixed Stars, for the following Year. These were published by Mr. *Oldenburgh* in the *Philosophical Transactions*, with some Observations of the Planets, which Mr. *Flamsteed* imparted to him. ——— In 1673, he wrote a small Tract in *English* concerning the true Diameters of all the Planets, when at their nearest Distances from the Earth, or their greatest Removes from it; "which I lent, says he, to Mr. *Newton* in 1685, who has made Use of it in the fourth Book of his *Principia Phil. Nat. Mathemat.*" By Mr. *Oldenburg*'s Means he exchanged some Letters with *Monsieur Cassini.* ——— In 167$\frac{3}{4}$, he wrote an Ephemeris, to shew the Falsity of Astrology, and the Ignorance of those who pretended to it; and gave a Table of the Moon's Rising and Setting, carefully calculated: Together with the Eclipses and Approaches of the Moon and Planets to the fixed Stars. This fell into the Hands of Sir *Jonas Moore*, for whom, at his Request, Mr. *Flamsteed* made a Table of the Moon's true Southings that Year, from which, and from Mr. *Philips*'s Theory of the Tides, the High-waters being computed, he found that they shewed the Times of the Turn of the Tides very near; whereas, the common Seamen's coarse Rules would err sometimes 2 or 3 Hours. ——— In 1674, our Author passing through *London* in his Way to *Cambridge*, Sir *Jonas Moore* informed him, that a true Account of the Tides would be highly acceptable to his Majesty: Upon which, he composed a small Ephemeris for his Majesty's Use, which he compleated by *Christmas.* ——— Mr. *Flamsteed* often discoursed of the Weather-glass, or Barometer, and the Certainty of judging of the Weather by it, from the Observations which Mr. *Townley* had communicated, and the Rules he had deduced from them: And afterward he set up a Barometer at *Derby*, where, for three Years together, he noted thrice a Day the Height of the Mercury in the

the Barometer, and of a tinged Spirit in the Thermometer, and found, conſidering the different Situation, that Mr. *Townley*'s Remarks agreed very well with his, which were, that, upon every ſinking of the Mercury, the Air was more moved; and that either Wind or Rain followed, not the ſame Day always, but one, two, three, or four Days after, according to the Time and Height it had been ſtationary at. Something of this had been noted by Mr. *Boyle*, but not proſecuted, by Reaſon that the daily watching its Motions, and noting them, was thought perhaps a Trouble. About this Time, Mr. *Flamſteed*, at Sir *Jonas Moore*'s Requeſt, ſet up for him a Pair of theſe Glaſſes, and left him Materials for making more. It had been long ſettled fair Weather when Mr. *Flamſteed* left *London*; ſoon after which, the Mercury in the Glaſſes began to ſink, but no Rain followed till the fourth, or fifth Day after: This made Sir *Jonas* eſteem the Glaſſes and Rules very highly, and mentioned them as Curioſities to the King and Duke of *York*, whereupon he was ordered to exhibit them the next Day, which he did, together with Mr. *Flamſteed*'s Directions for judging of the Weather by their riſing or falling. Sir *Jonas* was a great Friend to our Author, and took all Opportunities of introducing his Inventions and Improvements to his Majeſty, and ever frankly diſclaiming any Pretenſions to Diſcoveries which juſtly belonged to Mr. *Flamſteed*; whereby he laid a Foundation for his reaping Advantages from Royal Favour, as was very evident in After-time. Indeed, he might have enjoyed ſome preſent Emoluments from Sir *Jonas*'s having ingratiated him into his Majeſty's Friendſhip: But, as Mr. *Flamſteed* had now taken his Degree of *Maſter of Arts* at *Cambridge*, with a Deſign to enter into holy Orders, and aimed at ſettling himſelf in a ſmall Living near *Derby*, which had been promiſed by a Friend, this limited his Purſuit of greater Honour or Riches. However, Sir *Jonas*, zealous of promoting his Advantage, wrote to him to come to *London*, with a Deſign to procure him a better Support: And he came at his Invitation to *London*, and reſided for ſome Time at that Gentleman's Houſe: During this Interval, Sir *Jonas* brought Mr. *Flamſteed* a Warrant to be the King's Aſtronomer, with a Salary of 100*l. per Annum*. This, however, did not abate our

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Author's Inclinations for Orders, and he was accordingly ordained at *Ely* by Biſhop *Gunning*, who ever afterwards converſed freely with him, and particularly upon his new Philoſophy and Opinions, which Mr. *Flamſteed* was always ready and well qualified to defend. ——— On the 10th of *Auguſt*, 1675, the Foundation of the Royal Obſervatory at *Greenwich* was laid, and during the Building of it, Mr. *Flamſteed*'s temporary Obſervatory was in the Queen's Houſe, where he made his Obſervations of the Appulſes of the Moon and Planets to the fixed Stars, and wrote his Doctrine of the Sphere, which was afterward publiſhed by Sir *Jonas*. ——— About the Year 1684, he was preſented to the Living of *Burſlow* in *Surry*, which he held indeed as long as he lived; but always intent on making Improvements whenever the Duties of his Function did not engage him. This however, as it raiſed him to the Notice of the World, and recommended him to royal Favour and Protection, ſo it likewiſe procured him the Friendſhip and Confidence of ſome of the moſt illuſtrious Perſons in the Knowledge of the philoſophical, aſtronomical, and mathematical Sciences; ſuch as the incomparable Sir *Iſaac Newton*, Dr. *Edmund Halley*, Dr. *John Wallis*, the celebrated *Caſſini*, to whom reſpectively he communicated the Improvements he had made, and by whom many of them were communicated to the *Royal Society*, and ſome of them are printed in the *Philoſophical Tranſactions*; others preſerved in the Libraries of his ingenious Correſpondents, and, through their Means, have been communicated to Poſterity. Among many others, Mr. *Hodgſon* has in his Poſſeſſion above 20 Letters that paſſed between our Author and Sir *Iſaac Newton*, from the Year 1680 to 1699; and a great many others to him from Mr. *Caſſini*, and other eminent Perſons. Dr. *Wotton*, in his Reflections upon ancient and modern Learning, ſtiles our Author one of the moſt accurate Obſervers of the Planets and Stars, and that he calculated Tables of the Eclipſes of the ſeveral Satellites, according to which Aſtronomers, in the different Quarters of the World, having Notice of the preciſe Time when to look for them, have found them to anſwer to his Predictions, and made their Obſervations accordingly. Mr. *Molyneux*, in his *Dioptrica Nova*, gives him a great Character;

and, in the Admonition to the Reader prefixed to the Work, obſerves, that the geometrical Method of calculating a Ray's Progreſs is wholly new, and never before publiſhed; and for the firſt Intimation thereof, ſays he, I muſt acknowledge myſelf obliged to my worthy Friend, Mr. *Flamſteed*.

But that which is of all others the moſt remarkable is, his *Hiſtoria Cœleſtis Britannica*, publiſhed in *London* in 1725. The firſt Volume contains, the Obſervations of Mr. *William Gaſcoigne*, the firſt Inventor of the Way of meaſuring Angles in a Teleſcope by the help of Screws, and the firſt who applied teleſcopical Sights to aſtronomical Inſtruments, taken at *Middleton* near *Leeds* in *Yorkſhire*, betwixt the Years 1638 to 1643, excerpted from his Letters by Mr. *Crabtree*, with ſome of Mr. *Crabtree*'s Obſervations about the ſame Time; as alſo, Obſervations of the Sun's and Moon's Diameters, Configurations, and Elongations of *Jupiter*'s Satellites from him, ſmall Diſtances of fixed Stars, with Appulſes of the Moon and Planets to them, obſerved with a Teleſcope and Micrometer at *Derby*, by himſelf, betwixt the Years 1670 and 1675, with the larger mutual Diſtances of the fixed Stars, and of the Planets, from them; Eclipſes of the Sun, Moon, *Jupiter*'s Satellites, Spots on the Sun, Comets, and Refractions, taken with a Sextant of near ſeven Feet Radius, a valuble Quadrant, and the above-mentioned Inſtruments, betwixt the Years 1675 and 1689, at the Royal Obſervatory, ranked under proper Heads, with the Places of the Moon, *Saturn*, *Jupiter*, *Mars*, *Venus*, and *Mercury*, deduced from the Obſervations; and alſo neceſſary Tables to be uſed with them. —— The ſecond Volume contains, his Obſervations (made with a mural Arch of near ſeven Feet Radius, and 140 Degrees on the Limb) of the meridional Zenith Diſtances of the fixed Stars, Sun, Moon, and other Planets, with the Times of their Tranſits over the Meridian; together with Obſervations of the Sun's and Moon's Diameters, Eclipſes of the Sun, Moon, and *Jupiter*'s Satellites, Variations of the Compaſs, from 1689 to the End of the Year 1719, *&c.* with Tables ſhewing how to render the Calculation of the Stars and Planets Places, from the Obſervations, eaſy and expeditious: To which are added, the Places of the Moon (at her Oppo-

positions, Quadratures, and on her Limits, *&c.*) and the Places of *Saturn*, *Jupiter*, *Mars*, *Venus*, and *Mercury*, derived from the abovementioned Observations. ——— The third Volume contains, a Catalogue of the Right-ascensions, Distances from the Pole, Longitudes and Magnitudes of near 3000 fixed Stars, with Variations of their Right-ascensions and Distances from the Pole, whilst they change their Longitudes one Degree, whereby the Right-ascensions and Distances from the Pole of the Stars and Planets being given, their Longitudes and Latitudes may be found by Inspection. To this Volume is prefixed a very large Preface, containing an Account of all the astronomical Observations made before his Time, with a Description of the Instruments made Use of; as also his own Observations and Instruments, with a new *Latin* Version of *Ptolomy*'s Catalogue of 1026 fixed Stars, from the *Greek*, and *Uleg-beig*'s Places annexed on the *Latin* Page, with the Corrections, small Catalogue of the *Arabs*, *Tycho Brahe*'s of about 780 fixed Stars in a proper Order. The *Landgrave* of *Hesse*'s of 386. *Hevelius*'s of 1534 in a proper Order. A Catalogue of some of the Southern fixed Stars not visible in our Hemisphere, reduced to Right-ascension, Distance from the Pole; Longitude, with Variations of Right-ascension and Distances from the Pole, calculated from Observations made by Dr. *Halley* at St. *Helena*, and Mr. *Flamsteed*'s Places of the Stars, and fitted to the Year 1726. This Work he prepared in great Measure for the Press, with great Care and Accuracy: But through a natural Weakness of Constitution, and the Declines of Age, he died before he had finished it, which was on the 19th Day of *December*, 1719, occasioned by a Strangury, aged 73 Years, leaving a disconsolate Wife, who, pursuant to his Will, published this valuable Work in Conjunction with Mr. *Hodgson*, and dedicated it to the King in 1725. These, his Works, do Honour to his Memory, and are sufficient to perpetuate the same with great Esteem amongst the Learned in these Sciences, and some have been before-hand in paying Tribute to his Merit.

Mr. *Stephen Gray*, in a Letter, dated from *Canterbury*, describing a very ingenious Instrument invented by him for drawing a true Meridian Line by the Pole Star, and also for finding

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the Hour of the Night, has the following Paſſage: "That moſt learned, accurate, and judicious Aſtronomer, Mr. *John Flamſteed*, has lately diſcovered, that there is a Parallaxis of the Earth's annual Orbit at the Pole Star, of about 40 or 45″, whereby the Diameter of the Star's Parallel is greater in *June* than in *December*, by about one Minute, two Seconds, which he has evinced from ſeven Years ſucceſſive Obſervations, whereby the Earth's Motion has been indubitably demonſtrated, as appears from his learned Letter to Dr. *Wallis*, on that Subject."*

Dr. *Wotton*, who was a Perſon of univerſal Knowledge, produces the Labours and Diſcoveries of Mr. *Flamſteed*, to prove, that the ancient Aſtronomy was not at all comparable with the Modern, or which is the ſame Thing, that modern Aſtronomers have far ſurpaſſed the Ancients in Point of Accuracy as well as Extenſiveneſs in their Obſervations.

The great Mathematician, Dr. *John Keill*, has ſaid of Mr. *Flamſteed*, that, with indefatigable Pains for more than 40 Years, he has watched the Motions of the Stars, and has given us innumerable Obſervations of the Sun, Moon, and Planets, which he made with very large Inſtruments, exactly divided with moſt exquiſite Art, and fitted with teleſcopical Sights; whence we are to rely, ſays he, more on the Obſervations he made, than on thoſe that went before him, who made their Obſervations with the naked Eye, without the Aſſiſtance of Teleſcopes.

Mr. *Molineux*, Dr. *Halley*, and other eminent Mathematicians and Aſtronomers, as well abroad as at home, have given high Encomiums on Mr. *Flamſteed*; but what we have inſerted, we think may ſuffice.

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* This has ſince been proved to be a Miſtake by the more accurate Inſtruments and Obſervations of late Aſtronomers; as we are well aſſured that the Parallax of a fixed Star cannot amount to ſo much as a *ſingle Second* without being obſerved.

The LIFE of (GODEFROY) WILLIAM DE LEIBNITZ.

WILLIAM de LEIBNITZ, an eminent Philoſopher and Mathematician, was born at *Leipſic* in *Saxony*, *June* 23, 1646: He was the Son of *Frederic Leibnitz*, Profeſſor of Ethics, and Secretary of the Univerſity of *Leipſic*; who dying when *William* his Son was very young, the Care of his Education devolved on his Mother, who, we find, ſpared no Expence to furniſh him with polite Literature. As his Father had left him a large, and well choſen Library, as ſoon as he was capable, by the Knowledge of *Latin* and *Greek*, he applied himſelf to the proper Uſe thereof, according to the ſeveral Claſſes of Poets, Orators, Hiſtorians, Civilians, Mathematicians, and Divines. He firſt diſcovered a Genius for Poetry, in which he was much aſſiſted by a ſtrong Memory: But this did not engroſs his Attention long; for, about the Age of Fifteen, he applied himſelf to the Study of Philoſophy and the Mathematics, at the Univerſity of *Jena*; and, likewiſe, ſoon after that, at *Leipſic*, whither he returned in 1663, and the Year following was admitted Maſter of Arts.

He now applied his Mind, with great Aſſiduity, to the Study of the *Greek* Philoſophers, and took much Pains to reconcile *Plato* and *Ariſtotle*; as he did, afterward, *Ariſtotle* with *Deſcartes*: But this, probably, proved a difficult, or unprofitable Undertaking; for he now entered upon the Study of the Law, and made it ſo much his ſole, or principal Purſuit, and ſoon became ſo great a Proficient therein, that he was admitted Bachelor of Laws in 1665, and, the Year following, would have been advanced to the Degree of Doctor, had it not been refuſed on Account of his Youth, and it is ſaid, had incurred the Diſpleaſure of ſome of the College for rejecting the Principles of *Ariſtotle* and the Schoolmen.

In the Year 1667, he went to *Altorf*, where he maintained Three Theſes in the Law, with ſuch Applauſe, that he had the Degree of Doctor conferred on him, and was ordered a Profeſſor-

ſhip extraordinary in Law, which latter he refuſed.——— Thence he went to *Nuremberg*, in order to viſit the learned Men there, and was introduced into a Society of Perſons there engaged in the Purſuit of the Philoſophers Stone: He was alſo admitted into their Laboratory, and deſired to act as their Secretary, offering him a Penſion; but this he declined.

About this Time, *Baron de Boinebourg*, firſt Miniſter of the Elector of *Mentz*, meeting Mr. *Leibnitz* at an Entertainment, conceived ſo high an Opinion of his Abilities, that he recommended to him to apply himſelf wholly to the Study of Law and Hiſtory, and promiſed to engage the Elector, *John Philip de Schonborn*, to ſend for him to his Court. Upon this, Mr. *Leibnitz* removed to *Frankfort upon the Mein*, in the Neighbourhood of *Mentz*.

In 1668, he wrote a Treatiſe to induce the *Poles* to chuſe the Elector Palatine their King; which ſo highly pleaſed the Elector, that he invited him to his Court: But he was prevented from accepting this Invitation by the Baron *Boinebourg* procuring the Elector of *Mentz*'s Delegation appointing him Councellor of the Chamber of Review in his Chancery, though he was then but 22 Years of Age.

In 1672, he went to *Paris* to manage ſome important Affairs of the Barons, and during his Stay there, he contracted ſuch an Acquaintance with Gentlemen in the philoſophical and mathematical Sciences, as led him more particularly to the Study of the Mathematics; and having obſerved ſome Defects in the arithmetical Machine of *Monſieur Paſcal*, he invented a new one, the Deſign of which he explained to *Monſieur Colbert*, which was greatly approved of by him and the Academy of Sciences, who, as a Mark of their Eſteem, offered him a Penſion, and promiſed him other Advantages to reſide there, and to commence a Member of that Society: But, as it would be neceſſary for this End to embrace the *Roman* Catholic Religion, and Mr. *Leibnitz* being firmly attached to the *Lutheran*, he abſolutely refuſed all the Offers that were made him by that Society.

In 1673, upon the Death of the Baron *de Boinebourg*, he came over to *England*, where he became acquainted with Mr. *Oldenburg*,

burg, Secretary of the *Royal Society*, and Mr. *John Collins*, Fellow of that Society; and then he applied himſelf, with Vigour, to the Study of the Mathematics, (in which he acknowledges to have received great Aſſiſtance from the Writings of *Paſcal*, *Gregory*, and *Huygens*) and took ſo much Pleaſure in his Studies and Friends, as greatly contributed to fix his Reſidence in *England*.

But, ſoon after this, he received an Account of the Death of the Elector of *Mentz*, by which he loſt his Penſion. Upon this, he returned to *France*, whence he wrote a Letter to the Duke of *Brunſwick Lunenburg*, to inform him of his Circumſtances, who returned him a very kind Anſwer, and, as a Pledge of his Favour, appointed him Councellor of his Court, with a Stipend, and gave him Leave to continue at *Paris* till his arithmetical Machine ſhould be completed.

In 1676, he returned again to *England*, and from thence went to *Holland*, in order to proceed to *Hanover*, where he propoſed to ſettle: Upon his Arrival there, he applied himſelf to furniſhing the Prince's Library with the beſt Books in the various Branches of Science and Literature. —— The Duke of *Brunſwick Lunenburg* dying in 1679, his Succeſſor *Erneſt Auguſtus*, then Biſhop of *Oſnabrug*, ſhewed our Author the ſame Favour as his Predeceſſor had done, and ordered him to write the Hiſtory of the Houſe of *Brunſwick*. Mr. *Leibnitz* undertook it, and travelled over *Germany* and *Italy* in order to collect Materials, and returned to *Hanover* in 1690.

In 1700, he was admitted a Member of the *Royal Academy* of *Paris*. —— The ſame Year, the Elector of *Brandenburg*, afterwards King of *Pruſſia*, founded an Academy at *Berlin*, under the Direction of Mr. *Leibnitz*, who was appointed perpetual Preſident: And though his Affairs did not admit of his conſtant Reſidence there, he furniſhed their Memoirs with ſeveral curious Pieces in Geometry, Aſtronomy, and other Branches of polite Literature.

His Fame ſpread, about this Time, through all *Europe*, as a Philoſopher, Lawyer, and Sateſman: That beſides the Office of Privy Councellor of Juſtice, which the Elector of *Hanover* had given him, the Emperor, upon the Recommendation of

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the Duke of *Brunſwick* in 1711, appointed him *Aulic* Counſellor; and the *Czar* made him Privy Counſellor of Juſtice, with a Penſion of a thouſand Ducats a Year, after but a few Hours Acquaintance, or Converſation with him, at *Torgaw*, at the Time of the Marriage of the Princeſs of *Wolfenbuttle* with the Son of that Prince.

Upon his Return to *Hanover* in 1714, he found that the Elector, who was then raiſed to the Throne of *Great Britain*, had appointed Mr. *Echard* for his Collegue in Writing the Hiſtory of *Brunſwick*, the Proſecution of which had been interrupted by many occaſional Peices, and ſome incidental Controverſies.

The moſt conſiderable of which, antecedent to this Time, was concerning the Invention of a new Method of *Fluxions*, which he claimed as his own, though he received the firſt Hints thereof from Sir *Iſaac Newton*'s Letters. The Method of *Fluxions*, as Sir *Iſaac* ſtiles it, and other *Engliſh* Mathematicians after him, is the ſame Method of Analyſis as what Mr. *Leibnitz* calls *Calculus Differentialis* (in which he has been followed by moſt of the Mathematicians abroad.) This Invention gave Occaſion to a Paper Diſpute, firſt between Mr. *Keill* and Mr. *Leibnitz*, and afterwards between Sir *Iſaac* and Mr. *Leibnitz*, in which, the Difference betwixt Sir *Iſaac*'s Method of *Fluxions* and Mr. *Leibnitz*'s is ſo ſmall and trivial, that our *Engliſh* Mathematicians have given the Credit of it to Sir *Iſaac*. The Subſtance of what paſſed *Pro* and *Con* may be ſeen in the *General Dictionary*, to which we refer the Reader; but more particularly in a ſmall Treatiſe entitled, *Commercium Epiſtolicum*, publiſhed by Order of the *Royal Society* of *London*.

About the latter End of the Year 1714, our Author returned again to *England*, when he received ſome farther Marks of Friendſhip from the Elector of *Hanover*, then his *Britannic* Majeſty, and was frequently at Court: But he had not been in *England* long before he engaged in a Diſpute with Dr. *Samuel Clarke*, relating to the Principles of natural Philoſophy and Religion. This was conducted with much Candor and Learning; and thoſe Papers, which are publiſhed by Dr. *Clarke*, will ever be eſteemed by Perſons of Genius, Learning, and Penetration, on theſe Subjects: But Mr. *Leibnitz*'s Death terminated thoſe Diſputes,

putes, probably, much ſooner than otherwiſe, he dying *Nov.* 14, 1716, in the 70th Year of his Age, of the Gout and Stone.

His diſtinguiſhed Character for Learning, great natural Abilities, and polite Addreſs, were ſuch Qualifications as gave him Admiſſion and Favour at ſeveral Courts of *Europe*. As he was not inſenſible of the Honour of being conſidered as one of the greateſt Men of the Age, ſo he was always ſolicitous to procure and continue the Favour of Princes, which, how much ſoever it may ſavour of Vanity, he laudably made uſe of that Advantage for the Promotion of Learning, as well as his perſonal Intereſt; for he was very fond of Money, and amaſſed together ſeveral thouſand Pounds. He never was married, though he made Courtſhip when he was about 50 to a Gentlewoman, who, it is ſaid, deſired Time to conſider of it: Mr. *Leibnitz* had thereby an Opportunity to do the ſame, which was all the reſt of his Life. This neglect of Marriage, without any real Averſion to it, was greatly wondered at by ſome of his Friends, who knew he was naturally of a warm Temper, and had a natural Son in his Youth, whom he took Care to have educated, and afterward was his Companion and Confident during his Life. It is likewiſe obſerved, that the natural Warmth of his Temper ſubjected him to many of thoſe Diſputes which he began and ſupported in the Courſe of his Life, never giving up a Point of which he was not fully convinced, and too apt to triumph over his Adverſary where he had, as he apprehended, any Advantage. ——— This Attachment to his favourite Sentiments, and his general Knowledge of Science, led him too often to think himſelf Maſter of many Subjects which he had but ſuperficially conſidered, and thereby loſe himſelf in the Intricacy, and ſuffer in his Reputation. This is ſpoken principally with regard to ſome Reflections our Author made on Mr. *Lock*'s *Eſſay on Human Underſtanding*, which occaſioned Mr. *William Molyneux*, in a Letter to Mr. *Locke*, to write thus: "Mr. *Leibnitz* is certainly an extraordinary Perſon, eſpecially in Mathematics; but, really, to ſpeak freely of him, in Relation to his Reflections on your Eſſays on *Human Underſtanding*, I do not expect any great Matters from him; for methinks (with all Deference to his great Name) he has given the World no extraordinary Samples of his

Thoughts that Way." In anſwer to which, Mr. *Locke* obſerves, that even great Parts will not maſter any Subject without great thinking. ——— In the Profeſſion of Religion, he was a *Lutheran*, but held many Sentiments that did not conſiſt with any eſtabliſhed Form, and thought indifferently of the Prieſt; for he ſeldom or never attended the public Service of the Church, and refuſed the Attendance of a Miniſter in his laſt Illneſs.

He was of a moderate Stature and thin in Body, uſing much Study and Temperance, which contributed to the Strength of his intellectual Faculties; for, it is ſaid, he could repeat *Virgil* by Heart.

His Writings were equally numerous and voluminous: But as they were on all Kind of Subjects indiſcriminately, and in no particular, or ſyſtematic Order, eſpecially in Mathematics and Philoſophy, we cannot here propoſe to trouble the Reader with a tedious Catalogue of ſuch detached Pieces, Letters, Memorials, *&c.* which may be ſeen at large in the *general Biographical Dictionary*, and moſt of his mathematical Memoirs in the *Acta Eruditorum*, *&c.*

The LIFE *of* JOHN LOCKE.

JOHN LOCKE, a celebrated Politician, and Metaphyſician, rather than a Philoſopher, deſcended from a genteel Family in *Somerſetſhire*, being born at *Wrington* in 1632: He had an early and liberal Education, firſt in the Grammar-ſchool at *Weſtminſter*, and afterwards at *Chriſt's Church* in *Oxford*, where he made a very diſtinguiſhing Progreſs in Learning, took his Degree in Arts at the earlieſt Periods, and entered more particularly on the Study of Phyſic with greater Application than was conſiſtent with his Health, and therefore, on the Advice of Friends, he declined it, and accepted an Offer made him, of going Abroad as Secretary to Sir *William Swan*, who was Envoy to the Elector of *Brandenburg* and other *German* Princes: But this Employ continuing but one Year, he returned again to his Studies at *Oxford*, and gave ſome remarkable Inſtances of his Skill in this Science.

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In 1669, he attended the Counteſs of *Northumberland* into *France*, with her Huſband; but the Earl dying at *Turin*, Mr. *Locke* ſoon returned with her Ladyſhip to *England*. He then reſided at Lord *Aſhley*'s, but, occaſionally, gave ſuch Hints of a Latitude in Sentiments reſpecting Religion as was not then generally approved; ——— he was very early diſguſted with the Method of *Ariſtotle*, and the common Syſtems of Logic and Metaphiſics uſed in the Schools, and much averſe to the ſcholaſtic Diſputations: He reſolved to attempt ſomething that Way, and formed the Plan for his Eſſay on *Human Underſtanding*, which he proſecuted with all the Diſpatch his other Affairs permitted. He was ſtill properly in the Service of his Patron, who, being created Earl of *Shaftſbury*, and Lord Chancellor the following Year, engaged Mr. *Locke* as his Secretary. He held this Place till *November*, 1673, when he had a Commiſſion from the Board of Works, and 500*l. per Ann.* But this terminated the very next Year; for the Commiſſion granted to the Board itſelf was diſſolved.

In 1674, he again returned to his Studies at *Oxford*, and took the Bachelors Degree in Phyſic; but his Studies were interrupted by an Indiſpoſition tending to a Conſumption, and he went to *France* the next Summer for his Health. His Thoughts were, however, employed on the Subjects of his Eſſay, which he communicated to Lord *Herbert*, and received no ſmall Encouragement in the intended Work: But did not neglect his Attention to the Science of Phyſic, and was much eſteemed by that Faculty, eſpecially Dr. *Sydenham* and Dr. *Mapletoft*, with whom he held a Correſpondence during his Reſidence at *Montpelier*.

The Earl of *Shaftſbury* being reſtored to Favour at Court in 1679, Mr. *Locke* was ſent for to be his Secretary, when his Lordſhip was made Preſident of Sir *William Temple*'s Council; but being diſgraced and impriſoned in leſs than half a Year, he fled into *Holland*, where our Author thought proper to follow him for his own Safety, as he had the Meaſures of the Government at that Time; and, as he ſteadily adhered to Revolution Principles, he was obliged to remain Abroad, as it were, concealed, which was probably no ſmall Diſadvantage to him in reſpect to Riches; but it gave him an Opportunity for Writing

on

on a Variety of Subjects, which he did with ſuch Strength, Juſtneſs of Sentiment, and of Reaſoning, as will ever be eſteemed by the Friends of Truth and Liberty.

Soon after his Return to *England*, which was (in the Fleet which convoyed the Prince of *Orange*) in *February*, 1689, he was made Commiſſioner of Appeals, which was 200*l. per Ann.* and was offered to go Abroad in Character of Envoy to the Court of the Emperor, or to the Elector of *Brandenburg*, but he declined both, and accepted the Invitations he received to reſide at Sir *Francis Marſham*'s at *Oates* in *Eſſex*, where, beſides the Agreeableneſs of the Seat and the Benefit accruing to his Health, he found, in Lady *Marſham*, a Friend and Companion exactly to his Wiſh: A Lady of contemplative and ſtudious Complexion, and innured to deep and refined Speculations, which contributed to animate our Author in a further Exertion of his Talents on many intereſting and important Subjects: Here we find him writing in Defence of the Revolution, —— and in attempting to aſcertain the Standard of the *Engliſh* Coin.

In 1695, he was appointed Commiſſioner of Trade and Plantations, which much engaged him for about three Years in the Affairs of State; after which he returned to *Oates*, the forementioned Seat of Lady *Marſham*, and there continued to the End of his Life. He was very ſenſible of his Diſſolution, and always ſpoke of it with great Compoſure. He expired on the 28th of *October*, 1704, in the 73d Year of his Age. His Body was interred in the Church at *Oates*. For a Catalogue of his many and valuable Works, on a Variety of Subjects, chiefly political and mechanical, beſides a ſmall Treatiſe on the *Newtonian* Philoſophy, we may refer the Curious to the *new general Biographical Dictionary*.

His Character has been often attempted, particularly by Mr. *Peter Coſte*, his Companion and Amanuenſis: But the higheſt Elogium upon him was certainly that of the late Queen *Caroline*, who erected a Pavilion in *Richmond* Park in Honour of Philoſophy, where ſhe placed our Author's Buſt on a Level with *Bacon*, *Newton*, and *Clarke*, as the four principal *Engliſh Virtuoſi*. —— But this Parallel will not meet with much Approbation from thoſe who beſt underſtand Nature and Science.

The LIFE of the Hon. Robert Boyle, Esq;

ROBERT BOYLE, one of the greateſt experimental Philoſophers as well as the beſt of Men, was born at *Liſmore*, in the Province of *Munſter* in *Ireland*, upon the 25th of *January*, 1626-7, his Father was *Richard*, Earl of *Cork*, being his ſeventh Son and the fourteenth Child, by one of the moſt accompliſhed Women, who dying when this Son was ſcarce three Years old, the Care of his infant Years devolved on the Father, who was not wanting in the Care of his Conſtitution nor Education. He had ſo great Averſion to the ill judged Fondneſs of ſome Parents, who will ſcarce let the Sun ſhine, or the Wind blow upon their Children, that he committed him to the Care of a Nurſe in the Country, with Orders to bring him up hardy; and this probably contributed to his being of a ſtrong and vigorous Conſtitution. When he had paſſed through the neceſſary Rudiments of School-learning in that Country, in the Year 1635, his Father ſent him to *England*, in order to be educated at *Eaton* under Sir *Henry Wotton*, an intimate Acquaintance of his Father's. Here he ſoon diſcovered a Force of Underſtanding, and ſuch a Diſpoſition to improve and cultivate it, as gave great Hopes of his future Eminence: Here he continued for three Years, when his Father carried him to his own Seat at *Stalbridge*, where he remained ſome Time under the Care of one of his Chaplains. —— Here he wrote ſome Memoirs of his early Years, in which he diſcovered a very ſerious Turn of Mind, as he firſt, and very minutely, relates various remarkable Inſtances of divine Goodneſs, in his many ſignal Eſcapes from eminent Danger of his Life; whereby he was probably led, or determined upon devoting himſelf to the Study of Religion in its genuine Principles and Practices, particularly to the Study of the Holy Scriptures in their original Languages. For theſe Purpoſes, about the Year 1640, he went to the Univerſity of *Leyden* in *Holland*, where he received his academical Education, and afterwards travelled into *France*, *Switzerland*, and *Italy*, where he made ſuch conſiderable Improvements in the oriental Languages (which he continued for many Years afterwards) that Biſhop

Burnet took Notice, in his funeral Diſcourſe upon him, that he could have quoted all the remarkable Paſſages of the *Old Teſtament* very readily in the *Hebrew*, or thoſe of the *New Teſtament* in *Greek*.

Upon his Return from his Travels, about the Year 1655, he ſettled in the Univerſity of *Oxford*, where he proſecuted his Studies with great Vigour, eſpecially thoſe of experimental Philoſophy and Chymiſtry, in which he ſpent a conſiderable Sum of Money, entertaining Operators to work in the Laboratory, which he had built for his own Uſe. ——— Here he read the Philoſophy of *Ariſtotle* and *Des Cartes*, with a Criticiſm and Attention that enabled him to form right Judgment with reſpect thereto: And finding their Account of Things were founded chiefly on Conjecture and mere Hypotheſis, he ſaw the greater Expediency and Advantages of Philoſophy founded on Experiments, and therefore proceeded with great Steadineſs on thoſe Principles which were more certain and demonſtrable.

He frequented, likewiſe, the Society of the *Virtuoſi*, who met in the Apartment of Dr. *Wilkins*, Warden of *Wadham College* (which they ſtiled the philoſophical College): Here many united with him in the Improvement of experimental Philoſophy, among whom were Dr. *Seth Ward*, Dr. *Wilkins*, Dr. *Bathurſt*, Mr. *Chriſtopher Wren*, Mr. *Rook*, and ſeveral others. For ſome Time they were not under the Regulations and Orders of a Body corporate, but communicated to each other their Sentiments, with great Freedom, which they either had or apprehended might be confirmed by Example: This they continued till the latter End of the Year 1658, when many of them removed from *Oxford*; and the greater Part coming to *London*, they uſually met at *Greſham College*, and united, with many other learned and ingenious Gentlemen, in their Improvements of the true Principles of Philoſophy by Experiments.

In the Year 1657, our Author communicated ſeveral Experiments on the AIR PUMP, which was in ſome Meaſure his own Invention, and perfected by that ingenious Philoſopher Mr. *Hook*. By this Means he diſcovered and demonſtrated ſeveral Qualities of the Air, ſo as to lay a Foundation for a compleat Theory; whereby his Improvements became very con-

conſiderable, and his Character, on this Account, highly eſteemed by thoſe who knew him.

About this Time the famous Dr. *Wallis*, ſo diſtinguiſhed for his Philoſophical and Mathematical Learning, did him the Honour to dedicate to him his excellent Treatiſe on the *Cycloid*, and Dr. *Nathaniel Highmore*, a very eminent Phyſician, dedicated a Book to him under the Title of *The Hiſtory of Generation*.

Not long after the Reſtoration of King *Charles* II. when the Royal Society was incorporated, he was one of the firſt Members of it, and appointed one of the Council to it, and afterwards Preſident; where he diſtinguiſhed himſelf, as Mr. *Wood* obſerves, as the greateſt Promoter of the New Philoſophy (as it was then called) of any amongſt his Cotemporaries: And for this Purpoſe, he maintained a Correſpondence with ſeveral Proficients in theſe Sciences, particularly Sir *Iſaac Newton*.

He took great Pains to acquire a proper and certain Knowledge of the various Properties of natural Bodies, and communicated the Reſult of his Enquiries, when it might be done with Satisfaction and Uſefulneſs. Some of theſe were the following:———That the Matter of all natural Bodies is the ſame, *viz.* an extended, diviſible, impenetrable Subſtance:——That the Principles of natural Bodies depend partly on the Influence of external Objects, as well as the primary Affections of Matter:———He likewiſe inveſtigated the Nature of Fluids,———the great Effects of unheeded and languid Motion,———the Nature of Heat and Cold,———and the final Cauſes of natural Things.———He likewiſe invented, or improved an Inſtrument for eſtimating the Difference of Metals;———explained an Inſtrument, called the *Statical Hygroſcope*, to ſhew the different Variations of Weather, and the Deſcription of a Cord Hygrometer;———made many curious Diſcoveries with Reſpect to the Air;——the Nature of the human Blood;———exhibited many Experiments to prove the Properties of Mineral Waters, and for making ſalt Water ſweet; and uſed a Variety of Methods to improve the Knowledge of the *Materia Medica*.———He ſearched into the Origin and Virtue of Gems;——— the determinate Nature of

Effluvia, their Subtlety and Efficacy; —— the Incaleſcence of Gold and Mercury; —— the Cauſes of Attraction and Suction; ——and the Nature of Electricity. —— He likewiſe ſtudied and ſhewed the Uſe of ſpecific Medicines, with its Reconciliableneſs to the corpuſcular Philoſophy, and the Advantages and Uſe of ſimple Medicines.——He likewiſe made many elaborate Proceſſes in Chymiſtry, which he collected together and left, as a Kind of hermetic Legacy, to the ſtudious Diſciples of that Art. —— Dr. *Boerhaave* therefore ſaid of him, "To him we owe the Secrets of Fire, Air, Water, Animals, Vegetables, and Foſſils: So that from his Works may be deduced, the whole Syſtem of natural Knowledge.

But Philoſophy and Enquiries into Nature, though they engaged his Attention deeply, did not engroſs it intirely, ſince we find that he ſtill continued to purſue critical and theological Studies: In theſe he had the Aſſiſtance of ſome great Men, particularly Dr. *Edward Pococke*, Mr. *Thomas Hyde*, and Mr. *Samuel Clarke*, all of great Eminence for their Skill in the oriental Languages. He had alſo a ſtrict Intimacy with Dr. *Thomas Barlow*, at that Time Keeper of the *Bodleian* Library, and afterwards Biſhop of *Lincoln*.

About the Year 1663, Mr. *Boyle* received ſome Marks of the Royal Favour, and was treated with much Civility and Reſpect by the two great Miniſters, the Lord Treaſurer *Southampton* and Lord Chancellor *Clarendon*. He was ſollicited by the latter to enter into Holy Orders, not only out of Regard to him and his Family, but chiefly with a View to ſerve the Church itſelf, my Lord *Clarendon* declaring, that his unblemiſhed Life and diſtinguiſhed Learning would do Honour to any eccleſiaſtical Preferments he might attain. —— Mr. *Boyle* conſidered all this with due Attention, but, to ballance theſe, he reflected, that, in the Situation of Life he was in, whatever he wrote in ſupport of Religion would have as great Weight as if he was in the Character of a Clegyman: —— That he needed no Acceſſions with reſpect to Fortune, nor indeed any eager Appetite for greater; but, above all, according to his wanted Modeſty, he frankly declared, that he had not felt any Motion or Tendency of Mind which he could ſafely eſteem a Call from the Holy Ghoſt; and ſo not venturing to take Holy Orders leſt he ſhould be found to have lied

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into it. He choſe therefore to purſue his philoſophical Studies in ſuch a Manner as might be moſt effectual for the Support of Religion, and began to communicate to the World the Fruits of thoſe Studies.

He was conſtant to the eſtabliſhed Church, an Enemy to Perſecution in Matters of Conſcience, and averſe to all contracted Notions of Religion. He had poſſeſſed himſelf of ſuch an amiable View of Chriſtianity, ſeparated from either ſuperſtitious Practices, or the Sourneſs of Parties: He conſidered it as a Syſtem of Truths, which ought to purify the Hearts and govern the Lives of thoſe who profeſs it: He loved no Practice which ſeemed to leſſen that, nor any Niceties which occaſioned Diviſions among Chriſtians. He loved no narrow Thoughts, nor ſuperſtitious Opinions in Religion; and therefore, as he did not ſhut himſelf within a Party, ſo neither did he ſhut any Party out from him. He had a particular Averſion to all thoſe Opinions and Practices which ſeemed, to him, to deſtroy Morality and Charity. Severities and Perſecution upon the Account of Religion, he looked upon as directly oppoſite to the Spirit of it. He was extremely candid and courteous, and free of Acceſs even to Strangers and Foreigners. ——— His Laboratory was conſtantly open to the Curious, whom he permitted to moſt of his Proceſſes. ——— He was plain, unaffected, and temperate in his Life, and bore all his Infirmities and Pains with the Decency and Submiſſion that became a Chriſtian and a Philoſopher; and whatever he was in the Sight of Men, how pure and ſpotleſs ſoever his Character appeared to the World, he was, in Reality, the ſame in his moſt ſecret Receſſes. He allowed himſelf a great deal of decent Chearfulneſs, having nothing of that Moroſeneſs which ſome Philoſopers have been chargeable with, nor of that Affectation which Men of extraordinary Piety often run into without being well aware of. ——— His Charity and Generoſity were the moſt exemplary imaginable, great Sums were readily parted with by him without the Partialities of Sect, Country, or Relations. This may be evidenced, in a Variety of Inſtances, as the general Tenour of his Conduct. ——— He ſpoke of the Government, even in Times which he diſliked, and upon Occaſions which he ſpared not to condemn, with a remarkable Exactneſs. King *Charles the Second*, King *James*, and King

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William were ſo highly pleaſed with his Converſation, that they uſed to converſe with him with great Familiarity. —— His four elder Brothers being all Noblemen, he was ſeveral Times offered a Peerage, which he conſtantly refuſed to accept; but he procured a Title, which without derogating from the Dignity of Kings, muſt be acknowledged beyond their Prerogative to confer. He had too unblemiſhed a Candour to be capable of thoſe little Arts and Practices which the World generally term *Wiſdom*. He could neither lie nor equivocate, but could be ſilent, and by practiſing that with Prudence and Diſcretion he recovered himſelf upon many uneaſy Occaſions. He made true Judgment of Men and Things, and his Advices were ſolid and rational; and if Caution and Modeſty gave too ſtrong a Bias, his Invention was fruitful to ſuggeſt good Expedients. He entertained a very high Opinion of the Dignity of human Nature, and of the great Improvements Man is capable of: But was ſurprized, to ſee how little the Generality, even of the more polite Part, were influenced by manly Principles and rational Motives. He very early perceived that the Affairs and Favours of Courts were very precarious, and therefore withdrew himſelf from the flattering Temptations of it, at a Time, ſays Dr. *Burnet*, when he was treated with Marks of Diſtinction. He had the Principles of an *Engliſhman* as well as of a Proteſtant, too deep in him to be corrupted or cheated out of them; and in theſe he ſtudied to fortify all that converſed with him. "He had a prodigious extenſive, as well as accurate Knowledge, and carried the Study of the *Hebrew* Language very far into the rabinical Writings and the other oriental Languages. He had read ſo much of the Fathers as to form a clear Judgment of all the eminent Ones. He had ſtudied the Scriptures with great Aſſiduity, and had gone with great Attention thro' the controverſial Parts of Religion, ſo as to be Maſter of the whole Body of Divinity. —— He run thro' the whole Compaſs of the mathematical Sciences, and tho' he did not ſet himſelf, ſays Biſhop *Burnet*, *to ſpring new Game*, yet he knew even the abſtruſeſt Parts of Geometry. —— Geography, in the ſeveral Parts of it which related to Navigation or Travelling, and Books of Travels, were his Diverſion. —— He went very accurately thro' all the Parts of Phyſic, only the Tenderneſs of his Nature made him leſs liable to endure the Exactneſs of anatomical Diſſections, eſpe-

eſpecially of living Animals, though he knew theſe to be moſt inſtructing. But, for the Hiſtory of Nature, ancient and modern, of the Productions of all Countries, of the Virtues and Improvements of Plants, of Ores and Minerals, and all the Varieties that are in them, in different Climates, he was by much, ſays the Writer laſt quoted, the Readieſt and moſt Perfect that I ever knew, in the greateſt Compaſs and with the trueſt Exactneſs. This put him in the Way of making all that vaſt Variety of Experiments, beyond any Man, for what we know, that ever lived. And in theſe, as he made a great Progreſs in new Diſcoveries, ſo he uſed ſo nice a Strictneſs and delivered them with ſo ſcrupulous a Truth, that all who have examined them have found how ſafely the World may depend upon them. But his peculiar and favourite Study was Chymiſtry, in which he engaged with none of thoſe ſiniſter and ambitious Deſigns that drew many into them. His Deſigns was only to find out Nature, to ſee into what Principles things might be reſolved, and of what they were compounded, and to prepare good Medicaments for the Bodies of Men. He made Chymiſtry a Charity to others, as well as an Entertainment to himſelf; employing his Siſter, and others, in diſtributing his Preparations wherever they might be ſerviceable. Biſhop *Burnet* ſums up his Character in theſe Words: "He, who laboured moſt, at the greateſt Expence, and with the moſt Succeſs, at Experiments, was *Robert Boyle*, the Earl of *Cork*'s youngeſt Son; he was looked upon by all that knew him, as a moſt amiable Patron, worthy of Imitation; and as a devout Chriſtian, humble and modeſt, unblemiſhed through Life, who delighted in nothing ſo much as in doing Good, mortified to the World, and living abſtracted from mere ſenſual Pleaſures and worldly Intereſt." His Health, in the latter Part of his Life, was tender, and frequently interrupted; yet, by obſerving an exact Regimen of Diet, and never indulging an Exceſs, he attained to the ſixty-fourth Year of his Age, and retained his Sight to the laſt. The Picture of him, which is prefixed to many of his Works, is extremely like him. He died *December* 30, 1691, and was interred in St. *Martin*'s in the Fields; his funeral Sermon was preached by Dr. *Gilbert Burnet*, Biſhop of *Saliſbury*, on *Eccleſ.* ii. 26. *For God giveth to a Man, that is good in his Sight, Wiſdom, Knowledge, and*

Joy;

Joy; a great Number of Elogies and Epitaphs upon him were ſoon after publiſhed. Theſe are generally carried to too great a Length, as no Man is infallible, but there were in ſome particular Acts of his Life, ſuch ample Proofs of his moral and religious Character, as well as his philoſophical, that it is really no leſs than an Act of Juſtice to mention ſome of them, *viz.* ——— His conferring on Dr. *Saunderſon* an honorary ſtipend, of 50*l.* a Year, for his ſingular Learning and Piety; when, by his Attachment to the Royal Party (which our Author did not eſpouſe) he had loſt all his Preferments, and was reduced to very unhappy Circumſtances. ——— He had very much at Heart the Care of Clergymen's Widows and their Children; as alſo the augmenting the Salaries of ſuch as could not well ſubſiſt on their Livings. Theſe Ways he diſburſted more than 1000*l. per Ann.* ——— About the Year 1682, he appropriated a very conſiderable Sum for the Propagation of the Goſpel amongſt the *Indians*, and was at the Charge of the Tranſlation, and an Impreſſion of the *New Teſtament* in the *Malayan* Tongue, which he ſent over all the *Eaſt-Indies*. ——— He beſtowed a noble Gratuity on the Tranſlator of *Grotius* on the Truth of the *Chriſtian* Religion into *Arabic*, and diſperſed an Impreſſion into thoſe Countries where it was underſtood: ——— Gave 700*l.* to the Edition of the *Iriſh* Bible; and contributed a like Sum to an Impreſſion of the Bible in the *Turkiſh* Language. ——— And he purchaſed many Books for the Promotion of Truth and Religion throughout *Great-Britain*. And laſtly, in Honour and Defence of the Chriſtian Religion, founded a Lecture, for ever, with a handſome Salary. So that we may, with great Propriety, apply to him that compendious and genuine Character given of him by Dr. *Shaw*, *viz.* ——— "He had a true philoſophical Mind, well ſeaſoned with Humanity, Beneficence, and Goodneſs. After he had led us through all the Regions of Nature, conſidered her various Productions, ſhewed us the Uſes and the Manner of converting them to our ſeveral Purpoſes, convinced us that we live in a World moſt wiſely contrived, wherein numberleſs grand Deſigns are at once carried on with unceaſing Variety, and manifeſted that all the Beings, and all the Bodies we know, jointly conſpire as one whole, in bringing about the great Ends of Nature, he bids us not ſtop here, but leaves us full of

of Aſſurance, that the farther we enquire into the Works of the univerſal Architect, the more Beauty and Harmony, and the greater Uſe and Satisfaction we ſhall find among them, and this as long as the Frame of the World endures. Theſe noble, manly, and religious Sentiments are what the Reader will find inculcated through moſt of the philoſophical and theological Works of Mr. *Boyle*, whoſe principal Aim and great Delight it was to benefit Mankind. His great Abilities in philoſophical Knowledge may, in Part, be judged of from the Elogiums beſtowed on him by many, at that Time diſtinguiſhed for their Learning, as Dr. *Shaw*, before mentioned, Dr. *Robert Plott*, Dr. *Herman Boerhaave*, Mr. *Bolton*, Mr. *Budgell*, Dr. *Halley*, Dr. *Wotton*, Mr. *Joſeph Glanville*, *Franceſco Redi*, and others; but more fully from his Works; theſe were, indeed, very numerous, ſome on theological and chemical, but principally on philoſophical Subjects, in all *Sixty-three*; beſides ſeveral Letters publiſhed in the *Philoſophical Tranſactions*; of which a Catalogue is given, with their Editions and Tranſlations, and Extracts from ſundry of them, by way of Note, at the Cloſe of his Life, in the *General Biographical Dictionary*, to which we ſhall refer the Curious, having already hinted at many of the principal Subjects of his Inveſtigation, and preſuming a farther Detail of them would be thought unentertaining to our Readers. We ſhall, however, inſert the Character given of his Works by Mr. *Joſeph Glanville*: He ſays, "His Works are ſufficient to oblige all Mankind, and to erect an eternal Monument to his Memory. In his Works you will find the greateſt Strength of Reaſoning, and gentleſt Smoothneſs; the moſt generous Knowledge, and the ſweeteſt Modeſty; the nobleſt Diſcoveries, and the ſincereſt Relations; the greateſt Self-denial, and univerſal Love to Men; the profoundeſt Inſight into Philoſophy and Nature, and the moſt devout affectionate Senſe of God and Religion."

As to the Perſon of this great Man, we are told, that he was tall, but ſlender; and his Countenance pale and emaciated; his Conſtitution tender and delicate, and was therefore very careful to obſerve and regulate himſelf, according to the Changes of the Weather by his Thermometer.

Mr. *Boyle* was never married, but we are credibly informed, he courted the ingenious and beautiful Daughter of *Cary*, Earl of

Monmouth, and that to this Paſſion was owing his ſeraphic Love. He afterwards abſtained from Marriage, from Political, or Philoſophical Motives.

It is much admired by many, that Mr. *Boyle* was never made a Peer; but this was not owing to a want of Opportunity, but his Choice of a more private Character and Station, to devote his Life to thoſe Studies which were the Honour and the Happineſs of his Life.

The LIFE of JOHN NEWTON.

JOHN NEWTON, an eminent *Engliſh* Mathematician, was the Grandſon of *John Newton* of *Axmouth* in *Devonſhire*, and Son of *Humphrey Newton* of *Oundle* in *Northamptonſhire*, where he was born in 1622: After he had received the proper Rudiments of a grammatical Education, he was ſent to *Oxford*, and commenced Commoner of St. *Edmund's-Hall* in 1637. He took the Degree of Batchelor of Arts in 1641, and his diſtinguiſhing Talents were ſo conſpicuous in the great Branches of Literature, that he was created Maſter of that Faculty the Year following, in Precedence to many other Students of Quality. At this Time, his Genius leading him principally to the Study of Aſtronomy and the Mathematics, he applied himſelf diligently to thoſe Sciences, and made a great Proficiency in them, inſomuch that he was able to write with great Skill and Accuracy on ſeveral important Branches thereof: But theſe did not engroſs all his Time and Study, theological Subjects were likwiſe attended to, ſo as to qualify him for thoſe high Preferments in the Church which he ſoon after enjoyed; for immediately upon the Reſtoration of King *Charles* II. he was created Doctor of Divinity at *Oxford*, made one of the King's Chaplains, and Rector of *Roſs* in *Herefordſhire*, in the Place of Mr. *John Toombs*, who was ejected for Nonconformity, which Living he held till his Death, which happened at *Roſs* on *Chriſtmas-Day*, 1678. We meet with no other remarkable Memoirs of his Life. His Writings are a

Proof

Proof of his great Application to Study, and a ſufficient Monument of his Genius and Skill in the Mathematics: Theſe are the principal, *viz.*

I. *Aſtronomia Britannica*, in three Parts, 4to.
II. Tables of Declination, Aſcenſion, *&c.* for calculations.
III. *Trigonometria Britannica.* Folio.
IV. *Chiliades centum Logarithmorum.*
V. Geometrical Trigonometry.
VI. Mathematical Elements.
VII. A perpetual Diary.
VIII. A Treatiſe on Gauging.
IX. An Introduction to Aſtronomy.
X. An Introduction to Geography: With ten other Tracts relative to thoſe Sciences.

The LIFE of FRANCIS BLONDEL.

FRANCIS BLONDEL, a Native of *France*, was born about the Year 1630; but Hiſtorians do not inform us preciſely of the Time or Place: He was a Perſon of a diſtinguiſhed Genius, and having improved the Advantages of an early liberal Education, he made ſuch conſiderable Improvement in the mathematical Studies that he was choſen *Regius Profeſſor* of Mathematics at *Paris*, when he was about twenty-one Years of Age. He was afterwards appointed Governor to *Lewis Henry de Lomenie*, Count *de Brienne*, whom he accompanied in his Travels from *July* 1652, to *November* 1655, an Account of which were publiſhed twice in 1660 and 1662. The Skill he acquired in his Profeſſion introduced him into ſeveral honourable Employments in civil Affairs: He was alſo intruſted with the Management of ſome Negociations with foreign Princes, and, at Length, arrived to the Dignity of Councellor of State: He had likewiſe the Honour to be mathematical Preceptor to the Dauphin. It was he who drew

the Deſign of the new Gates at *Paris*, after the *Dutch* War in 1672. He likewiſe wrote ſome of the Inſcriptions; for he was no leſs verſed in the Knowledge of the *Belles Lettres* than in that of Geometry, as may be ſeen by the Compariſon he publiſhed between *Pindar* and *Horace*. He was afterward choſen Director of the Academy of Architecture, and a Member of the *Royal Academy of Sciences*, in all which he acquitted himſelf with Dignity and Applauſe, and died *February* 1ſt, 1686. He publiſhed a Variety of Books, but principally the following.

I. Some Notes on the Architecture of *Savoy*.
II. A Courſe of Architecture, in three Volume, Folio.
III. A Courſe of Mathematics.
IV. The Hiſtory of the *Roman Calendar*.
V. The Art of throwing Bombs.
VI. A new Manner of fortifying Places, *&c.*

The LIFE *of* BLAISE PASCAL.

BLAISE PASCAL, an eminent Mathematician of *France*, was born at *Clermont* in *Auvergne* the 19th of *June*, 1623. He deſcended from an ancient and honourable Family; his Father was *Stephen Paſcal*, Preſident of the Court of Aids, a learned Man, and an able Mathematician; who having an extraordinary Tenderneſs for his Son, and perceiving a remarkable Genius in him, quitted his Office in the Province, went and ſettled at *Paris*, and attended entirely to the Education of his Son. Prepared by a tractable Diſpoſition, he imbibed Inſtruction with a remarkable Eagerneſs and Improvement: His Genius was plainly bent to the Mathematics: but this his Father cautiouſly kept him from, that he might not be hindered from other Branches of Learning, which he thought proper to precede it. However, at Length he found Means to inveſtigate ſome mathematical Theorems that was thought beyond the Power of mere natural Capacity; from which Time his Father permitted, and aſſiſted

ted his Studies in this Science. He no ſooner viewed *Euclid's Elements* than he underſtood them.———When he was but ſixteen Years of Age, he wrote a Treatiſe of conic Sections, which was counted, by the moſt Learned, a mighty Effort of Genius: And therefore it is no Wonder that *Des Cartes*, who had been in *Holland* a long Time, ſhould, upon reading of it, chuſe to believe that Mr. *Paſcal* the Father was the real Author of it. ——— At nineteen Years of Age, he contrived an admirable artificial Machine, which was, at that Time, thought not to be equalled: And at twenty-three, having ſeen the *Torricellian* Experiment, he invented and tried a great Number of other Experiments. But our Author had not perſiſted very long in thoſe dry and difficult Studies, before his Mind took a new Turn, and he forſook philoſophical Diſquiſitions for a Variety of other incidental Amuſements, which, however they might ſerve to ſhew his Wit, detracted from his Character in other Reſpects. Theology ſeemed at firſt the favourite Topic, and he was eſteemed for ſome Time a devout Chriſtian as well as a Student in that Profeſſion; he is even ſaid to give himſelf up to Prayer and Mortification, and carried his Religion to mere ſuperſtitious Obſervances. But, as abſtracted as he appeared to be from the World, he could not forbear paying ſome Attention to what was doing in it; and he even intereſted himſelf in the Conteſt between the Jeſuits and Janſeniſts: That he wrote ſome Pieces on that Occaſion, the moſt remarkable were his *Provinciales Lettres*. Theſe Letters, ſays *Voltaire*, may be conſidered as the Model of Eloquence and Humour, equal to *Moliere* or *Boſſuet*. Theſe Letters were intended to prove that the Jeſuits had formed a Deſign to corrupt Mankind; and, for this Purpoſe, he ſelects ſome Characters among the *Spaniſh* and *Flemiſh* Jeſuits, as the Support of his Satyrs; ſo that *Voltaire* calls *Paſcal* the firſt of Satyriſts. Another Character given of the Letters and the Author is, that though there is very little of the ſerious Turn, or a Concern diſcovered for ſerious practical Religion in them, the Author did not degenerate into a Licentiouſneſs of Conduct, which is too often the Caſe of thoſe who are ſuperſtitious Zealots for Religion at one Time, and afterwards diſcover and expoſe the Ignorance, Artifice, Intrigues, and Impoſitions of Prieſts. Theſe Letters

have

have been tranſlated into a Variety of Languages, and though they received ſome Anſwers, they have nevertheleſs been deemed founded on too much Truth to be evaded. Mr. *Paſcal* died at *Paris*, *Auguſt* 19, 1662, aged 39 Years. After his Death it appeared, that he had wrote ſome MSS. for the Preſs, *viz.* On the Equilibrium of Fluids; and another on the Weight of the Air, and other Miſcellaneous Pieces: but we do not know they were ever publiſhed.

The Life of Sir WILLIAM PETTY.

SIR *William Petty*, a ſingular Inſtance of a univerſal practical Genius, was the elder Son of *Anthony Petty*, a Clothier at *Rumſey* in *Hampſhire*, where he was born, *May* 16, 1623: It is hard to determine whether his Education was directed more by his Father, or himſelf; for being carried by his Father, when he was very young, to view the common Mechanics at Work, he preſently took up the Tools and handled them with ſo much Dexterity, that he was encouraged to try his Genius in Mechanics very young, and at twelve Years of Age had attained to ſuch uncommon Skill in ſeveral mechanical Branches of Trade, as to equal moſt common Workmen. After this he went to the Grammar School at *Rumſey*, where, if we may believe his own Account, in three Years Time he not only acquired a competent Readineſs in the *Latin*, *Greek*, and *French* Tongues, but alſo of all the Rules of common Arithmetic, of practical Geometry, Dialling, and the aſtronomical Part of Navigation: Thus inſtructed in Literature and the Knowledge of ſeveral mechanical Trades, he removed at the Age of Fifteen to the Univerſity of *Caen* in *Normandy*, where he tarried about two Years: He returns again to *England*, and was preferred to ſome Office in the Navy: But having acquired about Sixty Pounds, he reſolves upon making uſe of it for his farther Improvement in Science: ——— He turned his Thoughts now to the Study of Phyſic and Anatomy; and, to acquire Proficiency therein, in 1643 he viſited *Leyden*, *Utrecht*, *Amſterdam*, and *Paris*, and con-

continued in foreign Parts three Years. ——— In 1647 he returned to *England*, and having invented an Inſtrument for double Writing, he obtained a Patent from the Parliament for teaching that Art for ſeventeen Years. Though this Project, however promiſing in the Theory, did not turn to any good Account; yet, by this Means, our Author became known to many leading Men of thoſe Times: And reſiding for a little Time at *Oxford*, and obſerving their Proceedings in the Univerſity, he reſolved, if poſſible, to get himſelf fixed there. Accordingly he wrote to Mr. *Hartſlip*, recommending the Advancement of Learning, and intimating what Improvements he had then made in ſome Parts thereof, he was ſent for to *Oxford*, and introduced at firſt as Aſſiſtant to the Profeſſorſhip of Anatomy: In the mean Time, he practiſed Chemiſtry and Phyſic with good Succeſs, and grew into ſuch Repute that the philoſophical Meetings, which preceded the *Royal Society*, were firſt held at his Houſe; and ſoon after, by a parliamentary Recommendation, he was put into a Fellowſhip at *Brazen Noſe* College, in the Place of one of the ejected Fellows, and created Doctor of Phyſic, *March* 7, 1649, and was admitted a Candidate of the College of Phyſicians on the 25th of *June* 1650; and upon the Reſignation of Dr. *Clayton* he ſucceeded him in the Profeſſorſhip of Anatomy, *January* 1, following, and was choſen Muſic Profeſſor at *Greſham College* on the 7th of the enſuing Month. ———In 1652 he was appointed Phyſician to the Army in *Ireland*, with a Salary of twenty Shillings *per Diem*: He was likewiſe Phyſician to three Lord Lieutenants ſucceſſively, *Lambert*, *Fleetwood*, and *Henry Cromwell*. ——— After the Rebellion in *Ireland*, he was appointed one of the Commiſſioners for dividing the forfeited Lands to the Army who ſuppreſſed it. ———When *Henry Cromwell* obtained the Lieutenancy of that Kingdom, in 1655, he made the Doctor his Secretary, and appointed him Clerk of the Council: He likewiſe procured him to be elected a Burgeſs for *Weſt-Loo* in *Cornwall* in *Richard Cromwell*'s Parliament, which met in *January*, 1658: But, upon the 25th of *March* following, Sir *Hierom Sankey*, Member for *Woodſtock* in *Oxfordſhire*, impeached him of high Crimes and Miſdemeanors in the Execution of his Office. This occaſioned a great deal of Trouble to the Doc-

tor,

tor, as he was ſummoned before the Houſe of Commons; but notwithſtanding the aſſiduous Endeavours of his Friends, in their Recommendations of him to Secretary *Thurloe*, and the Defence he made before the Houſe of Commons, his Enemies procured his Diſmiſſion from his public Employments, in 1659. He then retired to *Ireland* till the Reſtoration of King *Charles* II. ſoon after which he came into *England*, and was received very graciouſly by his Majeſty, and was made one of the Commiſſioners of the Court of Claims. ——— *April* 11, 1661, He received the Honour of Knighthood, and the Grant of a new Patent, conſtituting him Surveyor General of *Ireland*, *&c.*

Upon the incorporating of the *Royal Society*, he was one of the firſt Members, and of the Council eſtabliſhed therein: And though he had left off the Practice of Phyſic, his Name was continued as an honorary Member of the College of Phyſicians.

About this Time, he invented his double bottomed Ship to ſail againſt Wind and Tide, and afterwards gave a Model of this Ship to the *Royal Society*, which is ſtill in their Repoſitory; to whom alſo, in 1665, he communicated a Diſcourſe about the building of Ships, containing ſome curious Secrets in that Art: This was taken away by Lord *Brouncker*, ſaying, it was too great an Arcanum of State to be commonly peruſed. However, Sir *William*'s new planned Ship performed one Voyage from *Dublin* to *Holyhead* in *July* 1663; but finding it failed in ſome Reſpects, he ſpent two Years or more in perfecting the wiſhed-for Improvement; but at length he declined it, as he could not bring the ſeveral Purpoſes he had in view to unite and coincide with each other.

In 1666, he drew up a Treatiſe on the Wealth and Expences of *England*, and the Method of raiſing Taxes in the moſt equal Manner, which was eſteemed a laudible Undertaking and judiciouſly executed. ——— The Year following, he married *Elizabeth*, Daughter of Sir *Hardreſs Waller*, Knt. But this did not draw off his Mind from the Purſuit of other Studies; he thought of public Utility, and communicated them to the *Royal Society*, particularly on the Improvement of Land Carriage, Guns, and Pumps. But a few Years after, all his Purſuits were determined by a Gangrene in his Foot, which put a

Period

Period to his Life in the 65th Year of his Age, after having made Proviſion for his numerous Relations for their comfortable Subſiſtance, and bequeathed ſeveral Sums for the Relief of the Poor in ſeveral Pariſhes; and in his Will, wherein he bequeaths his real and perſonal Eſtate (not leſs than 12,000*l. per Ann.*) to his Widow and three Children, he likewiſe conjured them to pay a principal Regard to public Uſefulneſs. He died in the Profeſſion of that Faith, and in the Practice of ſuch Worſhip, as were eſtabliſhed by the Laws of his Country, rather yielding a ſubmiſſive Subjection than critically examining theological Subjects. The Variety of Purſuits in which Sir *William* was engaged, ſhews him to have had a Genius capable of almoſt every Thing his Inclination led him to enquire into; and it is a Matter of Wonder that he found Time for Writing near twenty miſcellaneous Tracts and Diſcourſes, many of them on intereſting and important Subjects, but not being directly of a *phyſical* Nature, are not here inſerted.

The LIFE of HENRY OLDENBURG.

HENRY OLDENBURG, deſcended from an ancient and honourable Family who were Earls of the County of *Aldenburg* in *Weſtphalia:* Our Author was born in the County of *Bremen* in the *Lower Saxony*, about the Year 1626, and was Conſul for his Countrymen at *London* in the Time of the long Parliament and *Cromwell*; but being diſcharged of that Employ, he was made Tutor to the Lord *Henry Obryan*, an *Iriſh* Nobleman, whom he attended to the Univerſity of *Oxford*; and, in 1656, he entered himſelf a Student in that Univerſity, by the Name of *Henricus Oldenburg*, *Bremenſis Nobilis Saxo*, principally for the Advantage of conſulting the *Bodleian* Library. He was afterwards appointed Tutor to Lord *Cavendiſh*, and became intimately acquainted with *Milton* the Poet. During his Reſidence at *Oxford*, he became alſo acquainted with the Members of that Society there, which gave Birth to the *Royal Society*;

and, upon the Foundation of this latter, he was elected Fellow; and when the Society found it neceſſary to have two Secretaries, he was appointed Aſſiſtant to Dr. *Wilkins*. He applied himſelf, with extraordinary Diligence, to the Buſineſs of this Office, and began the Publication of the *Philoſophical Tranſactions* with Number I. in 1664, and, in order to diſcharge this Taſk with greater Pleaſure to himſelf, and Satisfaction to the Society, he held a Correſpondence with more than ſeventy learned Perſons, and others, upon a vaſt Variety of Subjects, in different Parts of the World: This would have proved a much greater Fatigue, had not he (as he told Dr. *Leſter*) managed it ſo as to make one Letter anſwer another; and that to be always freſh, he never read a Letter till he was ready to anſwer it forthwith; ſo that the Multitude of his Letters cloyed him not, nor ever lay upon his Hands. Among others, he was a conſtant Correſpondent of the Hon. *Robert Boyle*, and tranſlated many of that ingenious Gentleman's Works into *Latin*.

About the Year 1674, he was drawn into a Diſpute with Mr. *Robert Hooke*, who complained, that the Secretary had not done him Juſtice in the *Hiſtory of the Tranſactions*, with Reſpect to the Invention of the ſpiral Spring for Pocket Watches: The Conteſt was carried on with ſome Warmth on both Sides, but was, at Length, terminated to the Honour of Mr. *Oldenburg*; for, purſuant to an open Repreſentation of the Affair to the *Royal Society*, the Council thought fit to declare, in Behalf of the Publiſher, that they knew nothing of Mr. *Hooke* having publiſhed a Book intitled, *Lampas*, &c. but "that the Publiſher of the *Tranſactions* had carried himſelf faithfully and honeſtly in the managing the Intelligence of the *Royal Society*."

Mr. *Oldenburg* continued to publiſh the *Tranſactions*, as before, till N°. CXXXVI, in 1677; after which, the Publication was diſcontinued till the *January* following, which was again reaſſumed by his Succeſſor in the Secretary's Office, Mr. *Nehemiah Grew*, who carried it on till the End of *February* 1678.

Our Author likewiſe attended, in ſome Meaſure, to theological Controverſy, and endeavoured to effect a Reconciliation between the *Calviniſts* and *Lutherans*: But, ſoon after, he ſided with the *Calviniſts*, took the Covenant, became a Member of the Aſſembly of Divines at *Weſtminſter*, and had ſeveral Places

from

from them. Afterwards, he joined the Independents, took the Engagement, and all other Oaths that followed, till the Reſtoration.

Mr. *Oldenburg* died at his Houſe at *Charlton*, near *Greenwich* in *Kent*, in *Auguſt*, 1678, and was interred there.

He publiſhed, beſides what has been already mentioned, twenty Tracts, chiefly on theological and political Subjects; in which he principally aimed at reconciling the Differences, and promoting Peace: A Catalogue of which may be ſeen at the Concluſion of his Life, in the *new general Biographical Dictionary*.

The LIFE of NEHEMIAH GREW.

NEHEMIAH GREW, an eminent Phyſician and Philoſopher, the Son of the Rev. Mr. *Obadiah Grew* of *Coventry*, the Place of our Author's Birth, but in what Year Hiſtorians have not preciſely informed us; but, by ſome Circumſtances, it appears to be about the Year 1628.

Mr. *Nehemiah Grew* was very early prepared for an academical Education, and, as his Father inclined to the Principles of the Nonconformiſts, he ſent his Son abroad to compleat his Education in one of the foreign Univerſities, where he took the Degree of Doctor of Phyſic: After which, reſolving to ſettle in *London*, he ſtood Candidate for an honorary Fellowſhip in the College of Phyſicians, and was admitted. He then applied himſelf, with great Aſſiduity, to the Practice of Phyſic, and his Fame for Skill in his Profeſſion particularly recommended him to the Eſteem of the *Royal Society*, where he was choſen Fellow ſome Years before, and, upon the Death of Mr. *Oldenburg*, their Secretary, ſucceeded him in that Office in 1677, in Conſequence whereof, he carried on the Publication of the *Philoſophical Tranſactions* from *January* enſuing till *February* 1678: In the mean Time, purſuant to an Order of Council, that ſame Year he drew up a Catalogue of the natural and artificial Curioſities belonging to the Society, publiſhed at *London* in 1681, in

a folio Volume.—This was ſoon after followed by a comparative Anatomy of the Stomach and Guts.——In 1682, he publiſhed the Anatomy of Plants, Folio.——He wrote ſeveral other Treatiſes, which were ſo much eſteemed by the learned World both at Home and Abroad, that they were tranſlated into *Latin* by Foreigners, *viz.*

1. Obſervations on the Nature of SNOW.
2. The Deſcription and Uſe of the *Pores* of the SKIN.
3. *Coſmologia Sacra*, or a theological Diſcourſe of the UNIVERSE. Folio.

Thus he paſſed his Time with the Reputation and Advantage of a learned Author, and an able Practitioner in his Profeſſion, till he was ſuddenly removed by Death, on *March* 25, 1711.

The Life of CLAUDIUS FRANCIS DECHALES.

CLAUDIUS FRANCIS DECHALES was an excellent Mathematician, Mechanic, and Aſtronomer: He was born at *Chambery*, the Capital of *Savoy*, in the Year 1611: He deſcended from a noble Family, which had produced many Perſons diſtinguiſhed for their Learning, Capacity, Piety, or Uſefulneſs, of which *Moreri* has ſpecified ſome. Our Author excelled in the mathematical and mechanical Sciences, not that he was bent upon, or was happy in making new Diſcoveries; but his Talent rather lay in inveſtigating the Nature, underſtanding well the Theory, and explaining the ſame with that Eaſe and Accuracy, as perhaps rendered him equally uſeful and deſerving Eſteem: He is always allowed to have made the beſt Uſe of the Productions of other Men, and to have drawn the ſeveral Parts of the Science of Mathematics together with great Clearneſs and Judgment. It is alſo ſaid of him, that his Probity was not inferior to his Learning, and that both theſe Qualities made him generally admired and beloved at *Paris*, where, for four Years together, he read public mathematical Lectures in the College

of

of *Clermont*. ——— Then he removed to *Marſeilles*, where he taught the Art of Navigation, and was afterwards Profeſſor of Mathematics in the Univerſity of *Turin*, and died the 28th of *March*, 1678, aged 67. ——— Among other Works which do Honour to his Memory are,

I. An Edition of *Euclid*'s ELEMENTS, wherein he has ſtruck out the unſerviceable Propoſitions, and annexed the Uſe of thoſe he has kept in.

II. A Diſcourſe of FORTIFICATION, and another of NAVIGATION: Theſe Performances, with ſome others, were collected in 3 Volumes, Folio, under the Title of *Mundus Mathematicus*, being indeed a compleat Courſe of Mathematics: The firſt Volume includes the firſt Six Books of *Euclid*, with the Eleventh and Twelfth; an arithmetical Tract, *Theodoſius*'s Sperics, Trigonometry, practical Geometry, Mechanics, Statics, univerſal Geography, a Diſcourſe upon the Loadſtone, civil Architecture, and the Carpenters Art. The ſecond Volume furniſhes Directions for Stone-cutting; military Architecture; Hydroſtatics; a Diſcourſe of Fountains and Rivers; hydraulic Machines, or Contrivances for Water-works; Navigation, Optics, Perſpective, Catoptrics, and Dioptics. The third Volume treats of Muſic; *Pyrotechnia*, or the Operations of Fire and Furnace; a Diſcourſe of the Uſe of the Aſtrolabe; Gnomonics, or the Art of Dialling; Aſtronomy, a Tract upon the Calendar, Aſtrology, Algebra, and the Method of indiviſible and conic Sections. But this Work was afterwards much enlarged, and publiſhed in 4 Vol. Folio, at *Leyden*, in 1690.

The LIFE of EVANGELISTE TORRICELLI.

EVANGELISTE TORRICELLI, an illuſtrious Mathematician and Philoſopher of *Italy*, was born at *Faenza*, *October* 15, 1608, and was educated in *Greek* and *Latin* by his Uncle, who was a Monk, probably to qualify him for ſome eccleſiaſtical Dignity: But natural Inclination led him to cultivate ma-

mathematical Knowledge, which he purſued ſome Time upon the Strength of his own Genius, having no Maſter to inſtruct him; but at twenty Years of Age he went to *Rome*, where he continued the Study of this Science under Father *Benedict Caſtelli*. *Caſtelli* had been a Scholar to the great *Galilei*, and had been called by Pope *Urban* VIII. to be a Profeſſor of Mathematics at *Rome*. *Torricelli*, however, made ſuch Progreſs in his Studies under this Maſter, that, having read *Galileo*'s Dialogues, he compoſed a Treatiſe concerning Motion upon his Principles. *Caſtelli*, aſtoniſhed at the Performance, carried it and read it to *Galilei*, who heard it with Pleaſure, and conceived an high Eſteem and Friendſhip for the Author: Upon this *Caſtelli* propoſed to *Galileo*, that *Torricelli* ſhould come and live with him, recommending him as the propereſt Perſon he could have, ſince he was the moſt capable of comprehending thoſe ſublime Speculations which his own great Age, Infirmities, and, above all, want of Sight, prevented him from giving to the World. *Galileo* accepted the Propoſal, and *Torricelli* the Employment, as Things of all others the moſt agreeable and advantageous to each. *Galileo* was at *Florence*, whither *Torricelli* arrived the 11th of *October*, 1641, and ſoon began to take down what *Galileo* dictated, to regulate his Papers, and be as ſerviceable as he could in that Capacity: But, as pleaſing as this Situation was, he did not enjoy the Pleaſure of it long; for, at the End of three Months *Galileo* died. *Torricelli* was then about to return to *Rome*, but the grand Duke *Ferdinand* II. engaged him to continue at *Florence*, making him his own Mathematician for the preſent, and promiſing him the Profeſſor's Chair as ſoon as it ſhould be vacant. ——— Here he applies himſelf intenſely to Mathematics, Phyſics, and Aſtronomy, and made many Improvements, with ſome Diſcoveries. He greatly improved the Art of making Microſcopes and Teleſcopes; and it is generally acknowledged, that he firſt found out the Method of aſcertaining the Weight of the Atmoſphere by Quickſilver, or Mercury, the Barometer being called from him the TORRICELLIAN, TUBE, and TORRICELLIAN EXPERIMENT. Great Things were expected from him, and great Things would probably have been performed by him, if he had lived: But he died, after a few Days Illneſs, the 25th of *October*, 1647, when he had juſt entered his fortieth Year.

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He had publiſhed, at *Florence*, in 1644, a Volume entitled, *Opera Geometrica*, in Quarto, and a poſthumous Piece, publiſhed 1715, called, *Lezioni Accademiche*. Theſe are Diſcourſes delivered by Way of Oration LECTURES, the firſt to the Academy of *La Cruſca*, for being admitted a Member of that Body: The reſt are upon Subjects of Mathematics and Phyſics.—Prefixed to the Whole, is a long Life of *Torricelli*, by *Thomas Buonaventuri*, a Gentleman of *Florence*.

The LIFE of PETER PETIT.

PETER PETIT, a Mathematician of *France*, was born at *Montlucon* in the Year 1600, and there ſpent the firſt Part of his Life, where he cultivated, from his Youth, Mathematics and Philoſophy: He was celebrated for his Writings and for his Connections with *Paſcal* when he was but about 30 Years of Age; and his Fame having reached *Paris*, he received Invitations to go thither, which he complied with in 1633, and was then employed on ſeveral Occaſions by Cardinal *Richlieu*: He was commiſſioned by this Miniſter to viſit the Sea Ports, and had the Title of the King's Engineer; and was alſo ſent into *Italy*, on ſpecial Affairs, by his Majeſty. He was at *Tours* in 1640, and married there, and was afterward advanced to be Intendant of the Fortifications. Mr. *Baillet*, in his Life of *Des Cartes*, ſpeaks of our Author as having a ſtrong Genius for Mathematics, and excelling particularly in Aſtronomy, owing, in great Meaſure, to the Pains he took for experimental Knowledge. About the Year 1637, he went to *Paris*: After his Return from *Italy*, where he heard much Talk of the Dioptrics of *Des Cartes*, he read it, and communicated his Objections to *Merſennus*, with whom he was intimately acquainted. Nevertheleſs, he ſoon after fell into the Principles of *Des Cartes*, which have been greatly admired at by many of his Acquaintance at that Time. As we before intimated he was acquainted with Monſ. *Paſcal*, with whom he made, at *Rouen*, the ſame Experiments which *Torricelli* had before made in *Italy*, and was aſſured of their Truth

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by frequent Repetitions: This was in 1646 and 1647, and though there appears to be a long Interval from this Time to that of his Death, we meet with no other Memoirs of his Life. He died the 20th of *Auguſt*, 1667, at *Laguy* near *Paris*, whither he had retired for ſome Time before his Deceaſe. He was the Author of ſeveral Works upon phyſical and aſtronomical Subjects; a Piece on Chronology, and in Defence of Mr. *Joſeph Scaliger*, printed at *Paris*, 1636.

The LIFE of JAMES ROHAULT.

JAMES ROHAULT, a *French* Philoſopher, was the Son of a rich Merchant of *Amiens*, and born there in 1620: He cultivated the Languages and *Belles Lettres* in his own Country, and then went to *Paris* to ſtudy Philoſophy: He read both the ancient and modern Philoſophers, and ſeems to have been an aſſiduous and impartial Enquirer after Truth; but was not altogether happy in fixing on the beſt Scheme, ſupported by truly philoſophical Principles; *Des Cartes* ſtruck him moſt, and he became a zealous Follower of this great Man, and drew up an Abridgment and Explanation of his Philoſophy with great Clearneſs and Method: By this Means he ingratiated himſelf into the Eſteem of *Clerſeller*, a Perſon well known for his Tranſlation of many Pieces of *Des Cartes*, ſo that he gave him his Daughter in Marriage, contrary to all the Remonſtraces of his Family: He afterwards continued as his Companion in the Study and Improvement of this Science; ſo that his Character became in great Repute among all who favoured the Philoſophy of *Des Cartes*. ——— The moſt conſiderable Piece he wrote is entitled, *Rohault*'s Phyſics; originally written in *French*, but has been tranſlated into *Latin* by Dr. *Samuel Clarke*, with Notes, in which the *Carteſian* Errors are corrected upon the *Newtonian* Syſtem: The beſt Edition is that of 1718. Mr. *Rohault* likewiſe wrote, *Elements* of Mathematics, by Way of Dialogue; in which he favoured too much the Principles of *Des Cartes*.

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Rohault died in 1675, and left behind him the Character of an amiable, as well as a learned and philoſophic Man.

The LIFE of BERNARD LAMY.

BERNARD LAMY, a *French* Proteſtant Divine and Philoſopher, was born at *Mans* in the Year 1640: His Father, *Allan Lamy*, (Lord of *Fontaine*) perceiving a very promiſing Genius in his Son, reſolved to give him a liberal Education, and, for that Purpoſe, provided particular Maſters to inſtruct him; but under theſe he made no great Proficiency, the Method which they took did not ſuit the Turn of his Genius, and gave him ſome Diſtaſte to the *Latin* Language: This, however, happened to be cured by the Pleaſure he took in the Elements of the *Roman* Hiſtory and Geography, which were taught him by one of his Maſters. Hence, as ſoon as his Age would permit him, he was ſent to the College of *Mans*, to ſtudy under the Fathers of the Oratory: Here he made an extraordinary Progreſs in the Study of the *Greek* and *Latin* Tongues, Grammar, Rhetoric, the Study of the ancient Poets, Orators, and Hiſtorians, as well as in Theology and the Practice of Piety; there he reſolved to make the firſt and principal End of his Purſuit: To this End he went to *Paris* in 1658, and entered himſelf into the Inſtitution, and applied himſelf with ardent Zeal to fulfil all the Duties of it. He had a great Taſte for the mecanical, geometrical, and philoſophical Sciences, and therefore he determined to give ſcope to the Bent of his Mind this Way; and accordingly he went through a regular Courſe of Philoſophy at *Saumur*, under the Father of *Fontinelle*: And about the Year 1661, he went to *Vendoſme*, in order to perfect himſelf in his Humanities, or learned Languages. ——— He was ſent to the Univerſity at *Juilli* in 1664, and entered into the Prieſthood in 1667, and afterwards had the Care of inſtructing the Youth in the College of *Mans*, where he continued for two Years, and then returned again to *Saumur* to ſtudy Philoſophy. The Fathers *Le Port* and *Martin* were his Maſters in this Science; and, as ſoon as he had finiſhed his

Courſe under them, he taught Philoſophy in the ſame Place, and afterwards at *Angiers*. His Attachment to the new Philoſophy diſguſted ſeveral Perſons who were prepoſſeſſed in Favour of the *Ariſtotelian* Philoſophy, inſomuch, that they procured an Order from Court obliging him to quit *Angiers*. ——— In 1676, he went to *Grenoble*, where Cardinal *Camus*, having an Opportunity of knowing his Merit conceived a great Eſteem for him, and would have him near his Perſon, and drew conſiderable Service from him in the Government of his Dioceſe. After contributing many Years to the Inſtruction and Edification of that Dioceſe, he went to reſide at *Rouen*, where he died, *January* 29, 1715, at the Age of 75 Years. His Character is truly great, as he knew how to reconcile the Amuſements of the *Belles Lettres*, and the Flowers of Rhetoric and Poetry with the Study of the Languages; the profound Meditations of the Mathematics with the Thorns and Briars of Criticiſm; the Pagan Philoſophy with Chriſtian Morality; and the liberal Arts with the Study of the Holy Scriptures: Together with theological and rabinical Literature. He had a quick Apprehenſion, and an eaſy Elocution: He wrote well both in *French* and *Latin*, and carried his Conjectures, as well as Reaſoning, to a proper Length. To conclude: To a profound Erudition, he joined the Virtues of a Miniſter of the Goſpel; and his Charity, Humility, and Love of Peace, were the Ornaments of his Life. He wrote ſeveral Books on the Subjects of Rhetoric, Mechanics, and on the Elements of Geometry; but his Treatiſe on the PRINCIPLES of PERSPECTIVE, with a View to the *Rationale* of PAINTING, is that by which he is beſt known in the literary World.

The LIFE of JOSEPH SAUVEUR.

JOSEPH SAUVEUR, an eminent *French* Mathematician, was born at *La Fleche* the 24th of *March*, 1653: He was abſolutely Dumb till he was ſeven Years of Age, and then the Organs of Speech did not diſengage themſelves ſo effectually, but

but that he was ever afterward obliged to ſpeak very ſlowly and deliberately: He very early diſcovered a peculiar Genius for Mechanics, and was always inventing and conſtructing ſomething or other in that Way. He was ſent to the College of the Jeſuiſts to learn polite Literature, but made very little Progreſs in Poetry and Eloquence: *Virgil* and *Cicero* had no Charms for him; but Books of Arithmetic and Geometry he read with Greedineſs. However, he was prevailed on to go to *Paris* in 1670, and applied himſelf, for a Time, to the Study of Philoſophy and Theology; but ſucceeded no better: In ſhort, Mathematics was the only Study he had any Paſſion or Reliſh for, and this he cultivated with extraordinary Succeſs; for during his Courſe of Philoſophy, he learned the ſix firſt Books of *Euclid* in one Month without a Maſter. As he had an Impediment in his Voice, and was found to be a Perſon of extraordinary Abilities; he was much perſuaded by Monſieur *Boſſuet* to apply himſelf to the Study of Phyſic: But this being utterly againſt the Inclination of his Uncle, from whom he drew his principal Reſources, our Author determined to devote himſelf to his favourite Study, and to perfect himſelf therein, ſo as to teach it for his Support, and, from his cloſe Application, ſoon became the Mathematician, *à la Mode*, and at 23 Years of Age he had Prince *Eugene* for his Scholar. ——— He had not yet read the Geometry of *Des Cartes*; but a Foreigner of the firſt Quality deſiring to be taught it, he made himſelf Maſter of it in an inconceivable ſmall Space of Time. ——— *Baſſet* being a faſhionable Game at that Time, the Marquis of *Dangeau* aſked him for ſome Calculations relating to it, which gave ſuch Satisfaction, that *Sauveur* had the Honour to explain it to the King and Queen: This was in 1678.

In 1681, he was ſent with Mr. *Mariote* to *Chantilli* to make ſome Experiments upon the Waters there, which he did with much Applauſe. ——— In 1686, he was made mathematical Profeſſor of the *Royal College*, and, in 1696, admitted a Member of the *Academy of Sciences*, where he was in high Eſteem with the Members of that Society. Here he became particularly acquainted with the Prince of *Conde*, and received many Marks of his princely Favour.

About this Time, he conceived a Deſign of writing a Treatiſe upon Fortification, and, in order to join Practice with Theory, went to the Siege of *Mons* in 1691, where he continued all the while in the Trenches: He likewiſe made the Tour of *Flanders* with this View, and ſo far approved himſelf by his Aſſiduity and Skill, that he was favoured with a Penſion from the Court of *France* for Life.

He was twice married: The firſt Time he took a very ſingular Precaution; for he would not go to ſee the Woman till he had fully determined on the Conditions, and had been with a Notary, and had them reduced to Writing in a proper Form, that they might be ready to preſent before his Mind was captivated with her Perſon, and he thereby rendered leſs Maſter of himſelf. This was acting like a Mathematician, who always proceeds by Rule and Line, and makes his Calculations when his Head is cool. ——— He had Children by both his Wives; and, by the latter, a Son who, like himſelf, was Dumb for the firſt ſeven Years of his Life. ——— He died, *July* 1716.

It is very ſtrange that ſome of our voluminous biographical Authors have taken no Notice of this great Mathematician and Philoſopher; and what is ſtill more Wonderful is, that thoſe who have pretended to write his Life, have yet taken no Notice of the moſt extraordinary Part of his Character, *viz.* "That though he had neither a *muſical Voice* or *Ear*, yet he ſtudied no Science more than MUSIC, and had compoſed an entire *New Syſtem* thereof. And though he was obliged to borrow other Peoples Voice and Ears, yet he amply repaid them with ſuch Demonſtrations as were unknown to former Muſicians. ——— He introduced a *new Diction* in Muſic, more appropriate and extenſive. ——— He invented a new Doctrine of Sounds. ——— He was the firſt of Men that diſcovered, by Theory and Experiment, the *Velocity* of muſical Strings, and the Spaces they deſcribed in their Vibrations, under all Circumſtances of Tenſion and Dimenſions. ——— He firſt invented for this Purpoſe the *Monochord* and the *Echometer*. ——— In fine, he purſued his Reſearches even to the *Muſic* of the ancient *Greeks* and *Romans*, the *Arabs*, and the very *Turks* and *Perſians* themſelves; ſo jealous he was, leſt any Thing ſhould eſcape him in the *Science of Sounds*.

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His Writings, which conſiſt of Pieces rather than of Set works, are all inſerted in the Memoirs of the *Accademy of Sciences*, on many geometrical, mathematical, philoſophical, and muſical Subjects.

The LIFE of BERNARD NIEUWENTYT.

BERNARD NIEUWENTYT, an eminent *Dutch* Philoſopher and Mathematician, was born on the 10th of *Auguſt*, 1654, at *Weſtraadyt* in *North Holland*, of which Place his Father, *Emanuel Nieuwentyt*, was Miniſter; he diſcovered very early a ſtrong Genius for Learning, which was carefully improved by a ſuitable Education; and withal he had that Sagacity and Prudence, that led him to purſue Learning by proper Steps, and to acquire a Kind of Maſtery in one Science before he proceeded to another. His Father, indeed, deſigned him for the Miniſtry; but, ſeeing his Inclination did not lie that Way, he prudently left him to purſue the Bent of his Genius. Accordingly, young *Nieuwentyt*, apprehending that nothing was more uſeful than fixing his Imagination and to form his Judgment well, applied himſelf early to Logic, and the Art of reaſoning juſtly, in which he grounded himſelf upon the Principles of *Des Cartes*, with whoſe Philoſophy he was greatly delighted: From thence he proceeded to the Mathematics, and, when he had, in ſome good Degree, acquired mathematical Knowledge, he applied himſelf to the Study of Phyſic; and after good Proficiency therein, he betook himſelf to the ſeveral Branches of Law. ——— He ſucceeded in all theſe Sciences ſo well as to acquire the Character of a good Philoſopher, a great Mathematician, an ble Phyſician, and an expert and juſt Magiſtrate. ——— Although he was naturally of a grave and ſerious Diſpoſition, yet he was very affable and agreeable in Converſation; his engaging Manner procured him ſuch a general Eſteem, that, by this Means, he frequently drew over to his Opinion thoſe who at firſt widely differed from him. Thus accompliſhed, he acquired a great Eſteem and Credit in the Council of the Town of

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Puremerend, where he reſided; as he did alſo in the States of that Province, who reſpected him the more, inaſmuch as he never engaged in any Cabals, or Factions, in order to ſecure it; regarding, in his Conduct, an open, honeſt, upright Behaviour, as the beſt Source of Satisfaction. In Reality, he was more attentive to cultivate the Sciences, than eager to obtain the Honours of the Government, contenting himſelf with being Counſellor and Burgo-maſter in the Town, without courting, or accepting any other Poſts, which might interfere with his Studies and draw him too much out of his Library. He died the 7th of *May*, 1730, aged 76, having been twice married. He wrote ſeveral Pieces in *Latin* and *French*, *viz.*

I. Conſiderations on the Analyſis of Quantities infinitely ſmall.

II. The Analyſis of *Curves* by the Doctrine of *Infinites*.

III. Conſiderations on the Principles of the *differential Calculus*.

IV. A Treatiſe of the new Uſe of the Tables of Sines and Tangents.

V. Contemplations on the UNIVERSE, *&c.* which was tranſlated into *Engliſh* under the Title of, *the Religious Philoſopher*: Which has been very well received and gone through ſeveral Editions. We have alſo, by our Author, one Letter to *Bothnia* of *Burmania*, up the Subject of Meteors; and a Refutation of *Spinoza* in *Dutch*, 4to.

The LIFE of JAMES BERNOULLI.

JAMES BERNOULLI, a celebrated Mathematician, was born at *Baſil*, *Dec.* 27, 1654, where his Father was of conſiderable Rank. He was educated with great Care, and, as he was deſigned for a Miniſter, he went through a regular Courſe of Studies: After he had made himſelf Maſter of polite Literature, he learned the old Philoſophy of the Schools; and having finiſhed the uſual Courſe, and taken his Degrees, according to Cuſtom, in the Univerſity of *Baſil*, he ſtudied Divinity,

nity, not ſo much out of Inclination as Complaiſance to his Father. He was engaged in this Manner when he happened, by Chance, to meet with ſome mathematical Figures which greatly raiſed his Curioſity; and, the natural Propenſion he had to that Science became more and more conſpicious, and that he ſoon became a good Proficient in Geometry, without the Aſſiſtance of a Maſter, and, at firſt, under very great Difficulties for want of Books: And the far greater Diſcouragement he met with from his Father was no ſmall Obſtruction to his Progreſs in this Science. This gave Occaſion for his chuſing, for his Device, *Phaeton* driving the Chariot of the Sun, with theſe Words, *Invito patre ſidera verſo.* I traverſe the Stars againſt my Father's Inclination. But notwithſtanding the Difficulties he met with, he overcome them all, and, in 1676, he began his Travels to *Geneva* and other Parts of *Germany.* While he was at *Geneva* he found out a Method to teach a young Girl to write, though ſhe was blind, and had been ſo from the Age of two Months. ——— He afterwards went to *Bourdeaux* in *France*, where he compoſed *Gnomonic* Tables; and viſited many other Parts of *France* in order to acquaint himſelf with the moſt celebrated Perſons in that Science, and gather what Improvement he could from them. Having ſeen *France*, he returned to his own Country in 1680: It was then, that, by the Advice of his Friends, he read Father *Manbranche*'s Search after Truth, and *Carteſius*'s Philoſophy, whoſe Method he more approved of than his Principles.

At this Time there appeared a Comet, which, as he expected, employed his Thoughts a good Deal, and he wrote a Treatiſe upon it in his own Language.

Soon after this he travelled into *Holland*, *Flanders*, and *England.* ——— In *Holland* he applied himſelf more than he had done before to the new Philoſophy; but eſpecially to that noble Part of Mathematics which conſiſts in reſolving of Problems, and in Demonſtrations which he was not before well verſed in: He read *Carteſius*'s Geometry with the utmoſt Attention, and ſoon made himſelf Maſter of the moſt difficult Parts. ——— He likewiſe tranſlated into *Latin* his Eſſay upon the Comets, which was ſoon followed by his little Treatiſe of the Weight of the Air. ——— Having ſeen *Flanders* and *Brabant*, he went to *Ca-*

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lais and paſſed over into *England*. At *London*, where he contracted an Acquaintance with all the moſt conſiderable Perſons in the ſeveral Sciences, and was greatly eſteemed by them, he had the Satisfaction of being preſent at the Conferences which were held every Week at the Houſe of the celebrated Mr. *Boyle*, who ſhewed a great regard for our Author. Here he reſided for near two Years, and then he returned home and reſolved to make his Studies uſeful to the World. Accordingly, he thought nothing would contribute more to this Deſign, than to ſhew to the World a Courſe of Experiments in natural Philoſophy and Mechaniſm. He greatly diſtinguiſhed himſelf by this Means in the City of *Baſil*, exhibiting a great Variety of new Diſcoveries which were unknown to them before.

In 1682, he publiſhed his Eſſay of a new Syſtem of Comets, in order to calculate their Motions and aſcertain their Appearances. ——— The Year following he printed his Diſſertation upon the Weight of the Air: In this Piece he not only treats of the Weight of the Air, which appears ſo inconteſtible from Experience and the Barometer, but he ſpeaks very particularly of the Æther, which he ſuppoſes to be a Matter much more fine and ſubtle than what we breathe. He accounts for the Hardneſs of Bodies from the Weight and Preſſure of the Air: And though this was a Conjecture before advanced, he mentions in the Preface, it was the Reſult of his Enquiries, and, in that reſpect, new, though otherwiſe it was not.

In the Year 1684, he was invited to be Profeſſor of the Mathematics at *Heidelberg*; and he was juſt entering upon that Engagement when he was diverted from it by marrying a Lady of very good Family.

Mr. *Leibnitz* having, about that Time, publiſhed ſome Eſſays of his new *Calculus Differentialis*, but concealed the Art and Method of it, Mr. *Bernoulli*, and one of his Brothers (who was likewiſe a famous Geometrician), diſcovered, by the little which they ſaw of this *Calculus*, the Beauty and Extent of it: They endeavoured, therefore, immediately to unravel the Secret, which they did with ſuch Succeſs, and carried the Method to ſuch Perfection, that Mr. *Leibnitz*, with a Frankneſs and Sincerity worthy a great Man, declared, that the Invention belonged as much to them as to himſelf.

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In 1687, the Profeſſorſhip of Mathematics at *Baſil* being vacant by the Death of *Peter Megertin*, Mr. *Bernoulli* was choſen in his Room, by the unanimous Conſent of the Magiſtrates, and diſcharged that Function with Satisfaction and Applauſe: His Reputation drew to *Baſil* a great Number of Foreigners, who came from all Parts to hear his Lectures. He had an admirable Talent in teaching, and a peculiar Art in adapting himſelf to the different Genius and Capacity of his Scholars; and the Turn which he gave to the moſt difficult and obſcure Subjects, rendered them clear and obvious to Perſons of common Sagacity and Penetration.

In 1699, the Academy of Sciences at *Paris* being put under a new Form, Mr. *Bernoulli*, with his Brother Mr. *John Bernoulli*, were admitted into it as foreign Members; and, in 1701, they were both choſen Members of the Academy of *Berlin*. He had by this Time wrote ſeveral Pieces, beſides thoſe before-mentioned, of which there is a Catalogue of about 50 in the *general Biographical Dictionary*, moſt of which are publiſhed in the *Acta Eruditorum* of *Leipſic*, *Journal des Scavans*, *Memoires* of the *Royal Academy of Sciences*, and other philoſophical Tranſactions. —— His continual Application to the Diſcharge of his Profeſſorſhip, and to his Studies, threw him into the Gout, and, by Degrees, reduced him to a ſlow Fever, of which he died the 16th of *Auguſt*, 1705, aged fifty Years. He left one Son and one Daughter. ——— *Archimedes* having found out the Proportion of a Sphere, to a Cylinder circumſcribed about it, which was a Diſcovery of prodigious Difficulty, and Matter of great Conſideration at that Time, though very eaſily performed by the preſent Methods, he ordered it to be engraved upon his Monument. In Imitation of him, Mr. *Bernoulli* appointed that a Spiral logarithmical Curve ſhould be inſcribed upon his Tomb, with theſe Words, *Eadem mutata reſurgo*, i. e. *I riſe the ſame, though changed*, in Alluſion to the Hopes of a Reſurrection; which are repreſented, in ſome Meaſure, by the Properties of the Curve which he had the Honour of diſcovering firſt.

The LIFE of WILLIAM MOLYNEUX.

WILLIAM MOLYNEUX, an excellent Mathematician and Aſtronomer, was born at *Dublin* in *Ireland* on the 17th of *April*, 1656, (where his Father, a Gentleman of Family and Fortune, lived,) and being of a tender Conſtitution, he was educated under a private Tutor, at Home, till he was near fifteen Years of Age, and then placed in the Univerſity of *Dublin*, under the Care of Dr. *William Palliſer*, afterwards Archbiſhop of *Caſhell*. He diſtinguiſhed himſelf here by the Probity of his Manners, as well as by the Strength of his Parts, and having made a remarkable Progreſs in academical Learning, and particularly in the new Philoſophy, as it was then called, he proceeded, at the regular Time, to his Bachelor of Arts Degree. After four Years ſpent in this Univerſity, he left it, and, being ſent to *London*, was admitted into the *Inner Temple* in *June*, 1675. He ſtaid there three Years, and applied himſelf to the Study of the Law of his Country, as much as was neceſſary for one who was not deſigned for the Profeſſion of the Law: But the Bent of his Genius, as well as Inclination, lying ſtrongly to Philoſophy and the Mathematics, he ſpent the greateſt Part of his Time in theſe Enquiries, which, from the extraordinary Advance newly made therein by the *Royal Society*, were then chiefly in vogue.

Thus accompliſhed, he returned to *Ireland* in *June*, 1678, and ſhortly after was married to *Lucy*, Daughter of Sir *William Dornvile*, the King's Attorney General. Being then Maſter of an eaſy Fortune, he continued to indulge himſelf in proſecuting ſuch Branches of natural and experimental Philoſophy as were moſt agreeable to his Fancy; wherein, Aſtronomy having the greateſt Share, he began, about the Year 1681, a literary Correſpondence with Mr. *John Flamſteed*, the King's Aſtronomer, which he kept up for ſeveral Years.

In 1683, he formed a Deſign of erecting a philoſophical Society like that at *London*, and, by the Countenance and Encouragement of the famous Sir *William Petty*, who accepted the Office

fice of Preſident, they began a weekly Meeting about *Michaelmas* that Year, when our Author was appointed their firſt Secretary. The Reputation of his Parts and Learning, which, by Means of this Society, became more known, introduced him to the Eſteem of Perſons of the firſt Rank.

In 1684, by the Friendſhip and Influence of the Duke of *Ormond*, then Lord Lieutenant of *Ireland*, he was appointed, jointly with Sir *William Robinſon*, Surveyor of his Majeſty's Buildings and Works, and Chief Engineer.

In *March*, 1685, he was choſen Fellow of the *Royal Society*, at *London*; and that Year, for the Sake of improving himſelf in the Art of Engineering, he procured an Appointment from the *Iriſh* Government to view the moſt conſiderable Fortreſſes in *Flanders*. Accordingly he travelled thro' that Country and *Holland*, and ſome Parts of *Germany* and *France*, and carrying Letters of Recommendation with him, from Mr. *Flamſtead* to Mr. *Caſſini*, he was introduced to him, and others the moſt eminent Aſtronomers in the ſeveral Places through which he paſſed.

Soon after his Return from abroad, in 1686, he printed his *Sciothericum Teleſcopium*, containing a Deſcription of the Structure and Uſe of a Teleſcopic Dial, invented by him, and which was reprinted with ſome Improvements in 1700.

When Sir *Iſaac Newton* publiſhed his *Principia*, the following Year, 1687, our Author was ſtruck with a pleaſing Aſtoniſhment, though Mr. *Edmund Halley*, with whom he conſtantly correſponded, had ſent him ſeveral Parts of this ineſtimable Treaſure, as they came from the Preſs, before the whole was finiſhed, aſſuring him that he looked upon it as the utmoſt Effort of human Genius: And ſome Time after it was publiſhed, Mr. *Flamſtead* deſiring his Opinion of it, Mr. *Molyneux* wrote a very critical and philoſophical Anſwer, of which we ſhall give the following ſhort Extract, *viz.* "*May* 19, 1688, Sir, You deſire to know our Thoughts of Mr. *Newton*'s Book, and to this I anſwer, that I have not yet had time to ſettle to it ſeriouſly; for I find I muſt rub up all the little Notions I have of Conics, and the Doctrine of Ratios, which are half ſliped out of my Head, before I venture upon it; and I queſtion, after all, whether I ſhall be able to Maſter it; for I perceive it is a Piece that requires great Application, or elſe it is invincible: Nor do

I know any mathematic Head in this Place that has thoroughly conſidered the whole, unleſs it be the honourable Mr. *Roberts*: He tells me he has run through Mr. *Newton*'s Book, and finds it really admirable. One Obſervation in Mr. *Newton*'s Book, though not firſt ſtarted there, I think to be truly wonderful to all Mortals, and that is, the *Seſquialtera ratio* between the Periods and Diſtances of the Planets, and this not only among the primary Erratics, but even among the leſſer Setts of Dancers. ——— It is in my Opinion, a moſt amazing Thought, to conſider how univerſally this great Law runs through the whole Frame of Nature, and agrees to Bodies at ſuch vaſt Diſtance, and that ſeem to have no Tie or Reſpect to each other. It is, to me, the ſtrongeſt Argument that can be drawn from the Frame of this Univerſe, for the Proof of a God, to ſee one Law ſo fixed and inviolable among thoſe vaſt and diſtant Chori, who therefore could not be put into this Poſture and Motion by Chance, but by an omnipotent intelligent Being."

In 1688, the philoſophic Society at *Dublin* was broke up and diſperſed, by the Confuſion of the Times: Mr. *Molyneux* had diſtinguiſhed himſelf as a Member of it, from the Beginning, by preſenting to it ſeveral Diſcourſes upon curious Subjects, ſome of which were tranſmitted to the *Royal Society*, and afterwards printed in the *Philoſophical Tranſactions*.

In 1689, among great Numbers of other Proteſtants, he withdrew from the Diſturbances in *Ireland*, and, after a ſhort Stay in *London*, he went with his Family to reſide at *Cheſter*. In this Kind of Retirement he employed himſelf in putting together the Materials he had ſome Time before prepared for his Dioptrics, in which he was much aſſiſted by Mr. *Flamſtead*: And in *Auguſt*, 1690, he went to *London*, put it to the Preſs, and ſubmitted the Reviſe of it to Mr. *Edmund Halley*, who, at our Author's Requeſt, gave leave for printing, in the Appendix, his celebrated Theorem for finding the *Foci* of Optic Glaſſes. Accordingly the Book came out in 1692, in *4to*, under the Title of *Dioptrica Nova*: A Treatiſe of Dioptrics in two Parts, wherein the various Effects and Appearances of Spherical Glaſſes both convex and concave, ſingle and combined, in Teleſcopes and Microſcopes, together with their Uſefulneſs in many Concerns of human Life. This Work does not contain any of the more

more curious Speculations therein, that being foreign to his Deſign, but ſeveral of the moſt generally uſeful Propoſitions for Practice are demonſtrated in a clear and eaſy Manner. The ſecond Part is very entertaining, eſpecially in his Hiſtory which he gives of the ſeveral Optical Inſtruments, and of the Diſcoveries made by them. The Dedication of the Dioptrics being addreſſed to the *Royal Society*, he takes Notice, among other Improvements in Philoſophy by building it upon Experience, of the Advances that had been lately made in Logic, "by the incomparable Mr. *John Locke* in his Eſſay upon *Human Underſtanding*. This drew a Letter of Thanks from Mr. *Locke* to our Author, and introduced an Acquaintance that preſently grew to an intimate Friendſhip, and a mutual Correſpondence ſubſiſted betwixt them as long as Mr. *Molyneux* lived, to whom many Improvements, made in the ſecond Edition of the Eſſay on *Human Underſtanding*, muſt be attributed.*

Before he left *Cheſter* he loſt his Lady, who died ſoon after the Birth of a Son. Illneſs had deprived her, in a great Meaſure, of her Sight for twelve Years before, which attended her, ſoon after her Marriage, 'till the Time of her Death, which, notwithſtanding it often creates an Indifference to each other, it was rather an Incentive to Sympathy and Affection.

As ſoon as the public Tranquility was reſtored in his native Country, he returned home, and, upon the convening of a new Parliament in 1692, was choſen one of the Repreſentatives of the City of *Dublin*. In the next Parliament, 1695, he was choſen to repreſent the Univerſity there, and continued to do ſo to the end of his Life, that learned Body having, before the End of the firſt Seſſion of the former Parliament, conferred on him the Degree of *Doctor of Laws*. He was likewiſe nominated by the Lord Lieutenant, one of the Commiſſioners for the forfeited Eſtttes, to which Employment was annexed a Salary of 500 *l. per Annum*, but, looking upon it as an invidious Office and not being a Lover of Money, he declined it.

In

* Mr. *Molyneux* was not ſo happy as to enjoy the good Opinion of Mr. *Flamſtead* to the laſt, as appears by ſome marginal manuſcript Notes he wrote in the above Book, (in a Copy I have ſeen) which are very hard both on his moral and literary Character.

In 1698, he publiſhed, *The Caſe of Ireland ſtated*, in Relation to its being bound by Acts of Parliament made in *England*, in which he is ſuppoſed to have delivered all or moſt that can be ſaid upon this Subject with great Clearneſs and Strength of Reaſoning. What occaſioned Mr. *Molyneux* to write the above Tract was, his conceiving the *Iriſh* woollen Manufactory to be oppreſſed by the *Engliſh* Government, on which Account he attempted to vindicate his Country's Independency. He had communicated to Mr. *Locke* his Thoughts on this Subject before it was ready for the Preſs, and deſired his Sentiments upon the fundamental Principle upon which it was grounded. In Anſwer to which, that Gentleman, intimating that the Buſineſs was of too large an Extent for the Subject of a Letter, propoſed to talk the Matter over with him in *England*. This, together with a Purpoſe Mr. *Molyneux* had long formed of paying that great Man, whom he had never yet ſeen, a Viſit, prevailed with him to croſs the Water once more, although he was then in a very infirm State of Health: Accordingly he did in *July* this Year, and ſtaid in *England* 'till the Middle of *September*; but the Pleaſure of this long wiſhed-for Interview, which he intended to have repeated the following Spring, ſeems to have been purchaſed at the Expence of his Life, for, ſhortly after, he was ſeized with a ſevere Fit of his conſtitutional Diſtemper, the Stone, which put a Period to his Life *October* 11th, 1698, bequeathing, by his laſt Will, to *John Locke*, Eſq; five Pounds to buy a Ring, in Memory of the Value and Eſteem he had for him. Beſides the Works already mentioned to have been publiſhed by him, he likewiſe publiſhed ſeveral Pieces on curious Subjects in the *Philoſophical Tranſactions*.

His Son, *Samuel Molyneux*, born at *Cheſter* in 1689, and educated with great Care by his Father, and on his Deceaſe committed to the Care of his Uncle Dr. *Thomas Molyneux*, inherited the Genius and Diſpoſition of his Father, and being ſuitably prepared by a liberal Education became a moſt polite and accompliſhed Gentleman, and was made Secretary to his late Majeſty when he was Prince of *Wales*. Aſtronomy being his favorite Study, as it had been his Father's, he projected many Schemes for the Advancement of it, and was particularly employed,

ployed, in the Years 1723, 1724, and 1725, in perfecting the Method of making Teleſcopes, one of which of his own making he preſented to *John* V. King of *Portugal*. But, in the Midſt of theſe Thoughts, he being appointed a Commiſſioner of the Admiralty, he became ſo engaged in public Affairs that he had not Leiſure to purſue theſe Enquiries any farther, and gave his Papers to Dr. *Robert Smith*, Profeſſor of Aſtronomy at *Cambridge*, whom he invited to make Uſe of his Houſe and Apparatus of Inſtruments in order to finiſh what he had left imperfect: But Mr. *Molyneux* dying ſoon after, Dr. *Smith* loſt that Opportunity; notwithſtanding which, he ſupplied what was wanting in the beſt Manner he could from Mr. *Huygens* and others, and publiſhed the whole in his *Compleat Treatiſe of Optics*.

The LIFE of THOMAS BRANKER, *or* BRANCKER.

THOMAS BRANKER, an eminent Mathematician, Son of *Thomas Branker*, ſometime Bachelor of Arts in *Exeter College*, in *Oxford*, was born in *Devonſhire* in 1636, and was admitted Butler of the ſaid College *November* 8, 1652, being then about ſeventeen Years of Age. —— *June* the 15, 1655, he took the Degree of Bachelor of Arts, and was elected Probationer Fellow the 30th of the ſame Month. —— *April* 22, 1658, he took the Degree of Maſter of Arts, and became a Preacher; but, after the Reſtoration, refuſing to conform to the Ceremonies of the Church of *England*, he left his Fellowſhip in 1662, and returned to *Cheſter*: But not long after, he was reconciled to the Service of the Church, and, taking Orders from a Biſhop, was made a Miniſter of *Whitegate*. He had however, for ſome Time, enjoyed great Opportunity and Leiſure for purſuing the Bent of his Genius in the mathematical Science, and his Skill both in the Mathematics and Chymiſtry procured him the Favour of Lord *Brereton*, who gave him the Rectory of *Tilſton*, and was afterwards choſen Maſter of the well

endowed

endowed School at *Macclesfield*, in that County, where he ſpent the Remainder of his Life. He wrote a Piece on the Doctrine of the Sphere, in *Latin*, which was publiſhed at *Oxford* in 1662; and, in 1688, he publiſhed a Tranſlation of *Rhonius*'s *Algebra*, with the Title of *An Introduction to Algebra*, which he communicated firſt to Mr. *John Pell*, and from him received ſome Aſſiſtance towards improving it, which he generouſly acknowleges in a Letter to Mr. *John Collins*, with whom and ſome other Gentlemen, Proficients in this Science, he continued a Correſpondence during Life: But this was terminated by a ſhort Illneſs when he was at the Age of 40 Years, and he was interred in the Church at *Macclesfield* in *November*, 1676.

The LIFE of EDMUND HALLEY.

EDMUND HALLEY was born at St. *Leonard Shoreditch*, near *London*; his Father, who was in affluent Circumſtances, determining to improve the promiſing Genius of his Son by a ſuitable Education, ſent him firſt to St. *Paul*'s School under the Care of the eminent Maſter Dr. *Thomas Gale*, where his Proficience ſoon became conſpicuous, and at the Age of Fifteen he was not only ſkilled in many Branches of claſſical Learning, but had made extraordinary Advances in the Mathematics, in plain and ſpherical Trigonometry, in the Science of Navigation; and likewiſe great Progreſs in Aſtronomy before he was removed to *Oxford*. Mr. *Wood* tells us, he had perfectly learnt the uſe of the Celeſtial Globe, and could make a compleat Dial.

He went to *Oxford*, and was entered a Commoner in *Act Term*, 1673, being then in the 17th Year of his Age. Here he devoted himſelf to the Study of Aſtronomy, being furniſhed by his indulgent Father with a curious Apparatus of Inſtruments for that Purpoſe, and ſoon acquired ſuch Skill in this Science, that, at 19 Years of Age, he publiſhed *A direct and geometrical Method of finding the Aphelia and Excentricity of the Planets*, the Want of which, 'till that Time, had occaſioned Reflections on *Kepler*'s Hypotheſis, *Kepler* having built his Theory upon the

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ſure Foundation of Facts, as they appeared in the aſtronomical Tables of *Tycho Brahe*, for he thought that ſufficient, leaving the geometrical Proof of it to others. ——— Nor did he leſs diſtinguiſh himſelf in the Improvements he made in other Parts of Aſtronomy; beſides an Eclipſe of the Moon, *June* 17, 1675, on which he made ſome curious Obſervations: He made ſome Diſcoveries with Reſpect to a Spot in the Sun, ſeen at *Oxford* in *July* and *Auguſt*, 1676, which were afterwards publiſhed in the *Philoſophical Tranſactions*. By theſe the Motion of the Sun round its own Axis, a Phænomenon 'till then not thoroughly aſcertained, was fully and finally determined. ——— *Auguſt* 21, the ſame Year, he obſerved the Occultation of *Mars* by the Moon, which he made uſe of afterwards in ſettling the Longitude of the *Cape of Good Hope*, againſt the Objections of the *French* Aſtronomers. During his Stay at *Oxford*, he alſo accurately obſerved the Motions of *Jupiter* and *Saturn*, whereby he made ſeveral Corrections in the beſt of thoſe aſtronomical Tables then extant of thoſe Planets. ——— About this Time alſo, (before his Voyage to St. *Helena*,) he had diſcovered the Method, now well known, of conſtructing Eclipſes of the Sun, by which Means the Calculation of Parallaxes in thoſe Phænomena was ſuperſeded. Neither yet was his Induſtry confined within theſe Limits; but all this Time he had been careful to make the proper Obſervations for aſcertaining the true Places of the fixed Stars, and thereby correcting the Errors of *Tycho Brahe*. His original View therein was to carry on the Deſign of that firſt Reſtorer of Aſtronomy, by compleating the Catalogue of thoſe Stars from his own Obſervation: But, upon farther Enquiry, finding this Province taken up by Mr. *Hevelius* and Mr. *Flamſtead*, he dropt that Purſuit, and immediately formed a Reſolution of perfecting the whole Scheme of the Heavens, by the Addition of the Stars which lie ſo near the South Pole, that they could not be obſerved by the Aſtronomers either at *Dantzick* or *Greenwich*, as never riſing above their Horizon. Animated with the Proſpect of making ſo diſtinguiſhed an Improvement in his favorite Science, he left the Univerſity before he had been there long enough to take any Degree, and returning to his Father, applied for his Conſent to his Voyage to St. *Helena*, to which his Father conſented; and thereupon our Author addreſ-

ſed himſelf to Sir *Joſeph Williamſon*, then Secretary of State, and Sir *Jonas Moor*, Surveyor of the Ordnance, a Lover of Mathematics, and a Promoter of the Science, who both applauded his Purpoſe and communicated it to King *Charles* II. who approved the Deſign, and no Expedient was omitted for rendering his Voyage eaſy, agreeable, and ſucceſsful; and, purſuant thereto, he embarked for that Iſle in 1676, where he arrived ſafely in three Months, and applied himſelf diligently to the Uſe of his Teleſcopes, 'till he had entirely finiſhed the Taſk he had undertaken, and compleated his Catalogue: This done, he returned to *England* in *November*, 1678, with Satisfaction to himſelf and Applauſe from the Curious in this Science.

During the Navigation, in his Paſſage he had frequently obſerved a great Inconvenience in an Inſtrument well known to the Seamen by the Name of *Davis*'s Quadrant, which then had only a Shadow-Vane to the leſſer Arch, wherefore he added a Glaſs to that Vane. This was a very conſiderable Improvement to this Inſtrument, as the Spot of Light, exhibited by the Glaſs, can be clearly ſeen at ſuch Times, when the Shadow is ſo faint that its Edge cannot be ſufficiently diſcerned.

Not long after, he delineated a Planiſphere, wherein, with the niceſt Accuracy, he laid down the exact Places of all the Stars near the South Pole, from his own Obſervations; which he preſented, with a ſhort Deſcription thereof, to his Majeſty, which was graciouſly received, and granted him a Letter of *Mandamus* to the Univerſity of *Oxford* for the Degree of Maſter of Arts. This Letter was dated the 18th of *November*, 1678.

The ſame Year he was choſen Fellow of the *Royal Society*, and he gave an ample Confirmation of his juſt Claim to thoſe Honours, by three Pieces he publiſhed relating to the Stars, in the following Year. Theſe Works were ſcarcely out of the Preſs when he was pitched upon, by the *Royal Society*, to viſit Mr. *Hevelius* at *Dantzic*, that Gentleman having employed himſelf in preparing a new Catalogue of the fixed Stars, and, obſerving that it would not be compleat without the Stars near the South Pole, applied to the *Royal Society*, wiſhing that ſome ſkilful Perſon of that Body might be prevailed upon to execute

that

that Part of his Deſign. —— Our Author, likewiſe, had a View to adjuſting the Diſpute betwixt him and Mr. *Hook*, about the Preference of plain, or glaſs Sights in Aſtroſcopical Inſtruments. Mr. *Halley* accordingly ſet out for that City the 14th of *May*, 1679, and arriving there the 26th immediately waited on the Conſul, and, after ſome Conference, agreed to enter upon the Buſineſs of his Viſit that ſame Night, on which, and every Night afterwards, the Sky permitting, the two Aſtronomers made their Obſervations together 'till the 18th of *July*: When our Author, taking Leave, gave his Opinion of the ſurprizing Accuracy of the Conſul's Obſervations in a Letter addreſſed to him.

Returning home to his Father, he continued with him 'till the latter End of the enſuing Year, 1680, when he ſet out upon what is uſually called the *Grand Tour*: He was accompanied by Mr. *Robert Nelſon*, his old School-fellow: —— They embarked for *Calais*, and, in the Midway from hence to *Paris*, Mr. *Halley* had, firſt of any one, a Sight of the remarkable Comet, as it now appeared a ſecond Time that Year, and thence gave, as it were, a new Æra to the aſtronomical World. It was, at this Time, in its Aſcent or Return from the Sun. He had, the *November* before, ſeen it in its Deſcent; and he now haſtened to compleat the Gratification of his Curioſity in viewing this extraordinary, and, at that Time, unaccountable Phænomenon, from the *Royal Obſervatory* of *France*. Our Author's Deſign, in this Part of his Tour, was to ſettle a friendly Correſpondence between the two Royal Aſtronomers of *Greenwich* and *Paris*, and, at the ſame Time, neglect no Means, if any offered, of improving himſelf, (as he had done before with Mr. *Hevelius*,) by ſo great a Maſter as *Signior Caſſini*. —— From *Paris* our Author went with his Fellow-traveller to *Italy*, where he ſpent great Part of the Year, 1681, but his Affairs then calling him home, he left Mr. *Nelſon* at *Rome*, and returned to *Paris*, where he made a ſhort Stay, and then came to *England*. —— He had not been in *England* long before he married *Mary*, Daughter of Mr. *Tooke*, Auditor of the Exchequer, a young Lady equally amiable for the Gracefulneſs of her Perſon and the Beauties of her Mind, in whoſe Society he lived happy for 55 Years, and took up his Reſidence at *Iſlington*, where he ſet up

his Apparatus, his Tubes, Sextant, *&c.* the Attendants of his darling Employment.

In 1683, our Author publiſhed his *Theory of the Variation of the Magnetical Compaſs:* Wherein he ſuppoſes, that the whole Globe of the Earth is one great Magnet, having four magnetical Poles, or Points of Attraction, *&c.* In this, our Author obſerved, there were ſome Things Matter of Difficulty and Uncertainty, and therefore he reſolved to ſpare no Pains to poſſeſs himſelf of all the Obſervations, relative to it, both abroad and at home: However, his Father's Death, and ſome other Circumſtances, interrupted his Purſuit.

In 1684, he turned his Thoughts upon the Subject of *Kepler*'s *Seſquialterate Proportion*, and after ſome Meditation, concluded from it, that the centripetal Force muſt decreaſe in Proportion to the Squares of the Diſtances reciprocally. He found himſelf, however, unable to make it out in any geometrical Way, and therefore, firſt, applied to Mr. *Hooke*, and Sir *Chriſtopher Wren*, who not affording him the deſired Satisfaction, he went to *Cambridge* to Mr. *Newton*, who ſupplied him fully with what he had ſo ardently ſought. ——— Mr. *Halley*, having found in him an immenſe Fund of Knowlege, could not reſt 'till he had prevailed upon Mr. *Newton* to enrich the World with it; and to this Interview the World is, in ſome Meaſure, indebted for the *Principia Mathematica Philoſophiæ Naturalis.* The *Principia* was publiſhed in 1686, and Mr. *Halley*, who had the whole Care of the Impreſſion under the Direction of the *Royal Society*, preſented it to his Majeſty King *James* II. with an introductory Diſcourſe of his own, explaining the aſtronomical Part of the Book, together with an Elogium in *Latin.*

In 1685, Dr. *William Muſgrave*, Secretary to the *Royal Society*, declining to act, our Author was appointed aſſiſtant Secretary, in which Place the firſt Paper that he publiſhed was, a Tract of his own, on the Subject of Gunnery: Wherein he diſcovered ſome Improvement of this uſeful Art. This was followed by another, wherein our Author ſhewed the Method of meaſuring very high Mountains, Steeples, and other Eminences, by the Barometer.

The next Year, he publiſhed a third Tract, by the ſame Canal, containing both the Hiſtory and phyſical Cauſe of the *Trade-*

Trade-winds and *Moonſons*. He likewiſe publiſhed a Chart, repreſenting their Direction, wherever they are found to blow, through all the Parts of the Globe known to the *Engliſh* Mariners.

In 1687, our Author undertook to explain the Cauſe of a natural Phænomenon, which greatly puzzled the ableſt Geographers. The *Mediterranean* Sea is obſerved not to ſwell in the leaſt, notwithſtanding there is no viſible Diſcharge of the prodigious Quantity of Water which runs into it from nine large Rivers, beſides ſeveral ſmall ones, and the conſtant ſetting in of the Current at the Mouth of the Streights. His Solution of this Difficulty gave ſo much Satisfaction to the Society, that he was requeſted to proſecute theſe Enquiries: He did ſo, and having ſhewn, by the moſt accurate Experiments, how that great Increaſe of Water was actually carried off in Vapours raiſed by the Action of the Sun and Wind upon its Surface, he proceeded with the like Succeſs to point out the Method uſed by Nature to return the ſaid Vapours into the Sea. This Circulation he ſuppoſes to be carried on by the Winds driving theſe Vapours to the Mountains, where being collected, they form the Springs which uniting become Rivulets, or Brooks; and many of theſe again meeting in the Valleys grow into large Rivers, emptying themſelves at laſt into the Sea.

He next ranged into the Field of ſpeculative Geometry, where, obſerving ſome Imperfections in the Methods laid down by others for conſtructing ſolid Problems, or Equations of the third and fourth Powers; for the better effecting the Purpoſe, he furniſhed new Rules, which were both more eaſy and more elegant than any of the former. Nor did this ſatisfy him 'till he had proceeded to ſhew a new Way of finding the Number of Roots in ſuch Equations, as alſo the Limits of them, and this too by the Help of that particular Curve Line, the Rectification of which, being the firſt Performance in that Way, was compleated by Mr. *Neile*, and thence called the *Neilian Parabola*.

Mr. *Halley* then undertook to publiſh a more correct *Ephemeris* for the Year 1688, there being then great Want of proper *Ephemerides* of any tolerable Exactneſs, the common ones being juſtly complained of by Mr. *Flamſtead*.

In

In the Beginning of the Year 1691, he publiſhed exact Tables of the Conjunction of *Mercury* and *Venus* with the *Sun*. Dr. *Smith*, Plumian Profeſſor of Aſtronomy at *Cambridge*, ſpeaking of it, obſerves, that it contains a moſt accurate Theory for finding the viſible Conjunctions of *Mercury* and *Venus*, with a Specimen thereof, in Tables comprehending all the Times of their Appearance over the Sun's Diſk for two Centuries, beginning from the Time of the Invention of Teleſcopes, and agreeing with the lateſt and beſt Obſervations, to a wonderful Degree of Exactneſs, ſome few Errors excepted, which were corrected in a ſecond Publication; and he afterwards ſhewed one extraordinary Uſe to be made of thoſe Tables, relating to the Conjunction of *Venus* with the *Sun*, *viz.* for diſcovering the Sun's Parallax, and thereby the true Diſtance of the Sun from the Earth.

In 1692, our Author produced his Tables for ſhewing the Value of Annuities for Lives, calculated from the Bills of Mortality; and his *Univerſal* THEOREM for finding the *Foci* of Optic Glaſſes.

This Year, Dr. *Edward Bernard* reſigned the *Savilian* Profeſſorſhip of Aſtronomy at *Oxford*: Mr. *Halley* applied for the Place, but did not ſucceed. Biſhop *Stillingfleet* was deſired to recommend him at Court, as a proper Poſſeſſor of the Mathematical Chair; but the Biſhop refuſed it, as knowing he was not an orthodox Chriſtian.

Leaſure now favoured his former Intentions, of making all the requiſite Obſervations for aſcertaining the Variations of the Needle: To this End, he procured an Application to be made to King *William* III. who appointed him Captain of the *Paramour* Pink, with proper Aſſiſtants; and in this Voyage he proceeded ſo far as to croſs the Line, and traverſed the vaſt *Atlantic* Ocean from one Hemiſphere to another; and, in his Way back touched at St. *Helena*, the Coaſt of *Brazil*, *Cape Verd*, *Barbadoes*, *Madeiras*, the *Canaries*, the Coaſt of *Barbary* and many other Latitudes: He ſet out on this Voyage in 1698, and returned in 1700, and having by this Means furniſhed himſelf with a competent Number of Obſervations, he publiſhed, in 1701, a general Chart, ſhewing, at one View, the Variation of the Compaſs in all thoſe Seas where the *Engliſh* Navigators were acquainted.

The

The *Captain*, for he had now acquired that Title and Character, had not been at home little more than half a Year before he went out in the ſame Ship, with Commiſſion from the King to obſerve the Courſe of the Tides in every Part of the *Britiſh* Channel at home, and to take the Latitude and Longitude of the principal Head Lands; which Orders were executed with his uſual Expedition and Accuracy: And, in 1702, he publiſhed a large Map of the *Britiſh* Channel.

In 1703, the Emperor of *Germony* ſent for him to fix on a proper Place for making a commodious Harbour on the *Adriatic* Coaſt; but ſome Oppoſition being made to it by the *Dutch*, the Deſign was laid aſide. The Emperor nevertheleſs received him with Marks of high Eſteem, and, beſides other Gratuities, preſented him with a Diamond Ring from his own Finger. ——— He was likewiſe received with great Reſpect by the King of the *Romans*, Prince *Eugene*, and the principal Officers of the Court. ——— He was ſent a ſecond Time on the like Buſineſs by her Majeſty Queen *Ann*; and, upon his Return to *England*, Dr. *Wallis* being deceaſed, he was appointed *Savillian* Profeſſor of Geometry at *Oxford*; and, by the unanimous Voice of the Univerſity, had the Degree of Doctor of Laws conferred upon him. In 1706, he was employed, at the Requeſt of Dr. *Aldrich*, in the Tranſlation of *Apollonius* from the *Arabic* into *Latin*, and ſome other foreign and curious Pieces in the mathematical Science.

Very ſoon after he had finiſhed this Buſineſs, to the great Satisfaction of the Learned, in 1708 he publiſhed the *Miſcellanea Curioſa*, containing ſeveral of his own, as well as many curious Diſcoveries and Obſervations of others, which had come under his Notice.

November 13, 1713, he ſucceeded Doctor, afterwards Sir *Hans Sloane*, in the Office of Secretary to the *Royal Society*. And, as perfecting the Theory of the Moon's Motion was always uppermoſt in his Thoughts, and to which he devoted great Part of his Time, he was now bent upon compleating of it: And in the Year 1715, he finiſhed it ſo far as this Theory regarded the Syzigies or Conjunctions. By this Means he not only predicted, within a very few Minutes, the central Eclipſe of the Sun, which happened that Year, but drew a Map likewiſe

wherein

wherein the Extent of the Moon's Shadow was repreſented to a wonderful Degree of Exactneſs, as was verified by the Event, and more ſo than that of Mr. *Whiſton*'s, or the Royal Aſtronomer: His Merit therefore became univerſally acknowledged; ſo that upon the Death of Mr. *Flamſtead* in 1719, Dr. *Halley* was appointed to ſucceed him as *Regius Profeſſor* of Aſtronomy at *Greenwich*.

The Doctor now ſaw himſelf in one of the moſt agreeable, as well as advantageous Situations; here he was not only provided with the beſt Conveniencies, but had his Royal Maſter's Command to purſue that Study, and compleat that Theory of the Moon's Motion, which had been his conſtant Wiſh. He immediately fixed a Tranſit Inſtrument upon the Meridian, and purſued his Views with ſingular Aſſiduity: And though he was then in the ſixty-fourth Year of his Age, a Time of Life when *Cicero* ſaid of himſelf, in the Words of *Plautus*, *Life is almoſt over with me*; and yet Dr. *Halley* attended his Teleſcope, without any Aſſiſtance, for eighteen Years afterwards; in all which Time he ſcarce loſt a Meridian View of the Moon, whether by Day or by Night, when the Heavens would permit. That he might have no Avocation from this Work, he reſigned the Poſt of Secretary to the *Royal Society* in 1721, and the next Year he began to take the right Aſcenſions of the Moon, with his Tranſit Inſtrument, 'till the celebrated Mural Arch was finiſhed at the Public Expence in 1725, by which he was enabled to determine their Longitudes from Obſervation.

Upon the Acceſſion of his late Majeſty to the Throne, his Conſort Queen *Caroline* thought proper to make a Viſit to the Royal Obſervatory, and, being pleaſed with every Thing ſhe ſaw, took Notice, that Dr. *Halley* had formerly ſerved the Crown as Captain in the Navy, and ſoon after obtained a Grant of his Half-pay for that Commiſſion, which he enjoyed from that Time during Life: An Offer was alſo made him, of being mathematical Preceptor to the Duke of *Cumberland*, but he declined that Honor by Reaſon of his great Age, and becauſe he deemed the ordinary Attendance upon that Employ would be inconſiſtent with the Performance of his Duty at *Greenwich*.

In 1729, he was admitted a foreign Member of the *Academy of Sciences* at *Paris*, in the room of *Signior Bianchini*. —— About the

the Year 1737, he was ſeized with a paralytic Diſorder in his Right-hand; however, he came as uſual, once a Week, to viſit his Friends in Town the *Thurſday* before the Meeting of the *Royal Society*, and continued to do ſo 'till within a few Months before his Death: Nor did he neglect his Mural Arch 'till the End of the Year 1739, when, having compleated his third *Plinian* Period, he there cloſed this important Work; and ſoon after his Strength viſibly declined, and he came at Length to be wholly ſupported by ſuch Cordials as were ordered by his Phyſician, Dr. *Mead*, 'till being tired with theſe, he aſked for a Glaſs of Wine, and, having drank it, preſently expired, as he ſat in his Chair, without a Groan, on the 14th of *January* 174½, in the 86th Year of his Age: His Corpſe was interred at *Lee* near *Greenwich*, with this Inſcription:

Sub hoc marmore
Placide requieſcit cum uxore Chariſſima
EDMUNDUS HALLEIUS, LL.D.
Aſtronomorum ſui ſeculi facile princeps.
Ut vero ſcias lector
Qualis quantuſque vir ille fuit,
Scripta ejus multifaria lege:
Quibus omnes fere Artes et Scientias
Illuſtravit, Ornavit, Amplificavit.
Æquum eſt igitur,
Ut quum cives ſui virum
Tantopere coluere,
Memoriam ejus poſteritas
Grata veneretur.
Natus } *eſt* A. C. { MDCLVI.
Mortuus } { MDCCXLI.
Hoc ſaxum optimis parentibus
Sacrarunt duæ filiæ pientiſſime.
Anno C. MDCCXLII.

As to Dr. *Halley*'s Perſon, he was of a middle Stature, inclining to Tallneſs, of a thin Habit of Body, fair Complexion, and always ſpoke, as well as acted, with an uncommon Degree of Vivacity. As he was a Member of the *Royal Academy of Sciences*,

whoſe Name was eſteemed an Honour to it, Mr. *Marian* read an Eloge of him before that Academy, in 1742, wherein he gives an Oratorical Account of the Univerſality of his Genius in his *Hiſtory of the Trade-winds and Monſoons:* ——— *His Eſtimation of the Quantity of Vapours which the Sun raiſes from the Sea:* —— *The Circulation of Vapours, the Origin of Fountains:* ——— *The Nature of Light and tranſparent Bodies:* ——— *Adjuſting the Value of Annuities, from a Calculation of the Degrees of Mortality:* and many other Works, in which almoſt all the Sciences, Aſtronomy, Geometry and Algebra, Optics and Dioptrics, Baliſtics, and Artillery, ſpeculative and experimental Philoſophy, Natural Hiſtory, Antiquities, Philology and Criticiſm, being near thirty Diſſertations, which he produced during his Reſidence in *London*, and all abounding with Ideas new, ſingular, and uſeful: Remarks in particular the Boldneſs and Sublimity of his Philoſophical Hypotheſis, that, as he was not afraid to oppoſe popular Opinions, conceiving and propoſing Hypotheſis without the leaſt Scruple, forming Conjectures from his own Obſervations and particular Apprehenſions; ſo to his Boldneſs frequently fortunate, the World now ſtands indebted for the admirable Theory of the Variation of the Compaſs, and the greater Part of his other Diſcoveries which have ſo much contributed to the Advancement of Learning. ——— As he embraced the common Opinion concerning the Reality and Infinity of Space, he concludes the Number of Stars to be infinite, upon the Principles of mutual Attraction, which muſt immediately unite them in one common Centre, unleſs balanced every where and to Infinitude, an Opinion long ago maintained by *Lucretius*. To which we may add, the Doctor's Account of the Infinity of the Syſtem of the World, from the *Philoſophical Tranſactions*, N°. 364, where he tells us, that the Syſtem of the World is now underſtood to occupy the whole Abyſs of Space, and conſequently be actually infinite; and ſmaller fixed Stars being ſtill diſcoverable, as more perfect Teleſcopes are employed, ſeems to confirm this Doctrine. That if the whole Syſtem were finite, it would, though ever ſo extended, ſtill occupy no Part of the *Infinitum* of Space, which neceſſarily and evidently exiſts: Whence the whole World would be ſurrounded with an infinite *Inane*, and the ſuperficial Stars would gravitate towards thoſe

near

near the Center, and, with an accelerated Motion, run into them, and in Proceſs of Time unite into one. But if the whole be infinite, all the Parts of it would be nearly in *Equilibrio*; whence each fixed Star, being attracted by contrary Powers, would keep its Place, or move till, from ſuch an Equilibrium, it comes to reſt. It is no more abſurd, that the fixed Stars ſhould exceed any given Number, than that Duration ſhould be eternal; becauſe no Number of Days and Years can compleat it. ——— It is ſaid, I know, continues the Doctor, that if the Number of the fixed Stars were more than finite, the whole Surface of their apparent Sphere would be luminous. But if we ſuppoſe all the fixed Stars to be as far from one another, as the neareſt of them is from the Sun; that is, if we may ſuppoſe the Sun to be one of them; at a greater Diſtance their Diſks and Light will be diminiſhed, and the Space to contain them increaſed in Proportion of the Squares; ſo that in each ſpherical Surface the Number of Stars it might contain will be as the Biquadrate of their Diſtances. If then, as it needs muſt, the Diſtances be immenſely great, it will follow, that as the Light of the fixed Stars diminiſhes, the Intervals between them decreaſe in a leſs Proportion; the one being as the Diſtances, the other as the Squares thereof reciprocally. And the more remote Stars are ſo ſmall, that they muſt vaniſh even in the moſt exquiſite Teleſcopes, as a ſmall Teleſcopic Star is inviſible to the naked Eye.

To conclude: Dr. *Halley*, ſays this Eloge Writer, poſſeſſed all the Qualifications neceſſary to the Aſtronomer, the Naturaliſt, the Scholar and the Philoſopher; abundantly ſufficient to merit the Approbation of Princes, and the Applauſe of the Learned: His extenſive Knowlege always joined with a Preſence of Mind and Freedom of Expreſſion, at the ſame Time pertinent, judicious, polite, and ſincere: He was open and punctual in his Dealings, candid in his Judgment, blameleſs in his Manners, ſweet and affable in Converſation, communicative and diſintereſted: He always ſpoke of others with due Difference to their Merit, however they may in ſome Reſpects differ from him in Sentiment; and this happy Diſpoſition was the more perfect, as it was ſtill attendant upon that Peace of Mind which is the noble Endowment and Reward of Virtue.

The LIFE of JOHN LE CLERC.

JOHN LE CLERC, a celebrated Hiſtorian, Philoſopher and Critic, was born at *Geneva* the 19th of *March*, in the Year 1657: His Father, *Stephen Le Clerc*, was a learned and eminent Phyſician of *Geneva*, afterwards made *Greek* Profeſſor in that Academy, and Senator of the Republic: He took great Care of his Children's Education, and *John* was ſent to a Grammar-School at eight Years of Age, where he ſoon diſcovered a prodigious Inclination to Books, and ſuch a Genius for Poetry, that, as he tells us himſelf, if he had duly cultivated it he would probably have gained no ſmall Reputation that Way. We have ſome Specimens of his Talents that Way; for having tranſlated two Sermons of Biſhop *Burnet*'s, preached before King *William*, into *French*, he ſubjoined to one a ſmall Poem in Heroic, and to the other an Epigram in Elegiac Verſe, *de Anglia liberata*, that is, upon *England* reſtored to Liberty. However, our Author determined to purſue more ſerious Studies, and to neglect the Amuſements of Poetry.

When he was about ſixteen Years of Age, he was removed from the Grammar-ſchool and placed under the Care of Mr. *Chovet*, a very learned Man, to Study Philoſophy: And in this he ſpent two Years, but did not yet enter upon the Study of Divinity, thinking it better to employ another Year in perfecting himſelf in the *Belles Lettres*, and in acquiring the Principles of the *Hebrew* Tongue, and made it his Study with cloſe Application. —— At 19 Years of Age he began to ſtudy Divinity under *Philip Meſrezat*, *Francis Turretin*, and *Lewis Tronchin*, and attended their Lectures above two Years, and went through all the uſual Forms of Study to qualify himſelf for the Dignity of the Prieſthood. But about this Time, many theological Diſputes aroſe about the Univerſality of Grace and the Efficacy of Chriſt's Death, and other Points, Controverſies betwixt the *Calviniſts* and *Armenians*, which engroſſed our Author's Attention; and, in order to determine the Points in Debate, he not only read the Scriptures in the Original, but wrote Notes and Commentaries thereon; and Polemial Subjects, for a conſidera-

ble

ble Time, employed his Thoughts and Pen, in which he diſcovered his great Learning and Criticiſm. However, as he did not favour the orthodox Scheme, he was not in the Way of Preferment.

In the Year 1682, he came over to *London*, partly to perfect himſelf in the *Engliſh* Tongue, where he continued about a Year, then went back to *Holland*; but he had not been long there before his Friends ſolicited him to return to *Geneva*, but the Diſſonance of his Opinions rendered his public preaching Diſſatisfactory to the governing Party, and, in 1684, when the Remonſtrants held a Synod at *Rotterdam*, he preached once more before them, and was then admitted Profeſſor of Philoſophy, the *Hebrew* Tongue, and polite Literature, in their School at *Amſterdam*. From this Time to 1690, the Hiſtorians of his Life furniſh us with little elſe than an Account of his Works, chiefly on controverſal Subjects; but all this Time he continued to read regular Lectures, as Profeſſor of Philoſophy and the *Belles Lettres*, to the Univerſity of *Amſterdam:* And, becauſe there were no ſingle Authors who appeared clear and full enough for this Purpoſe, he drew up ſome Treatiſes himſelf, and publiſhed, in the Year 1691, his Treatiſe of Logic, Ontology and Pneumatology: And, to compleat his Courſe, in 1695 he publiſhed his *Natural Philoſophy*, a Treatiſe in great Eſteem for many Years, and may ſtill be read to Advantage by thoſe who would have a general Idea of the Science in ſuch Parts as are not envelloped in *Mathematical Demonſtrations*. He had dedicated his Logic to the Hon. *Rob. Boyle*, but that great Philoſopher dying before it came to his Hands, he addreſſed it in the next Edition to his Friend Mr. *Lock*. Theſe Philoſophical Works were written in *Latin*, and underwent ſeveral Impreſſions: But theſe appear to be the principal Books which he wrote on theſe Subjects. We ſhall only juſt mention ſome others, as an Inſtance of his Univerſal Learning, great Application to Study, and conſtant Endeavours to be generally uſeful by his Publications, *viz.* his Commentaries on the Books of the *Old* and *New Teſtaments:* ——— His *Ars Critica:* ——— Hiſtory of Eccleſiaſtical Writers: ——— A Compendium of Univerſal Hiſtory: ——— The Life of Cardinal *Richlieu:* ——— A Tranſlation of Dr. *Hammond*'s Paraphraſe on the *New Teſtament*, with Notes: ——— His *Harmonica*

monica Evangelica: ——— His *Parthaſiana*; or, Thoughts upon Religion, Hiſtory, Poetry, Morals, and Politics: ——— An Edition of *Heſiod:* ——— A *French* Tranſlation of the *New Teſtament:* ——— *Bibliotheque ancienne* and modern: ——— An elegant Edition, with Notes, of *Grotius de Veritate:* ——— A Defence of *Tindal*'s Rights of the Chriſtian Church: ——— A new Edition of *Livy*, and a Variety of other Miſcellaneous Tracts, ——— beſides a large hiſtorical Dictionary.

His Works every where abound with good Senſe and ſound Learning, and the greater Part of them will be valued while Liberty and Literature ſhall maintain their Ground in *Europe*. He always enjoyed a pretty good State of Health 'till the Year 1728, when he was ſeized with a Palſy and Fever, and was more or leſs afflicted 'till his Death, the 8th of *January*, 1736, in the 79th Year of his Age. He was married in the Year 1691, and had four Children, who died young. *Le Clerc* was much eſteemed for his Candour and Integrity as well as Learning; neither ambitious of Riches or Honours, and though he had uncommon natural Parts, as well as Acquirements, yet we do not find that the Love of Fame, or Vain-glory, ever tempted him to play looſe with his Friends, or with Truth: Satisfied with a Competency of Fortune, he always appeared to be happy in the ſtudious and philoſophic Eaſe which he enjoyed at *Amſterdam*, dividing his Time between his Books and his Pupils. Upon the Whole, Hiſtory muſt perpetuate his Memory as a truly valuable Man, and as the Friend of Religion and Learning.

The LIFE of WILLIAM DERHAM.

WILLIAM DERHAM, an eminent *Engliſh* Philoſopher and Divine, was born at *Stowton*, near *Worceſter* upon the 26th of *November*, 1657, and educated in Grammar Learning at *Blochley* in that County: Upon the 4th of *May*, 1675, he was admitted into *Trinity* College, *Oxford*, and, by the Time he took his Bachelor's Degree, was greatly diſtinguiſhed for

for his Learning in the Languages, for his Genius in philoſophical Enquiries, and for other Eminent Qualifications. He was ordained Deacon by Dr. *Compton*, Biſhop of *London*, *May* 29, 1681, and Prieſt by Dr. *Seth Ward*, *July* 9, 1682, and was ſoon after preſented, by Mr. *Neville*, to the Vicarage of *Wargrave* in *Berkſhire*, where he continued about ſeven Years, and on the 31ſt *of Auguſt*, 1689, he was preſented by Mrs. *Jane Bray*, to the valuable Rectory of *Upminſter* in *Eſſex*: This Living being ſituate at a convenient Diſtance from *London*, afforded him an Opportunity of converſing and correſponding with the greateſt Virtuoſos of that City, in the philoſophical Sciences; beſides thoſe, he likewiſe held a Correſpondence with many other ingenious Gentlemen: And as he was then placed in a Retirement ſuitable to his contemplative and philoſophical Genius, he applied himſelf, with great Eagerneſs, to the Study of Nature, and to Mathematics and Experimental Philoſophy, in which he became ſo eminent, that he was ſoon after choſen Fellow of the *Royal Society*; and he proved one of the moſt uſeful and induſtrious Members of it, frequently publiſhing, in the *Philoſophical Tranſactions*, curious Obſervations and valuable Pieces, beſides various other occaſional and miſcellaneous Diſſertations: In particular, his Regiſters and Obſervations of the Weather at *Upminſter* for ſeveral Years, compared with other Obſervations communicated to him from Correſpondents in other Places:—— Variety of Calculations of Eclipſes, and other Phænomena. The following are reckoned the Principal:

1. Experiments on the Motion of Pendulums in *Vacuo*.
2. A Deſcription of an Inſtrument for finding the Meridian.
3. Experiments and Obſervations on the Motion of Sound.
4. On the Migration of Birds.
5. An Hiſtory of the Spots in the Sun, obſerved from 1703 to 1711.
6. Obſervations on the *Lumen Boreale*, or Northern Lights, *Oct.* 8, 1726.
7. Tables of the Eclipſes of *Jupiter*'s Satellites.
8. The Difference of Time in the Meridian of different Places.

9. A Letter to Sir *Hans Sloane*, giving an Account of ſome uncommon Appearances obſerved in an *Aurora Borealis*, *Oct.* 13, 1728.

10. Of the Meteor called *Ignis Fatuus*.

11. The Hiſtory of the Death Watch.

12. A Treatiſe of Watch and Clock-work: With many new and curious Improvements.

In the Year 1711, he preached ſixteen Sermons at Mr. *Boyle*'s Lecture, which he digeſted in another Form, and publiſhed under the Title of *Phyſico-Theology*; or, *A Demonſtration of the Being and Attributes of* GOD, *from his Works of Creation*. And, in Purſuance of the ſame Deſign, in 1714, he publiſhed *Aſtro-Theology*; or, *A Demonſtration of the Being and Attributes of* GOD, *from a Survey of the Heavens*. ——— Theſe Works are highly valued, and have paſſed through ſeveral Editions.

In the Year 1716, he was made a Canon of *Windſor*, being at that Time Chaplain to his late Majeſty, then Prince of *Wales*, and in 1730, received the Degree of Doctor of Divinity from the Univerſity of *Oxford*, on Account of his Learning, and the Service he had done to Religion by his Culture of natural Knowlege. ——— When *Eleazar Albin* publiſhed his natural Hiſtory of Birds and *Engliſh* Inſects, in 4 Vols. 4to. with many beautiful Cuts, it was accompanied with very curious Notes and Obſervations by our learned Author: And he likewiſe reviſed the *Miſcellanea Curioſa*, publiſhed by Dr. *Halley* in 3 Vols. 8vo. ——— The laſt Thing he publiſhed of his own Compoſition was entitled, *Chriſto-Theology*; or, *A Demonſtration of the divine Authority of the Chriſtian Religion*. ——— But, beſides his own, he publiſhed ſome Pieces of the famous Mr. *Ray*, reviſing and correcting the Author's Manuſcripts. ——— To him the World is likewiſe indebted, for the Publication of the *Philoſophical Experiments* of the late eminent Dr. *Hooke*, and other Ingenious Men of his Time.

Thus this great and good Man, having ſpent his Life in the moſt agreeable and improving Study of Nature, and made all his Reſearches therein ſubſervient to the Cauſe of true Religion and Virtue, died, at length, in his 78th Year, upon the 5th of *April*, 1735, at *Upminſter*, where he was buried. He left behind

hind him a valuable Collection of Curioſities; among the reſt he had collected a Specimen of Inſects and of moſt Kind of Birds, of which he had preſerved the Male and Female. —— It may be proper, likewiſe, to obſerve, that Dr. *Derham* was very ſkillful in medical, as well as philoſophical and theological Knowlege, and was a conſtant Phyſician to the Bodies as well as the Souls of his Pariſhoners.

The LIFE of the MARQUIS DeL'HOSPITAL.

WILLIAM-FRANCIS-ANTHONY, Marquis *De L'Hoſpital*, a moſt eminent Mathematician of *France*, was born of an ancient and illuſtrious Family in the Year 1661: His Genius for mechanical and mathematical Studies very early diſcovered itſelf, that he was thought a Prodigy in Nature: For being one Day at the Duke of *Roan*'s, where ſome able Mathematicians were ſpeaking of a Problem of Mr. *Paſcal*'s, which appeared to them extremely difficult, he ventured to ſay he believed he could ſolve it: This was conſtrued an Inſtance of Preſumption in a Youth of no more than 15 Years of Age. Nevertheleſs, in a few Days he ſent them the Solution. He diſcovered likewiſe a ſprightly, active Genius, qualified for military Atchievements; and therefore entered himſelf very early into the Army, and diſcharged his Duty in ſeveral Ranks and Characters with Applauſe; ſo that he was at Length advanced to the Dignity of Captain of Horſe. But ſtill our Author preſerved his Love for the mathematical Science, and took every convenient Opportunity to improve in the Study of it: But in this there was ſome Difficulty which he laboured under; for it was thought derogating from the Dignity of a Nobleman, and inconſiſtant with the Character of a Soldier, to purſue ſuch Studies: So that, as a Soldier, he was in ſome Meaſure obliged to conceal his Application to Study, and his Attainments of that Kind. However, as it ſtood ſomewhat in Competition with his military

Dignity, and as being ſhort-ſighted, was on that Account expoſed to great Inconveniencies while he was Captain of Horſe; and, withal, having an independent Fortune, he quitted the Army and applied himſelf entirely to his favourite Amuſement. He then contracted a Friendſhip with *Malbrank*, judging him to be an excellent Guide in the Sciences, and, accordingly, took his Opinion and Advice upon all Occaſions; and correſponded with other Perſons famous for thoſe Studies, in order to facilitate his Improvement. His Abilities ſoon became more conſpicuous, and at the Age of Thirty-two, he gave a public Solution of ſome Problems drawn from the deepeſt Geometry which had been propoſed to the Mathematicians in the Acts of *Leipſic*.

In 1693, he was received an honorary Member of the *Royal Academy of Sciences* at *Paris*, and gave ſome Proofs of his great Skill in Mathematics.——He publiſhed a Work intitled *Analyſe des infiniment Petits*, built upon Sir I. NEWTON's Doctrine of *Fluxions*. He was the firſt in *France* who wrote upon this Subject; and, on this Account, it met with no ſmall Regard. He ingaged afterwards in another mathematical Work, in which he included "*Les Sections Coniques, les lieux Geometriques, & la Conſtruction des Egalités*. This he prepared for the Preſs, but he did not live to publiſh it, being ſeized with a Fever, of which he died on the 2d of *February*, 1704, aged 43 Years. It was publiſhed after his Deceaſe, and very well received. His Character was that of a candid, ingenious Friend, juſtly valued, and his Loſs generally regretted by thoſe who had the Happineſs of his Acquaintance.

The LIFE of JOHN HUDSON.

JOHN HUDSON, a very learned Critic and Philoſopher, was born at *Widehope*, near *Cockermouth* in *Cumberland*, in 1662; after having had a Grammar Education in that Neighbourhood, he was ſent, at the Age of fourteen, to *Queen's* College, *Oxford*, where he made a great Progreſs in Philoſophy

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and polite Literature, under the Tuition of Mr. *Thomas Croſthwaite:* He took the Degree of Bachelor of Arts, *July* 4, 1681; and that of Maſter, *February* 12, 1684; and, according to the regular Times, having taken his laſt Degree, he removed to *Univerſity* College, of which he was choſen Fellow, *March* 29, 1686: On the 5th of *June*, 1701, he accumulated the Degrees of Bachelor and Doctor in Divinity, having the *April* before been appointed Head Keeper of the *Bodleian* Library. In 1712, he was appointed Principal of St. *Mary Hall*, by the Chancellor of the Univerſity, at the Requeſt of Dr. *Ratcliffe*; and to Dr. *Hudſon* is the Univerſity obliged, from the moſt ample Benefaction ſhe received from Dr. *Ratcliffe*, whoſe Advice and Perſuaſion determined him thereto. —— The principal and truly valuable Part of our Author's Employment was, publiſhing ſome Tranſlation and curious Editions of the beſt ancient Writers in Hiſtory and Philoſophy, ſome of them interſperſed with Notes. The laſt which he employed his learned Pains about was, *Joſephus*, whom he juſt finiſhed, but did not live to publiſh. His ſtudious and ſedentary Way of Life, and too great Abſtemiouſneſs withal, brought him into an ill Habit of Body, which turned to a Dropſy, of which he died, *Nov.* 27, 1719, aged 58, at St. *Mary Hall*, and was buried in the Chancel of that Church, where there is a Stone, with a very ſhort Inſcription, mentioning only his Name, Age, and Date: He left one Daughter, beſides his Widow, who was afterwards married to Dr. *Hall*. Such, to the great Loſs of Learning, was the too early Period of this great Man, who, if he had lived, had probably obliged the World with many curious Productions, and aſſiſted others in ſending their valuable Pieces into the World. He was a great Aſſiſtant in that Reſpect to Dr. *Gregory*, in his Edition of *Euclid*'s Works. He kept up a friendly and uſeful Correſpondence with many of the moſt conſiderable Perſons abroad, in *Italy*, *France*, *Sweden*, *Denmark*, and *Holland*; in a Word, he was in ſo great Repute abroad, that he frequently complained of the Expences attending it; but his Love of Learning was ſuperior to that Diſadvantage. He was a Man of great Probity, of a ſanguine Complexion, a handſome agreeable Countenance, of moderate Stature, and

very good Conſtitution, 'till he impaired it by inceſſant Study and Application.

The LIFE of DAVID GREGORY.

DAVID GREGORY, Nephew of that celebrated Philoſopher and Mathematician *James Gregory*, (ſee his Life, p. 349.) was born at the ſaid Town of *Aberdeen*, *Jan.* 24, 1661, where he alſo received the firſt Rudiments of his Learning; but was afterwards removed to *Edinburgh*, and took his Degree of Maſter of Arts in that Univerſity. The great Advantage of his Uncle's Papers was both an Incitement and Introduction to the mathematical Study, for which he was likewiſe qualified by a natural Subtlety of Genius, to which he applied with indefatigable Induſtry, and ſucceeded ſo well, that he was advanced to the mathematical Chair at *Edinburgh* at the Age of twenty-three: And the ſame Year he publiſhed a Treatiſe entitled, *Exercitatio Geometrica de Dimenſione Figurarum*, *Edin.* 1684, 4*to*. wherein, aſſuming the Doctrine of Indiviſibility and the Arithmetic of Infinites as already known, he explained a Method which not only ſuited his Uncle's Examples, left by him without any Way of finding them, but diſcovered others whereby an infinite Number of Curve Lines, and the Areas contained between them and Right Lines, might be meaſured.

Not long after he had been promoted to the Chair in that Univerſity, in the Execution of this Office, he was the firſt that introduced the *Newtonian* Philoſophy into the Schools, having firſt made himſelf ſo thoroughly acquainted with it, as to be able to read his Profeſſorial Lectures upon the Philoſophy contained in it; and he continued to read his Lectures, with great Applauſe, 'till the Year 1691; but after the breaking up of the College for the long Vocation that Year, he left *Scotland*, and coming to *London*, (partly on the News of Dr. *Bernard*'s Intention of reſigning the *Savilian* Profeſſorſhip of Aſtronomy at *Oxford*,) he was introduced to Sir *Iſaac Newton*, then intent upon bringing the Theory of the Moon to greater Perfection:

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That great Man, according to his native Modeſty and Candour, ſoon conceived a good Opinion of Mr. *Gregory*'s Abilities, and, by his Recommendation, was made a Fellow of the *Royal Society*, *London*. He likewiſe recommended him to Mr. *Flamſtead*, (Maſter of the mathematical School in *Chriſt*'s *Hoſpital*,) as a Perſon qualified to ſucceed Dr. *Edward Bernard* at *Oxford*. Thus recommended, the Royal Aſtronomer uſed his beſt Endeavours to procure him Succeſs at *Oxford*, where he was elected Aſtronomy Profeſſor this Year, having been firſt admitted of *Baliol* College, and incorporated Maſter of Arts, on the 8th of *February*; and he was created Doctor of Phyſic on the 18th of the ſame Month. He had no Reliſh for the technical Part of his Profeſſion, and was ſeldom ſeen in the Obſervatory; his Genius lay more to Geometry, in which he ſucceeded very well. His *Elements of Optics* he printed at *Oxford* in 1695. In the Preface he informs us, that theſe Elements are the Subſtance of ſome of his public Lectures at *Edinburgh*, eleven Years before. In this Book he conſiders theſe Branches of Optics chiefly with a View to the Conſtruction of Teleſcopes, and particularly the two reflecting Ones, that of his Uncle *James Gregory* and that of Sir *Iſaac Newton*, giving the Preference to the Latter, he had brought his Deſign into a ſmall Compaſs, and the Demonſtrations being very neat and eaſy, the Book was in much Eſteem.

In 1697, our Author was the firſt who gave a Demonſtration of that Curve which is well known ſince by the Name of *Catenaria*, or the Curve that is formed by a Chain faſtened at each End, and firſt diſcovered that this Curve, inverted, gave the Form of a true and legitimate Arch, all the Parts ſupporting each other, becauſe in their Thickneſs ſome *Catenaria* is included. But his moſt celebrated Performance appeared in 1702, entitled, *Aſtronomiæ Phyſicæ & Geometricæ Elementa*. The chief and the moſt uſeful Part of his Deſign in this Treatiſe is, to explain Sir *Iſaac Newton*'s Geometry of the *Centripetal* Forces, as far as his Diſcoveries in Aſtronomy were built upon it, and to throw the aſtronomical Part of Sir *Iſaac*'s *Principia* into a new and more intelligible Form: And our Author's Merit, in the Performance, received its moſt diſtinguiſhed Luſtre from the particular Atteſtation given to it by that incomparable Perſon himſelf,

himſelf, who communicated to him his Theory of the Moon, after he had improved it to the greateſt Exactneſs from Mr. *Flamſtead*'s Obſervations.

In the Year, 1703, our Author publiſhed a Folio Edition of *Euclid*'s Works in *Greek* and *Latin*. The undertaking had been begun by his Predeceſſor, Dr. *Edward Bernard*, as the beſt Specimen that could be given of his great and noble Deſign he had formed of printing the Works of all the ancient Mathematicians. In the Preface, after a ſhort Summary of his Life, the Doctor proceeds to inform his Readers, that he had inſerted into this Collection every Thing that had been aſcribed, by any conſiderable Mathematician, to that Author: As likewiſe of his Pieces, excluding ſuch only as he thought ſpurious: Among others, condemning *Euclid*'s *Catoptrics* as not at all ſuited to *Euclid*'s Character: And, in Purſuit of the ſame Deſign, our Author engaged not long after with his Colleague, Dr. *Halley*, to publiſh *Apollonius*'s *Conics*; but was prevented from compleating his Share of the Work by his Death, which happened on the 10th of *October*, 1710, being then retired to *Maidenhead* in *Berkſhire* for the Recovery of his Health, where his Body was interred; and a handſome marble Monument is erected to his Memory in St. *Mary*'s Church there, with this Inſcription:

P. M.
DAVID GREGORII, M. D.
Qui
Aberdenia natus Jan. 24, 1661;
In Academia Edinburgenſi,
Matheſeos Prælector Publicus.
Deinde Oxonii
Aſtronomiæ Profeſſor Savilianus.
Obit Oct. 10, *A. D.* 1710,
Ætatem illi heu brevem Natura Conceſſit
Sibi ipſe longam prorogavit
Scriptor Illuſtris.
Deſideratiſſimi viri
Elizabetha Uxor
M. P.

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He was ſuceeeded in the *Savilian* Profeſſorſhip by Mr. *John Caſwell*, A. M. of *Hart Hall*, now *Hertford* College, in *Oxford*. He left a Widow and ſeveral Children: His eldeſt Son, *David Gregory*, D. D. was firſt a Student, and ſince a Canon of *Chriſt Church*, and was appointed *Regius Profeſſor* of Modern Hiſtory at the Inſtitution thereof by King *George* I.

Beſides the Commentary our Author left upon Sir *Iſaac*'s *Principia*, he likewiſe left a Treatiſe upon Fluxions: ——— Another of Trigonometry, both plain and ſpherical: And a third upon Mechanics and Hydroſtatics. ——— He publiſhed, in his Life-time, ſeveral Papers in the *Philoſophical Tranſactions*, *viz.* a Scheme of the Phaſes, with his Obſervations on the Sun's Eclipſe, *Sept.* 13, 1699, N°. 256: A Paper *De Orbita Caſſiniana*, N°. 293: ——— Some Improvements relating to the Quadrature of the Parts of *Hippocrates*'s *Lunula*, in a Letter to Dr. *Wallis*, N°. 259.

Since his Death there has been publiſhed, his *Prælectiones de Motu, &c.* And, in 1745, Mr. *Colin Maclaurin*, a Succeſſor of our Author in the mathematical Chair at *Edinburgh*, publiſhed another Piece of his under the Title of *Practical Geometry*: Theſe are the principal of his Works, which do Honour to his Memory, which are generally ſpoken of with high Eſteem by thoſe who were well acquainted with his great Abilities, and the Improvements he had made in the philoſophical and mathematical Sciences.

The LIFE of Monſieur PARENT.

ANTHONY PARENT, a learned *French* Mathematician, was deſcended of a Family originally ſettled at *Chartres*: But his Father was born at *Paris*, as was alſo our Author, *Sept.* 16, 1666: Before he was three Years of Age, his maternal Uncle at *Chartres* took him to his Houſe, and became his Preceptor: Among other Things he taught him Writing and the firſt Rules of Arithmetic; but our Author ſoon run beyond what his Uncle could teach, for which he was beholden to Books, which he

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run through with Avidity and Penetration. His Method of Study was to write Remarks upon the Margin of the Books he read, and he had filled many of theſe with a Kind of Commentary at the Age of Thirteen.

At the Age of Fourteen, he was put under a School-maſter at *Charters*, who taught ſeveral Branches of the Mathematics, and here he made ſome Proficiency, firſt, in Rhetoric; but was afterwards, with much Pleaſure to himſelf, taught the Art of Dialling, and diſcovered ſuch Penetration with Reſpect to the Circles of the Sphere, and forming Sun-Dials, that he ſoon after wrote a Treatiſe on *Gnomonics*.

At Length his Friends ſent him to *Paris*, and enjoined on him the Study of the Law: and, in Obedience to them, he went through a Courſe in that Faculty; but this was no ſooner finiſhed, than, impelled by his predominant Paſſion for the Mathematics, he returned to the Study thereof, in Spite of all Oppoſition: And ſhut himſelf up in a Room of the College of *Dormans* with leſs than 200 Livres a Year, where he lived in that Retreat for ſome Time, from which he never ſtirred out but to the Royal College in order to hear the Lectures of *M. de la Hire*, or *M. de Sauveur*, under whom he made great Improvement: And it was not long after that he had made himſelf ſo well acquainted with Arithmetic in all its Branches, Fortification and Navigation, *&c.* that he commenced a Maſter, and taught ſeveral Pupils with great Eaſe and Satisfaction. He ſoon after began to entertain ſome Scruple about teaching what he had never ſeen, and knew by the Force of Imagination only. He imparted this Delicateneſs to *M. Sauveur*, and that Friend recommended him to the Marquis *d'Aligre*, who at that Time wanted a Mathematician with him. Mr. *Parent* was therefore made choice of, and he went two Campaigns with the Marquis, inſtructing him in the Nature of the ſeveral Fortifications he ſaw, and drawing Plans of many of them.

From this Time, his Life was ſpent in a continual Application to the Study of natural Philoſophy and the Mathematics, in all its Branches, both ſpeculative and practical, to which he joined Anatomy, Botany, and Chemiſtry; for his Aſſiduity in Study was very remarkable.

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M. de Billettes being admitted into the Academy of Sciences at *Paris*, with the Title of their Mechanician, he choſe M. *Parent* for his Aſſiſtant, who excelled chiefly in Mechanics; and in this Station he diſcovered a Genius for all the various Subjects of this Nature that were brought before them; but withal, he had a natural Precepitancy and Impetuoſity of Temper that raiſed frequent Diſputes and Contradictions, and rendered his Extent of Knowledge far leſs uſeful and beneficial to himſelf and others. —— However, upon a Regulation of the Academy, by the King's Command, he was appointed Aſſiſtant Member for Geometry in 1716: But this Promotion he enjoyed but a ſhort Time, being taken off by the Small-pox on the 26th of *September*, the ſame Year, in the fiftieth Year of his Age. He was Author of a great many Pieces, chiefly on Mechanics and Geometry.

The LIFE of JOHN KEILL.

JOHN KEILL, an eminent Mathematician and Philoſopher, was born *December* 1, 1671, at *Edinburgh*, where he received the firſt Rudiments of Learning; and being educated in that Univerſity he continued there till he took the Degree of Maſter of Arts. His Genius leading him to the Mathematics, he made a great Progreſs therein, under Mr. *David Gregory* the Profeſſor there, who had embraced the *Newtonian* Philoſophy; and, in the Year 1694, followed his Tutor to *Oxford*, where, being admitted of *Baliol*, he obtained one of the *Scotch* Exhibition in that College. He is ſaid to have been the firſt who taught Sir *Iſaac Newton*'s Principles by the Experiments on which they are grounded, and this he did, it ſeems, by an Apparatus of Inſtruments of his own providing, and got himſelf, by that Means, a great Reputation throughout the Univerſity. But the firſt Specimen he gave to the Public of his Skill in mathematical and philoſophical Knowlege was, his Examination of Dr. *Thomas Burnet*'s *Theory of the Earth*, which appeared in 1698: It was univerſally applauded by the Men of Science,

and allowed to be deciſive againſt the Doctor's Theory. To this Piece he ſubjoined Remarks upon Mr. *Whiſton*'s *New Theory of the Earth*; and thoſe Theories being defended by their reſpective Inventors, drew from Mr. *Keill*, in 1609, an Examination of the Reflections of *The Theory of the Earth*, together with a Defence of the Remarks on Mr. *Whiſton*'s *new Theory*. Dr. *Burnet* was a Man of great Humanity, Moderation and Candor, and it was therefore ſuppoſed that Mr. *Keill* had treated the Doctor too roughly, conſidering, likewiſe, the Diſparity of Years between them. Mr. *Keill* however left the Doctor in Poſſeſſion of that which has ſince been thought to conſtitute the great Excellence and Perfection of his Work; and though he diſclaimed him as a Philoſopher, he allowed him to be a Perſon of a fine Imagination. To uſe his own Words, "Perhaps (ſays he) many of his Readers will be ſorry to be undeceived about his Theory; for as I believe never was any Book fuller of Miſtakes and Errors in Philoſophy, ſo none ever abounded with more beautiful Scenes and ſurprizing Images; but I write only to thoſe who might expect to find true Philoſophy in it."

The following Year, Dr. *Thomas Millington*, *Sedleian* Profeſſor of natural Philoſophy in *Oxford*, who had been appointed Phyſician in ordinary to King *William*, ſubſtituted Mr. *Keill*, as his Deputy, to read Lectures in the public Schools. This Office he diſcharged with great Reputation, and the Term for enjoying the *Scotch* Exhibition at *Baliol* College now expiring, he accepted an Invitation given him by Dr. *Aldrich*, Dean of *Chriſt-church*, to reſide there.

In 1701, Mr. *Keill* finiſhed and publiſhed his celebrated Treatiſe entitled, *Introductio ad veram Phyſicam*, which is ſuppoſed to be the beſt and moſt uſeful of all his Performances. In the Preface he inſinuates, the little Progreſs that Sir *Iſaac Newton*'s *Principia* had made in the World, and ſays, that though the Mechanical Philoſophy was then in Repute, yet in moſt of the Writings upon this Subject, ſcarce any Thing was to be found but the Name. This Piece was eſteemed ſo good an Introduction to Sir *Iſaac*'s *Principia*, that it not only underwent ſeveral Impreſſions in *England*, but, when the *Newtonian* Philoſophy began to be eſtabliſhed in *France*, this Piece was tranſlated into *French* and held in great Eſteem.

About

About the Year 1708, he was made Fellow of the *Royal Society*, and ſoon after publiſhed, in the *Philoſophical Tranſactions*, a Paper of the Laws of Attraction, and its phyſical Principles. —— About this Time, being offended at a Paſſage in the *Acta Eruditorum* at *Leipſic*, wherein Sir *Iſaac Newton*'s Right to the firſt Invention of the Method of Fluxions was called in Queſtion, he communicated to the *Royal Society* another Paper, in which he aſſerted the Juſtice of that Claim. This occaſioned ſome Diſpute with Mr. *Leibnitz* on that Point, which terminated in Favour of Mr. *Keill*.

In 1709, Mr. *Keill* was appointed Treaſurer to the *Palatines*, and in that Station attended them in their Paſſage to *New England*: ——— And ſoon after his Return, in 1710, upon the Death of Mr. *Caſwell*, *Savillian* Profeſſor of Aſtronomy at *Oxford*, he was choſen to ſucceed him. ——— About the Year 1711, ſeveral Objections were urged againſt Sir *Iſaac Newton*'s Philoſophy in Support of *Des Cartes*'s Notions of a *Plenum*, which occaſioned Mr. *Keill* to draw up, and preſent to the *Royal Society*, a Paper "On the Rarity of Matter, and the Tenuity of its Compoſition." But while he was engaged in this Controverſy, Queen *Ann* was pleaſed to appoint him her Decypherer, a Poſt which his great Penetration and Sagacity was thought to qualify him for. ——— Soon after this, the Univerſity of *Oxford* conferred on him (at the Public Act in 1713,) the Degree of Doctor of Phyſic; and, in 1715, he publiſhed an Edition of *Commandinus*'s *Euclid*, with Additions of his own.

In 1717, he married a Lady for her ſingular Accompliſhments, but who, the Writers of his Life have left us no Account. ——— In the Year 1718, he publiſhed his Introduction *Ad verum Aſtronomiam*, which Treatiſe was afterwards, at the Requeſt of the Ducheſs of *Chandois*, tranſlated by himſelf into *Engliſh*, and, with ſeveral Emendations, publiſhed in 1721, under the Title of *An Introduction to the true Aſtronomy: Or, Aſtronomical Lectures, read in the Aſtronomical School of the Univerſity of Oxford*. In theſe Lectures we meet with many Inſtances of his great Underſtanding in this Science. But theſe terminate his Labours for the public Good; for he was, this Summer, ſeized with a violent Fever, which put an End to his Life the 1ſt of *September*, 1721, when he was not quite 50 Years of Age.

The LIFE of JAMES KEILL.

JAMES KEILL, a Phyſician and Philoſopher, was the younger Brother of the former, was alſo born in *Scotland* the 27th of *March*, 1673: He received the firſt Rudiments of Learning at *Edinburgh*, and then went to *Leyden*, and other Univerſities abroad, in order to perfect himſelf in Language and Science; and having completed his Travels, he applied himſelf, with great Aſſiduity, to the Study of Anatomy, and, to improve himſelf therein, diligently attended the Buſineſs of Diſſections, 'till he was capable of diſplaying his Skill in public; and began with reading ſome Lectures in private, to gratify ſome of his Friends, and afterwards read Lectures of Anatomy both at *Oxford* and *Cambridge*, in the Univerſities, with great Applauſe, and had the Degree of Doctor of Phyſic conferred on him at the Univerſity of *Cambridge*. Having ſome Time before publiſhed his *Anatomy of the Human Body*, for the Uſe of his Pupils, he was invited to ſettle at *Northampton*, which he accordingly did, as a Phyſician, and ſucceeded ſo well as to gain both Reputation and Fortune, and died at *Northampton* of a Cancer in his Mouth, *July* 16, 1719, in the 46th Year of his Age, and was buried in St. *Giles*'s Church, where a handſome Monument was erected to his Memory, by his Brother *John Keill*, to whom he left his Eſtate; but he ſurvived his Brother *James* only two Years, as we have ſeen in the preceding Life. —— Our Author *James Keill* diſcovered both his Knowledge, and his great Application to acquire and propagate uſeful Knowlege, by the following Books which he wrote.

In 1698, he tranſlated into *Engliſh*, *Lemery*'s Chemiſtry: —— In the *Philoſophical Tranſactions*, N°. 306, he publiſhed an Account of the Death and Diſſection of *John Bayles* of *Northampton*, reputed to have been 130 Years old: And, in N°. 361, *De Viribus Cordis Epiſtola*: —— In 1708, he publiſhed an Account of Animal Secretion, the Quantity of Blood in the human Body, and muſcular Motion. He concludes his Preface to this Work with remarking, that the *Vis Attrahendi* which he ſuppoſes to take Place in animal Secretion, was aſſerted by the moſt famous

famous antient Phyſicians, as *Hippocrates* and *Galen*; in the ſame Manner as the Gravitation of the heavenly Bodies one towards another was known to the ancient Philoſophers, as well as to *Kepler*, and Sir *Iſaac Newton*. Upon the Subject of Animal Secretion, and in explaining the Manner how the Fluids of the Animal Body are ſeparated from the Blood, our Author undertakes to ſhew, (1.) How they are formed in the Blood before they come to the Place appointed for Secretion. (2.) In what Manner they are ſeparated from the Blood by the Glands. Upon the former Head he ſhews, that the Blood conſiſts of a ſimple Fluid, in which ſwim corpuſcles of various Figures and Magnitudes, and endued with different Degrees of attractive Force. Hence he concludes, that of ſuch Particles as the Blood conſiſts of, muſt the Fluids be compoſed, which are drawn from it; and as in the Blood the Particles attract one another, and cohere together, ſo likewiſe may the Particles of the Fluids which are ſeparated from it: This he proceeds farther to ſhew to be not only poſſible, but actually ſo in ſeveral Secretions, as Milk, Urine, *&c.* From this Principle, that the Blood conſiſts of Corpuſcles of various Figures and Magnitudes, and endued with various Degrees of an attractive Power, *&c.* He attempts to ſhew the Force of the Air upon the Blood, in breathing, in order to demonſtrate that by the Preſſure of the Air the Coheſion of the Globules of the Blood is diſſolved. After this he ſhews how the Union of the attractive Particles is hindered near the Heart, and that the Particles which unite firſt, after the Blood is thrown out of the great Artery, muſt be ſuch as have the ſtrongeſt attractive Force; and that ſuch as have the leaſt, muſt unite laſt; and all the intermediate ones according to their reſpective attractive Power, *&c.* But, for farther Particulars, we muſt refer the Curious to the Work itſelf.

The LIFE of SAMUEL CLARKE.

DR. *Samuel Clarke*, one of the greateſt Divines that any Age has produced, and an expert Metaphyſician and Philoſopher, was the Son of *Edward Clarke*, Eſq; Alderman of the City

of

of *Norwich*, and one of its Repreſentatives in Parliament for ſeveral Years, and born there upon the 11th of *October*, 1675: He was inſtructed in claſſical Learning at that City, and, in the Year 1691, removed from thence to *Caius* College in *Cambridge*, where his uncommon Genius and Abilities ſoon began to diſplay themſelves. Though the Principles of *Des Cartes* was at that Time the eſtabliſhed Philoſophy of the Univerſity, yet Dr. *Clarke* eaſily maſtered the new Syſtem of Sir *Iſaac Newton*, and, in order to his firſt Degree of Arts, performed a public Exerciſe in the Schools upon a Queſtion taken from thence. And he greatly contributed to the Eſtabliſhment of the *Newtonian* Philoſophy by an excellent Tranſlation of, and Notes upon *Rohault*'s Phyſics, which he finiſhed before he was two and twenty Years of Age. The Syſtem of natural Philoſophy then generally taught in that Univerſity, was that written by Mr. *Rohault*, founded altogether upon *Carteſian* Principles, and very ill tranſlated into *Latin*. Mr. *Clarke* therefore gave a new Tranſlation, and added to it ſuch Notes as might lead young Students inſenſibly, and by Degrees, to other and truer Notions than could be found there. "And this certainly, ſays Biſhop *Hoadly*, was a more prudent Method of introducing Truth, unknown before, than to attempt to through aſide this Treatiſe entirely, and write a new one inſtead of it. The Succeſs anſwered exceeding well to his Hopes, and he may be juſtly eſteemed a great Benefactor to the Univerſity in this Attempt; for, by this Means, the true Philoſophy has, without any Noiſe, prevailed; and to this Day his Tranſlation of *Rohault* is in great Repute. And his Notes the firſt Directions to thoſe who are willing to receive the Reality and Truth of Things in the Place of Invention and Romance."

Mr. *Whiſton* relates, that in the Year 1697, while he was Chaplain to *Moore*, Biſhop of *Norwich*, he met Mr. *Clarke*, then wholly unknown to him, at a Coffee-houſe in that City, where they entered into a Converſation about the *Carteſian* Philoſophy, particularly *Rohault*'s Phyſics, which Mr. *Clarke*'s Tutor, as he tells us, had put him upon tranſlating. The Reſult of this Converſation was, ſays Mr. *Whiſton*, that I was greatly ſurprized that ſo young Man, as Mr. *Clarke* then was, ſhould know ſo much of thoſe ſublime Diſcoveries, which were then almoſt

almoſt a Secret to all except a few particular Mathematicians: Nor do I remember, continues he, above one or two at the moſt, whom I had then met with, that ſeemed to know ſo much of that Philoſophy as Mr. *Clarke*." ——— Of this Tranſlation of *Rohault* there were four Editions in Mr. *Clarke*'s Time, in every one of which he made conſiderable Improvements.

In this Year, *viz.* 1697, he applied his Mind to the regular Study of Divinity, and, in order to fit himſelf for the ſacred Function, he ſtudied the *Old Teſtament* in the original *Hebrew*, the *New* in the original *Greek*, and the primitive Chriſtian Writers. ——— In 1698, Mr. *Whiſton*, being collated by the Biſhop of *Norwich* to the Living of *Loweſtoff* in *Suffolk*, reſigned his Chaplainſhip, in which he was ſucceeded by Mr. *Clarke*, who lived, for near twelve Years, in this Station with all the Freedom of a Brother, and an Equal rather than as an Inferior. The Biſhop eſteeming him highly gave many Proofs of it while he lived, and at his Death gave him the higheſt Proof of his Confidence, by entruſting him with all the Concerns of his Family, a Truſt which Mr. *Clarke* executed very faithfully, to the Satisfaction of all Parties.

In 1699, Mr. *Clarke* publiſhed his three practical Treatiſes on Baptiſm, Confirmation, and Repentance, which were then, and are ſtill eſteemed a very uſeful Performance. ——— He likewiſe publiſhed ſome Reflections on a Book called *Amyntor*. ——— About the Year 1701, he publiſhed his Paraphraſe upon the *four Goſpels*, and intended to have proceeded in the ſame Method with the *Acts of the Apoſtles*; but ſomething accidentally interrupted the Execution of it. ——— In the mean Time, Biſhop *Moore*, his Patron, gave our Author the Rectory of *Drayton* near *Norwich*, and likewiſe a Lectureſhip in the City, 'till he was advanced to the Rectorſhip of St. *James*'s: ——— And in the Year 1704, he was appointed to preach Mr. *Boyle*'s Lecture, and the Subject he choſe was, *The Being and Attributes of God*. He ſucceeded ſo well in this, and gave ſuch high Satisfaction, that he was appointed to preach the ſame Lecture the next Year, when he choſe for his Subject, *The Evidences of natural and revealed Religion*. Theſe Sermons were firſt printed in two Volumes, and contained ſome Remarks on ſuch Objections as had been made by *Hobbes* and *Spinoza*, and other Deniers of

revealed

revealed Religion. He attempted this, firſt, by Arguments *a priori*, which, though it was intended to follow the Objector's Method and ſhew their Arguments inconcluſive, drew on him the Cenſure of ſome Critics, as an ambiguous and unneceſſary Method: Nevertheleſs, they have been held in much Eſteem, and recommended by ſome of our moſt eminent Divines as the beſt Performance on thoſe Subjects. ——— In the ſixth Edition was added, a Diſcourſe concerning the Connection of the Prophecies of the *Old Teſtament*, and the Application of them to Chriſt.

About this Time, Mr. *Whiſton* informs us, that he diſcovered our Author (having read much of the primitive Writers) began to ſuſpect that the *Athanaſian* Doctrine of the Trinity was not the Doctrine of thoſe early Ages; eſpecially it was remarked of him, that he never read the *Athanaſian* Creed at his Pariſh Church.

In the Year 1706, he publiſhed a Letter to Dr. *Dodwell* on the Immortality of the Soul: But the Controverſy did not end here; for the celebrated Mr. *Collins*, coming in as a Second to Dr. *Dodwell*, went much farther into the Philoſophy of the Diſpute, and indeed ſeemed to produce all that could be ſaid againſt the Immateriality of the Soul, as well as the Liberty of human Actions. This enlarged the Scene of the Diſpute, into which our Author entered and wrote with ſo much Clearneſs and Demonſtration as at once ſhewed him greatly ſuperior to his Adverſaries in metaphyſical and phyſical Knowlege, and "I am perſuaded, ſays Biſhop *Hoadly*, that as what he has wrote in this Controverſy comprehends the Little the Ancients had ſaid well, and adds ſtill more evidence than ever clearly appeared before, expreſſed in Words that have a Meaning to them, it will remain the Standard of good Senſe on that Side the Queſtion, and perpetuate his Memory to Poſterity. ——— Several Letters were between them, with Anſwers, *&c.* ——— But in the Midſt of all theſe Labours, Mr. *Clarke* found Time to ſhew his Regard to mathematical and phyſicical Sciences, and his accurate Knowlege in them, and his natural Propenſity for thoſe Studies, laid, as it were, a Foundation for his greater Improvement: But what more than common facilitated his Improvements therein was, his friendly Acquaintance with the incomparable Sir *Iſaac Newton*,

ton, at whoſe Requeſt he tranſlated his Optics into *Latin* in 1706: With this Verſion Sir *Iſaac* was ſo highly pleaſed, that he preſented him with the Sum of Five Hundred Pounds, or, which was equivalent, gave each of his five Children One Hundred Pounds.

The ſame Year alſo, Biſhop *Moore*, his Patron, who had long formed a Deſign of fixing him in a more conſpicuous Station in this Metropolis, procured for him the Rectory of St. *Bennet*'s, *Paul*'s *Wharf* in *London*, and ſoon after carried him to Court, and introduced him to the Queen with the higheſt Recommendations to her Favour: She immediately appointed him one of the Chaplains in ordinary, and very ſoon after, in Conſideration of his Merit, preſented him to the Rectory of St. *James*'s, *Weſtminſter*, when it became vacant, in 1709. ——— From this Time he left off preaching without Notes, and made it his Buſineſs to compoſe and write down as accurate Sermons as he could, "Not, ſays Biſhop *Hoadly*, becauſe he could not proceed in the former Method with a Copiouſneſs of good Senſe and clear Expreſſion, which the nobleſt Audience might with Pleaſure have attended to, but chiefly becauſe, from that Time, it became his Reſolution to prepare his Sermons in ſuch a Manner, that they might hereafter be as uſeful from the Preſs, as he wiſhed them to be from the Pulpit." ——— Upon his Advancement to this Station, he took the Degree of Doctor in Divinity, when the Public Exerciſe performed on that Occaſion at *Cambridge* was prodigiouſly admired: The Orations were delivered in *Latin*. In the Firſt, he maintained, *That no Article of the Chriſtian Faith, delivered in the Holy Scriptures, is diſagreeable to right Reaſon.* The ſecond was, *That without the Liberty of Human Actions there can be no Religion.* The Doctor's Theſis was upon the firſt of theſe Queſtions, which being thoroughly ſifted by that learned and accurate Profeſſor, *James*, the Doctor made an extempore Reply for near Half an Hour, with ſo little Heſitation and ſo much to the Purpoſe, that aſtoniſhed the Auditors.

This ſame Year, 1709, Dr. *Clarke* reviſed and corrected Mr. *Whiſton*'s Tranſlation of the *Apoſtolical Conſtitutions* into *Engliſh*. Mr. *Whiſton*, tells us, that his own Studies having been chiefly upon other Things, and having rendered him incapable of be-

ing alſo a Critic in Words and Languages, he deſired his great Friend and great Critic, Dr. *Clarke*, to reviſe that Tranſlation, which he was ſo kind as to agree to. —— In the Year 1712, Dr. *Clarke* publiſhed a moſt beautiful and pompous Edition of *Cæſar*'s *Commentaries*. —— The ſame Year, Dr. *Clarke* publiſhed his celebrated Book called, *the Scripture Doctrine of the Trinity*. Mr. *Whiſton* informs us, that ſome Time before the Publication of this Book there was a Meſſage ſent to Dr. *Clarke*, from the Lord *Godolphin* and others of Queen *Ann*'s Miniſters, importing, "That the Affairs of the Public were with Difficulty then kept in the Hands of thoſe that were for Liberty; that it was therefore an unſeaſonable Time for the Publication of a Book that would make a great Noiſe and Diſturbance; and therefore they deſired him to forbear till a fitter Opportunity ſhould offer itſelf." Which Meſſage, ſays Mr. *Whiſton*, the Doctor had no Regard to, but went on, according to the Dictates of his own Conſcience, with the Publication of his Book. Notwithſtanding, this occaſioned a Variety of Books and Pamphlets to be wrote, for a Year and more, *pro* and *con*, our Author ſpeedily anſwering whatever was publiſhed againſt him: But about the Year 1714, this Book of the Doctor's rendered him obnoxious to the Power Eccleſiaſtical; and the Lower Houſe of Convocation complained of it in a Letter drawn up and ſent to the Upper Houſe, to the following Purport, *viz.* "That a Book had been lately publiſhed and diſperſed throughout the Kingdom entitled, *the Scripture Doctrine of the Trinity*, and ſeveral Defences thereof by the ſame Author, which Book and Defences did, in their Opinion, contain Aſſertions contrary to the Catholic Faith, as received and declared by the reformed Church of *England*, concerning three Perſons of one Subſtance, Power and Eternity, in the Unity of the Godhead, and tending moreover to perplex the Minds of Men in the ſolemn Acts of Worſhip, as directed by our eſtabliſhed Liturgy, *&c.*" On the 4th of *June* the Biſhops returned for Anſwer, that they approved their Zeal, —— thought there was juſt Cauſe of Complaint, and directed an Extract to be made of the moſt exceptionable Paſſages therein: After this, however, there appeared in them a Diſpoſition to prevent Diſſentions and Diviſions, and the Paper he laid before the Houſe in his own Defence was ſo far ſatisfactory,

tisfactory, that the Upper Houſe reſolved to proceed no farther: But the Lower Houſe, not ſo ſatisfied, reſolved that the Paper ſigned and delivered by Dr. *Clarke* did not contain in it any Recantation of the heretical Opinions and Aſſertions complained of in their Repreſentation, and afterwards produced in their Extract. Thus ended this Affair, the moſt authentic Account of which we have in a Piece entitled, *An Apology for Dr. Clarke.* And Biſhop *Hoadly* aſſures us, "That from the Time of his publiſhing this Book, to the Day of his Death, he found no Reaſon, as far as he was able to judge, to alter the Notions which he there profeſſed concerning the Father, Son, and Holy Ghoſt, towards any of thoſe Schemes which ſeemed to him to derogate from the Honour of the Father on one Side, or from that of the Son and Spirit on the other."

About the Year 1712, Dr. *Clarke* held a Diſpute with Dr. *Smalridge* on this Subject, which was propoſed by the Latter; but the Company in general were fully ſatisfied, that the Evidence on Dr. *Clarke*'s Side was greatly ſuperior to the other.

In the Years 1715 and 1716, Dr. *Clarke* had a Diſpute with the celebrated Mr. *Leibnitz*, relating to the Principles of natural Philoſophy and Religion; as alſo on the important Subjects of Liberty and Neceſſity: This Controverſy was publiſhed in *French* and *Engliſh*; and Biſhop *Hoadly* tells us, that the Doctor inſcribed it to her late Majeſty. Queen *Caroline* made herſelf acquainted with all the Arguments advanced *pro* and *con.* This Liberty, or moral Agency, ſays the Biſhop, was a darling Point to him; he excelled always, and ſhewed a Superiority to all whenever it came into private Diſcourſe, or public Debate; but he never more excelled than when he was preſſed with the Strength this learned Adverſary was Maſter of, which made him exert all his Talents to ſet it once again in a clear Light, to guard it againſt Metaphyſical Obſcurities, and give the finiſhing Stroke to a Subject which muſt ever be the Foundation of Morality in Man, and is the ſole Ground of the Accountableneſs of Intelligent Creatures for all their Actions. This Diſpute, as it now ſtands, will for ever remain an illuſtrious Monument of a Genius capable of throwing the moſt pleaſing Light where Confuſion and Darkneſs were wont to reign.

About the Year 1718, Dr. *Clarke* made an Alteration in the Forms of Doxology in the Singing Pſalms, which produced no ſmall Noiſe and Diſturbance, and occaſioned ſome Pamphlets to be wrote. The Alteration was this,

To God, thro' Chriſt, his only Son, immortal Glory be, &c.

And,

To God, thro' Chriſt, his Son, our Lord,
All Glory be therefore.

Theſe were intended for the Uſe of his own Pariſh Church; but, upon their being printed, they were diſperſed abroad, where at leaſt they were approved: Which occaſioned a Letter from the Biſhop of *London (Robinſon)* to the Incumbents of all Churches and Chapels in his Dioceſe, againſt their uſing thoſe new Forms of Doxology, exhorting them, after a Repreſentation of the Caſe, to uſe their Endeavours with their ſeveral Flocks to have a great Abhorrence of the above mentioned new Forms, and particularly that they did not ſuffer the ſame to be uſed either in their own Churches or in any Schools.

This Letter of the Biſhop's gave riſe to ſeveral Pamphlets, ſome in Defence of the Biſhop of *London*; others, an Apology for the Alteration made by Dr. *Clarke*; ſome in a ſerious, others in an ironical Stile, by Perſons of different Denominations. The Remark which Mr. *Whiſton* makes on Dr. *Clarke*'s Conduct herein is, "that he eſteemed it one of the moſt Chriſtian Attempts towards a Reformation upon the primitive Foot: But adds, that the Biſhop of *London*, in the Way of modern Authority, was quite too hard for him."

About this Time he was preſented, by the Lord *Lechmere*, to the Maſterſhip of *Wigſton*'s Hoſpital in *Leiceſterſhire*. ——— In 1724, he publiſhed XVII Sermons, preached at St. *James*'s upon the erecting a Charity-ſchool for the Education of Women Servants. ——— In the Year 1727, upon the Death of Sir *Iſaac Newton*, he was offered, by the Court, the Place of Maſter of the Mint, worth about 1200 *l.* a Year; but this he conceived incompatable with the Diſcharge of his Duty in the Miniſtry, and by the Advice of his Friends, particularly Mr. *Emlyn*,

he

he abſolutely refuſed it; which was looked upon as one of the moſt laudable Actions of his Life, and to afford an undeniable Conviction that he was in earneſt in his Religion.

In the Year 1728 was publiſhed, a Letter from Dr. *Clarke* to Mr. *Benj. Hoadly*, F. R. S. occaſioned by the Controverſy relating to the Proportion of Velocity and Force in Bodies in Motion, and printed in the *Philoſophical Tranſactions*, N°. 401.

In the Beginning of the Year 1729, he publiſhed the 12 firſt Books of *Homer's Illiad*. This Biſhop *Hoadly* calls an accurate Performance; and his Notes, a Treaſury of grammatical and critical Knowlege.

The ſame Year was publiſhed, his Expoſition of the Church Catechiſm, and ten Volumes of Sermons in Octavo, Books ſo well known and ſo generally approved, that they need no Recommendation.

But the ſame Year, on *Sunday* the 11th of *May*, going to preach before the Judges at *Serjeants Inn*, he was ſeized with a Pain in his Side, which made it impoſſible for him to perform his Office, and he was carried home and continued under his Diſorder till the 17th of *May*, and then died, in the fifty-fourth Year of his Age, after enjoying a long vigorous State of Health, having ſcarce ever known Sickneſs. Many have attempted to do Juſtice to his Character, which was truly great and amiable. We ſhall content ourſelves with a ſhort Extract from the Elogium of Biſhop *Hare*, and Biſhop *Hoadly*.

Biſhop *Hare* ſays of him, "He was a Man who had all the good Qualities that could meet together to recommend him. He was poſſeſſed of all the Parts of Learning that are valuable in a Clergyman in a Degree that few poſſeſs any ſingle one. He has joined to a good Skill in the three learned Languages, a great Compaſs of the beſt Philoſophy and Mathematics, as appears by his *Latin* Works; and his *Engliſh* ones are ſuch a Proof of his own Piety, and of his Knowlege in Divinity, and have done ſo much Service to Religion, as would make any other Man, that was not under a Suſpicion of Hereſy, ſecure of the Friendſhip of all good Churchmen, eſpecially the Clergy. And to all this Piety and Learning was joined, a Temper happy beyond Expreſſion; a ſweet, eaſy, modeſt, obliging Behaviour, adorned all his Actions; and neither Paſſion, Vanity, Inſo-

lence,

lence, or Oſtentation appeared either in what he ſaid or wrote. This is the Learning, this the Temper of the Man, whoſe Study of the Scriptures has betrayed him into a Suſpicion of ſome heretical Opinions."

Biſhop *Hoadly*, having obſerved how great the Doctor was in all Branches of Learning, he adds, If in any one of theſe he had excelled only ſo much as he did in all, he would have been juſtly intitled to the Character of a great Man: But there is ſomething ſo very extraordinary, that the ſame Perſon ſhould excel not only in thoſe Parts of Knowlege which require the ſtrongeſt Judgment, but in thoſe which require the greateſt Memory too. So that, in a very high Degree, Divinity and Mathematics, experimental Philoſophy and claſſical Learning, Metaphyſics and critical Skill, were united in Dr. *Clarke*.

And from hence we find her late Majeſty Queen *Caroline* took great Pleaſure in his Converſation and Friendſhip, ſeldom miſſing a Week in which ſhe did not receive ſome Proof of the Greatneſs of his Genius, and of the Force of ſuperior Underſtanding. Much more is ſaid in his Commendation by Biſhop *Hoadly*, Dr. *Sykes*, and Mr. *Whiſton*, in their Memoirs of his Life: To which we refer the Curious.

Dr. *Clarke* married *Catherine*, the only Daughter of the Rev. Mr. *Lockwood*, Rector of *Little Miſſingham* in the County of *Norfolk*, by whom he had ſeven Children, four of whom ſurvived him: And it is obſervable, that from her good Senſe and unblamable Behaviour, he was happy to his Death.

The LIFE *of* WILLIAM WHISTON.

WILLIAM WHISTON, an eminent Divine and Philoſopher, of uncommon Parts, more uncommon Learning, but of ſingular and extraordinary Character, was born the 9th of *December*, 1667, at *Norton* in the County of *Leiceſter*, of which Place his Father, *Joſiah Whiſton*, a learned and pious Man, was Rector. He was educated under his Father 'till he was ſeventeen Years of Age; in 1684 he was ſent to *Tamworth* School,

School, and two Years after admitted of *Clare Hall* in *Cambridge*, where he purſued his Studies, and particularly the Mathematics, eight Hours in a Day, till the Year 1693: During this Time, and while he was under Graduate, he had a Weakneſs and Dizzineſs of Sight, contracted by too much Study, which was in a good Meaſure relieved by hanging the Place oppoſite to his Seat with Green.

In 1693, he was made Maſter of Arts and Fellow of the College, and ſoon after commenced one of the Tutors; and Archbiſhop *Tillotſon* ſent him one of his Nephews for a Pupil; but his ill State of Health not permitting him to continue a Tutor, he reſigned his Pupils to Mr. *Langhton*. As he had then taken Orders, he became Chaplain to Dr. *More* then Biſhop of *Norwich*, and during the Time of his Chaplainſhip, which was four Years, he publiſhed his firſt Work, entitled *A new Theory of the Earth*, from its Original to the Conſummation of all Things. This Work, in MSS, was ſubmitted to the Inſpection of Dr. *Bentley*, Sir *Chriſtopher Wren*, and Sir *Iſaac Newton*, on whoſe Principles it depended: And though Mr. *John Keill*, after its Publication, cenſured ſome Things in it as inconſiſtent with ſome Principles of the Mathematics and Philoſophy, yet it brought no ſmall Reputation to our Author.

In the Year 1698, Biſhop *More* gave him the Living of *Loweſtoff* in *Suffolk*, where he immediately went to reſide, and devoted himſelf to the Diſcharge of that Truſt; and, though he kept a Curate, generally preached twice every *Sunday*, and all the Summer read a Catechetic Lecture in the Evening, for the better Inſtruction of the Adult, and continued it for ſome Years with Diligence and Succeſs.

In the Beginning of this Century he was called to be Sir *Iſaac Newton*'s Deputy, and afterwards made his Succeſſor, in the *Lucaſian* Profeſſorſhip of Mathematics, when he reſigned his Living and went to *Cambridge*.

In 1702, he publiſhed *A ſhort View of the Chronology of the* Old Teſtament, *and of the Harmony of the* four Evangeliſts: And, in 1707, *Prælectiones Aſtronomicæ*; and eight Sermons on the Accompliſhment of Scripture Prophecies, preached at *Boyle*'s Lecture. ——— And, in 1708, *Tacquet*'s *Euclid, with ſelect Theorems of Archimedes*, the former of which had been his firſt Introduction

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to the Study of the Mathematics: —— In the ſame Year, he drew up an Eſſay upon the Apoſtolical Conſtitutions, which the Vice-chancellor refuſed his Licence for printing. The Author tells us, he had read over the two firſt Centuries of the Church, and found that the *Euſebian*, or *Arian* Doctrine was for the Main the Doctrine of thoſe Ages, which, though deemed Heterodox, he thought it his Duty to diſcover. ——— In 1709, he publiſhed a Volume of Sermons and Eſſays on various Subjects. ——— In 1710, he publiſhed *Prælectiones Phyſico-Mathematicæ*, which, with the *Prælectiones Aſtronomicæ*, were tranſlated and publiſhed in *Engliſh*. And it may be ſaid, with no ſmall Honour to the Memory of Mr. *Whiſton*, that he was one of the firſt who explained the *Newtonian* Philoſophy in a popular Way. ——— But among other Things, he tranſlated the *Apoſtolical Conſtitutions* into *Engliſh*, which favoured the Doctrine of the Supremacy of the Father and Subordination of the Son, vulgarly called the *Arian Hereſy*: And hereupon his Friends began to be alarmed for him; and the Conſequence ſhewed it was not groundleſs; for, *Oct.* 30, 1710, he was deprived of his Profeſſorſhip, and baniſhed the Univerſity of *Cambridge*, after he had been formally convened and interrogated for ſome Days together.

At the Concluſion of this Year, he wrote his hiſtorical Preface afterwards prefixed to his *Primitive Chriſtianity revived*, containing the Reaſons of his Diſſent from the commonly received Notions of the Trinity.

After his Expulſion from *Cambridge*, he went to *London*, where he conferred with Dr. *Clarke*, Dr. *Benj. Hoadly*, and other learned Men, who endeavoured to moderate his Zeal, which, however, he would not ſuffer to be tainted or corrupted, and many were not much diſſatisfied with the Authority of theſe Conſtitutions, and approved his Integrity.

Mr. *Whiſton* now ſettled at *London* with his Family, and though it does not appear that he had any certain Means of Support, he wrote Books and maintained the ſame Vigor and Chearfulneſs of Mind. ——— In 1721, he publiſhed an Eſſay towards reſtoring the true Text of the *Old Teſtament*: ——— In 1724, The literal Accompliſhment of Scripture Prophecies: ——— In 1727, The miraculous Deliverance of *Marius Antoninus* and his Army, on the Prayers of the Chriſtians: ———

In

In 1730, Memoirs of the Life of Dr. *Samuel Clarke*: ——— In 1732, An Account of the Darkneſs at our Saviour's Paſſion: ——— 1736, *Athanaſian* Forgeries, *&c.* ——— The Primitive Euchariſt revived: ——— In 1737, The Aſtronomical Year, particularly of the Comet foretold by Sir *Iſaac Newton*: ——— 1740, The Genuine Works of *Flavius Joſephus*: ——— A friendly Addreſs to the *Engliſh* Baptiſt: ——— In 1745, His primitive *New Teſtament* in *Engliſh*: ——— In 1748, his Sacred Hiſtory of the *Old* and *New Teſtament*; and Memoirs of his own Life and Writings, which are very curious and not without their Uſe. ——— He continued many Years a Member of the eſtabliſhed Church; but at laſt forſook it, and went over to the Baptiſts, which happened while he was at the Houſe of *Samuel Barker*, Eſq; at *Lynden* in *Rutlandſhire*, who had married his Daughter. ——— He died, after a ſhort Illneſs, the 22d of *Auguſt*, 1752, aged 84 Years and 8 Months. The Character of this conſcientious and worthy Man has been attempted by two very able Perſonages, *viz.* Biſhop *Hare* and Mr. *Collins*: They both afford us ſomething curious and entertaining, we ſhall therefore borrow an Extract from each.

Biſhop *Hare* characterizes him "A Man of a fair unblemiſhed Character; one who has all his Life been cultivating Piety and Virtue, and good Learning; rigidly conſtant himſelf in the public and private Duties of Religion, and always promoting in others ſuch Virtue and good Learning as he thought moſt for the Honour of God, by manifeſting the Greatneſs and Wiſdom of his Works. He has given the World ſufficient Proofs that he has not miſpent his Time, by very uſeful Works of Philoſophy and Mathematics: He has applied one to Explication of the other, and endeavoured by both to diſplay the Glory of the great Creator. And, to his Study of Nature, he early joined the Study of the Scriptures, and his Attempt, whatever the Event be, was at leaſt well meant: And if he has not ſucceeded, no more have others who have meddled with the ſame Subjects; nor is he more to be blamed than they: More to be blamed, did I ſay, I ſhould have ſaid, not leſs to be commended; for ſure it is a commendable Deſign to attempt to explain Scripture Difficulties, and to ſhew that there is nothing in the ſacred Writings but what is true and rational. But what does a

Life, thus ſpent, avail? To what Purpoſe ſo many watchful Nights and weary Days, ſo much Piety and Devotion, ſo much Mortification and Self-denial, ſuch a Zeal to do good and to be uſeful to the World, ſo many noble Specimens of a great Genius and of a fine Imagination? 'Tis the poor Man's Misfortune; for poor he is, and like to be, not having the leaſt Preferment to reward his Merit. ——— Whereas, if he had been orthodox it is more than probable he would have been cried up as an Ornament of the Age, and no Preferment denied him.

Mr. *Collins*, who publiſhed a Diſcourſe of the Grounds and Reaſon of the Chriſtian Religion, ſays, Mr. *Whiſton* was a Perſon of extraordinary natural Parts, and of great acquired Learning, particularly in Philoſophy and Mathematics; but above all in Theology, which he has ſtudied with the greateſt Application and Integrity in the Scriptures, and in the Writings of the Ancients, deſpiſing the Catechiſms, Confeſſions, or Articles of Faith and Tradition of all modern Churches, and the Commentaries on Scripture and ſyſtematical Books of all modern Theologues. He knows how to make the beſt of every Argument he takes in Hand, by his Sagacity and Quickneſs, by the Compaſs of his Reading, and, by his great Memory, he omits nothing that can be urged to ſupport his Sentiments. He is an upright and a religious Man; and a moſt zealous Chriſtian, leading a moral Life, as is common to moſt who are ſtiled Heretics; renouncing Glory, Riches, and Eaſe, and courageouſly undergoing Abloquy, Poverty, and Perſecution; all three whereof have been his Lot, deeming the Concealment of his religious Sentiments, or profeſſing to believe what he did not, a great Crime. ——— He lives for the moſt Part in *London*, where he viſits Perſons of both Sexes and of the higheſt Rank, who are delighted with his Plainneſs, Integrity, Senſe, and Learning; to whom he diſcourſes with the greateſt Freedom on many important Points, and inculcating this Belief, that the Father, the Son, and the Holy Ghoſt are three diſtinct intelligent Agents: That the Father was before, and is greater than the Son, according to the Scriptures. ——— His Aim is alſo to reſtore primitive Chriſtianity: Nor is he without great Deſigns for the Improvement of Philoſophy, and for the Welfare and Trade of his Country, as appears by his Attempts to

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explain the Philoſophy of Sir *Iſaac Newton*, and by his Attempts to diſcover the Longitude. But the greateſt good he poſſibly can aim at, is, putting Men upon Enquiry, and rejecting all narrow and partial Principles; to found their Belief and Profeſſion upon the Knowledge of what is Truth. In fine, he was naturally of a chearful Diſpoſition, which he cultivated to the laſt, and recommended to others as moſt conſiſtent with their Duty and their Happineſs.

The LIFE of IGNATIUS GASTON PARDIES.

IGNATIUS GASTON PARDIES, a very learned *French* Philoſopher and Mathematician, was born at *Paris* in 1636. He deſcended from an eminent Family, his Father was a Counſellor in the Parliament of *Paris*, who gave his Son an early and liberal Education; ſo that at the Age of Sixteen he entered into the Order of *Jeſuits*, and made ſo great a Proficiency in his Studies, that he taught polite Literature, and compoſed many Pieces in Proſe and Verſe with a diſtinguiſhed Delicacy of Thought and Stile, before he had ſcarce arrived to Manhood. Propriety and Elegance of Language appears to have been his firſt Purſuits; for which Purpoſe he ſtudied the *Belles Lettres*, and other learned Productions: But at Length he devoted himſelf to the mathematical and philoſophical Studies, and read, with due Attention, the moſt valuable Authors, ancient and modern, in thoſe Sciences; ſo that he made himſelf Maſter of the *Peripatetic*, as well as *Carteſian* Philoſophy in a ſhort Time, and taught both with great Reputation; not confining himſelf abſolutely to the *Carteſian* Principles, he aimed at improving theſe Sciences, in which he diſcovered a remarkable Genius, and acquired great Reputation in his Profeſſion, in the ſeveral Places where he taught, and particularly at *Paris*, from his Pupils in general; and the Glory he acquired raiſed the higheſt Expectations of his future Uſefulneſs, which was cut ſhort by his Death, when he was but thirty-ſeven Years of Age. His

Works indicate his extenſive Genius, and cloſe Application to Study which were principally as follows:

I. Elements of Geometry.
II. A Diſcourſe of Local Motion.
III. A Treatiſe of Statics, or the Science of moving Forces.
IV. A Deſcription of two Machines for making Dials.
V. A Diſcourſe on the Underſtanding of Brutes.
VI. A Diſſertation on the Nature and Motion of Comets.
VII. Of a two-fold wonderful Clock.

Beſides theſe there are ſeveral Letters publiſhed in the *Philoſophical Tranſactions* in the Year 1672, relative to a Diſpute this Author had with Sir *Iſaac Newton* on his *New Theory of Light and Colours.*

The LIFE *of* WILLIAM AMONTONS.

WILLIAM AMONTONS was born in *Normandy*, *Auguſt* 31, 1663: His Father having removed to *Paris*, *William* received the firſt Rudiments of his Education in that City, and had made conſiderable Progreſs in the *Latin* School: He had a conſiderable Illneſs, wherein he contracted ſuch a Deafneſs as obliged him to renounce almoſt all Converſation with Mankind. In this Situation he began to think of employing himſelf in the Invention of mechanical Inſtruments: He applied therefore to the Study of Geometry; he likewiſe ſtudied the Arts of drawing Plans, Architecture, and ſurveying of Lands: In Proceſs of Time, he bent his Mind to the Study of thoſe ſublime Laws upon which the Regulation of the heavenly Bodies principally depend. He ſtudied, with particular Attention, the Nature of Barometers and Thermometers, which he brought to great Perfection: And we may add, that this Invention is ſtill in very conſiderable Uſe among the Learned in moſt Parts of *Europe*, and next in Univerſality to *Farenheit*'s, and is that in particular which the celebrated Profeſſor *Daun* at *Petersburgh* made Uſe of

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in his very extraordinary Experiments relative to the Congelation, or freezing, or, rather, fixing of Quickſilver.

In 1687, he preſented a new Hygroſcope to the *Royal Academy of Sciences*, which was highly approved by the Society, and contributed to enhance the Reputation of the Inventor.

He communicated ſome other Conjectures, relative to the Improvement of this Inſtrument, to Mr. *Hubin*, a famous Enameller; but Mr. *Hubin* did not immediately accede to the Opinions of Mr. *Amontons*, which, for ſome Time, diſcouraged his communicating his Inventions of this Kind.

At length, he reſolved upon taking a Voyage to *England*, where he mentioned the ſame Thoughts to the Fellows of the *Royal Society*, where he found friendly Encouragement to his Genius. ——— He then propoſed a Method of conveying Intelligence, with great Expedition, by the Uſe of Teleſcopes; but as this Method was not reduceable to real Uſe, it did not meet with much Approbation from the Society. Nevertheleſs, at his Return to *Paris*, he made ſome Experiments before ſome of the Royal Family, and other Perſons of Diſtinction, which afforded ſome Satisfaction to the Spectators.

In 1695, he publiſhed Obſervations and Experiments concerning the Manner of making a new Hour-glaſs, and concerning Barometers, Thermometers, and Hygroſcopes. This is the only Book which he wrote, beſides ſome Pieces which are publiſhed in the *Journal des Scavans*. Though the Hour-glaſſes, made with Water, ſo much in Uſe among the Ancients, were entirely laid aſide, becauſe Clocks and Watches are much more uſeful, yet Mr. *Amontons* took a great deal of Pains in making his new Hour-glaſs, being in Hopes that it might ſerve at Sea, it being contrived in ſuch a Manner that the moſt violent Motion could not alter its Regularity; whereas, a great Agitation infallibly diſorders a Clock or Watch.

When the Royal Academy was new regulated in 1699, Mr. *Amontons* was choſen a Member of it, and read, for the firſt Lecture, his *New Theory of Friction*, in which he very happily cleared up a very uſeful and important Part of Mechanics. He had not only a remarkable Talent for Invention, but a very good Genius for making Experiments; as his Notions were delicate and juſt, ſo he had that Accuracy in the Execution of his

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Schemes as to prevent any Inconvenience in his new Inventions. He was remarkable for the Regularity of his Life, to which we may, in ſome Meaſure, attribute the Strength of his Underſtanding, and his great Freedom, many Years, from the Infirmities incident to human Nature: But, at length, was ſuddenly ſeized with an Inflammation in his Bowels, which ſoon mortified and became the Occaſion of his Death, the 11th of *October*, 1705, being then 42 Years of Age.

The LIFE of HERMAN BOERHAAVE.

HERMAN BOERHAAVE, one of the moſt celebrated Phyſicians this, or perhaps any Age has produced, was born at *Voohout* in *Holland*, near the City of *Leyden*, the 31ſt of *December* 1668: His Father intended him for the Study of Divinity; with this View he himſelf initiated him in Grammar, according to the Method of *Voſſius*, and proceeded with him from the *Colloquies of Eraſmus* to *Terence*, the *Greek Teſtament* and univerſal Hiſtory. About the twelfth Year of his Age, he was afflicted with a malignant Ulcer in his Left Thigh, which baffled all the Art of Surgery, and greatly interrupted his Studies for five Years; but, after all other Methods had failed, he himſelf, by fomenting it with Salt and Wine, effected a Cure, and thereupon conceived his firſt Thoughts of ſtudying Phyſic.

In 1682, he was ſent to *Leyden* and put under the Care of Mr. *Wynſchotan*, Maſter of the public School, and, at the Expiration of the Year, was advanced to the higheſt Claſs, and qualified for the Univerſity. But at this Time his Father dying, leaving a Wife and nine Children, (with but a ſlender Proviſion,) of whom *Herman*, though but ſixteen, was the eldeſt, it was like to prove a great Hindrance to his Acquiſition of Learning. However, the Proficiency he had made had ingratiated him into the Favour of Perſons of Note, and, upon his Admiſſion to the Univerſity of *Leyden*, Mr. *Trigland*, Profeſſor in Divinity, an Acquaintance of his late Father, procured him the Patronage

Patronage of Mr. *Daniel Van Alphon*, Burgomaſter of *Leyden*; by the Advice and Aſſiſtance of thoſe Gentlemen he attended the principal Lectures on Logic, the Uſe of the Globes, natural Philoſophy, Metaphyſics, and Ethics: He likewiſe attended *Gronovius*'s Lectures on *Greek* and *Latin* Authors, *Richius* on *Latin Claſſics*, Rhetoric, Chronology, and Geography; and *Trigland* and *Scaafe* on the *Hebrew* and *Chaldee* Languages, in order to underſtand the Scriptures in their Originals.

In 1687, he applied himſelf to the Mathematics, and found the Study ſo entertaining and intereſting, that, after having gone through Geometry and Trigonometry, he proceeded to Algebra, under *Volder*, to the Year 1689, when he gave a Specimen of his Erudition in an Academic Oration, "proving that the Doctrine of *Epicurus*, concerning the chief Good, was well underſtood by *Cicero*:" for this he received the golden Medal, which uſually is accompanied with a general Applauſe of ſuch probationary Exerciſe.

In 1690, he took a Degree in Philoſophy: In his Theſis on this Occaſion, with great Strength of Argument, he confuted the Syſtems of *Epicurus*, *Hobbs*, and *Spinoſa*.

After having laid a ſolid Foundation in all other Parts of Learning, he proceeded to the Study of Divinity under the Profeſſors *Trigland*, *Spanheim*, and *Mark*. The firſt gave Lectures on *Hebrew* Antiquities; the ſecond, on eccleſiaſtical Hiſtory; under whom *Boerhaave* held a public Theological Diſputation.

Notwithſtanding he was thus qualified for entering into Holy Orders, which, according to his Father's Intention, he had hitherto chiefly in View, and that his Patrimony was by this Time almoſt wholly exhauſted; yet ſuch was his Diffidence, he attempted rather by teaching the Mathematics to defray the Expence attending the farther Proſecution of his Theological Studies: By this Means he not only increaſed his Reputation, but (what laid the Foundation of his future Fortune) was introduced to an intimate Friendſhip with *John Vandenburg*, Burgomaſter of *Leyden*, by whom he was recommended to the Curators to compare the *Voſſian* Manuſcripts (purchaſed in *England* for the public Library at *Leyden*) with the Catalogue of Sale, which he executed with ſuch Accuracy as procured him the Eſteem of the Univerſity, and recommended him in ſo particu-

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lar a Manner to Mr. *Vandenburg*, that this Gentleman became ever after ſollicitous for his Advancement: And, obſerving what amazing Progreſs Mr. *Boerhaave* had made in what he applied himſelf to, perſuaded him to join the Study of Phyſic to Philoſophy and Theology, as a Relaxation from Divinity: And, in Complaiſance to this Gentleman, he entered upon the Study of Phyſic, for which his Acquaintance with the learned Languages and natural Philoſophy had ſo ſuitably prepared him. The Study of Medicine commencing with that of Anatomy, he diligently peruſed *Veſalius*, *Fallopius*, and *Bartholin*, oftentimes himſelf diſſecting, and attending the public Diſſections of Profeſſor *Nuck*. He moreover applied himſelf to the Study of the Fathers in Phyſic, beginning with *Hippocrates*, and, in their Chronological Order, reading carefully all the *Greek* and *Latin* Phyſicians. He then proceeded to acquaint himſelf with the moſt approved modern Authors, particularly with *Sydenham* whom he uſually ſtiled the *immortal Sydenham*. He next applied to Chemiſtry, which ſo captivated him, that he ſometimes ſpent Days and Nights ſucceſſively in the Study and Proceſſes of this Art. He made alſo a conſiderable Progreſs in Botany; not contenting himſelf with inſpecting the Plants in the Phyſic Gardens, he ſought others, with Fatigue, in Fields, Rivers, *&c.* thoroughly examining what he found, and comparing them with the Delineation of Authors.

The Progreſs he hitherto made in Phyſic was without any Aſſiſtance from Lectures, except thoſe mentioned in Anatomy, and a few by Profeſſor *Drelincourt* on the Theory: He therefore went to the Univerſity of *Harderwick* in *Guelderland*, and in 1693 was created there Doctor of Phyſic. ——— Upon his Return to *Leyden*, he perſiſted in his Deſign of engaging in the Miniſtry, and, after ſome Oppoſition made, through a falſe Repreſentation of his Principles, accepted a Licenſe for the Pulpit. But, notwithſtanding his Merit, nothing very intereſting offered to his Acceptance, and his Circumſtances being but narrow, he reaſſumed the Study and Practice of Phyſic, reading the moſt valuable Authors.

In 1701, on the Death of Profeſſor *Drelincourt*, he became Lecturer upon the Inſtitutes of Phyſic, and delivered an Oration the 18th of *May*, the Subject of which was, to recommend

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the Study of *Hippocrates*, apprehending that either through Indolence or Arrogance this Founder of Phyſic had been ſhamefully neglected.

Boerhaave's Pupils could not but obſerve, in his Lectures on the medical Inſtitutions, how judiciouſly he interſperſed Chemiſtry, ſo as to render the Art, by his Application of it, ſubſervient to the Illuſtration of his Lectures. They were ſo pleaſed with their Preceptor and his Doctrine, that they requeſted, with much Importunity, that he would inſtruct them in Chemiſtry as well as in Phyſic. In this he acquitted himſelf ſo well, that two Years afterwards, *viz.* in 1703, he was invited to a vacant Profeſſorſhip of Medicine, by the Univerſity of *Grottingen*, which he declined. This was conſidered by the Univerſity of *Leyden* as an Obligation on them to augment his Salary, and promiſed him likewiſe the firſt medical Profeſſorſhip that ſhould be vacant. From this Time to *February* 18, 1709, *Boerhaave* officiated as a Profeſſor with the Title of Lecturer only, when, upon the Death of Dr. *Hotton*, the Profeſſorſhip was conferred upon him. His inaugural Oration was upon the Simplicity of true medical Science, wherein, exploding the Fallacies and Oſtentation of Alchemiſtical and Metaphyſical Writers, he reinſtates Medicine on the ancient Foundation of Obſervation, Experiments, and Deductions naturally reſulting from them. In a few Years, he enriched the Phyſic Garden with ſuch a Number of Plants, that it was found neceſſary to enlarge it to twice the Dimenſions.

In the Year 1714, he was advanced to the Dignity of Rectorſhip in the Univerſity, and very ſoon after, in that ſame Year, was conſtituted Profeſſor of the Practice of Phyſic, in the room of *Bidloo*, and twice a Week attended the Univerſity Hoſpital, not leſs to the Advantage of his Pupils than Patients. —— During his Rectorſhip, in 1725, he delivered an Oration on the Methods of obtaining Certainty in Phyſics, in which he very learnedly ſhewed, that we are entirely ignorant of the firſt Principles of Things, and that all our Knowlege of their Qualities is derived either from ſuch Experiments as ſubject them to our Senſes, or from Conſequences, by an exact Method of Reaſoning deduced from thoſe Experiments.

In the Year 1728, Dr. *Boerhaave* was elected a Member of the *Academy of Sciences* at *Paris*, in the room of Count *Marſigi*, deceaſed; and in *April* 1730, he was propoſed, and unanimouſly elected a Member of the *Royal Society* at *London*.

About *Auguſt* 1722, Dr. *Boerhaave* had a ſevere Fit of Illneſs, another in 1727, and being, as it were, threatned with a Relapſe in 1729, he reſigned his Profeſſorſhip of Botany and Chemiſtry. This gave Occaſion to his excellent Declamation in *Auguſt* 28, in which he recounts, next to the Favours of Providence, many Inſtances of Friendſhip which had contributed to the Happineſs of his Life, and expreſſing the Satisfaction and Pleaſure attending his Endeavours to promote the Knowledge of thoſe uſeful Sciences which had ſo much employed his Studies, which he hoped had been attended with ſome Succeſs.

His eighth, and laſt Oration he delivered, *Feb.* 8, 1731, on laying down his Rectorſhip. In this he endeavoured to demonſtrate, that a real Attention to Nature, in obſerving her Dictates and following her Example, is the ſole Foundation of Merit in a Phyſician, and entitles him to the higheſt Honours in his Profeſſion; and that the Art of healing is never more ſucceſsful, than when directed by Nature. No Profeſſor was ever attended in public and private Lectures, by ſo great a Number of Students from ſuch different and diſtant Parts, for ſo many Years ſucceſſively, and few ever acquired ſuch univerſal Eſteem. He was remarkable in his Addreſs to Senior Phyſicians, and in his Courteſy to the Reſt; his Action in delivering his Lectures was both expreſſive and engaging, and, being without Affectation, it ſeemed the Gift of Nature, rather than the Acquiſition of Art. His Manner of explaining Things was ſimple, methodical, and exact, as well as ſuited to the Dignity of his Subject. ——— In the Adminiſtration of Juſtice, he had no Reſpect to Perſons; nor was ever awed into unworthy Compliances by the Frowns of the Great. He was always modeſt without Meanneſs, and ſteady without Rudeneſs. He neither ſwerved from Juſtice himſelf, nor connived at it in others. By the Veneration of his Countenance, blended with Sweetneſs, by Lenity without Softneſs, and by an Acquaintance with the Civil Law of his Country, he became an Ornament to Magiſtracy itſelf. ——— In his private Character, ſays the Author of his Life,

Life, he was no leſs amiable in private Converſation, ſeldom making his own Works, or Affairs, the Subject of Diſcourſe. In Friendſhip, he was ſincere, conſtant, and affectionate: He was communicative without Conceitedneſs; and zealous, though diſpaſſionate, in contending for the Truth; and ſo unmoved by Detraction as to ſay, "The Sparks of Calumny will be preſently extinct of themſelves, unleſs you blow them.

The latter Part of his Life was chiefly ſpent at his Country Seat, where his Garden was ſtored with all curious exotic and native Plants: Theſe he eſteemed his greateſt Riches, and the Study of their Nature his greateſt Pleaſure. His cloſe Attention thereto was thought to haſten his Death: After frequent Intervals of Illneſs, he died the 23d of *September* 1738, with that Calmneſs and Serenity of Mind which reſults from doing Good, and the Hopes of divine Favour, near Seventy Years of Age.

He wrote, and publiſhed many uſeful Tracts in Mechanics, on Chemiſtry, Plants, Medicine, *&c.* (a Liſt of which are prefixed to his *Elements of Chemiſtry)* which were printed from 1701 to 1728.

The LIFE of JOHN FREIND.

JOHN FREIND, a learned Phyſician, Chemiſt, and Hiſtorian, was born in the Year 1675 at *Croton* in *Northamptonſhire*, of which Place his Father was Rector, a Man of Learning, Piety, and Integrity, who, obſerving the promiſing Genius of his Son, ſent him early to *Weſtminſter* School, and put him under the Care of the celebrated Mr. *Buſby*, where he made a conſiderable Progreſs in Learning, and was from thence elected to *Chriſt-Church* College in *Oxford* in the Year 1690, and ſoon after publiſhed a *Greek* Oration of *Demoſthenes*, which was well received. —— He read, with great Attention, the *Greek* Poets, Orators, and Hiſtorians of Antiquity, in order to render himſelf a perfect Maſter of the *Greek* Language, and to acquire a Facility in *Latin* Verſe as well as Proſe, —— He then began to apply him-

ſelf to the Study of Phyſic, and his firſt Care was to digeſt thoroughly the true and rational Principles of natural Philoſophy, Chemiſtry, and Anatomy, to which he added a ſufficient Acquaintance with the Mathematics. The firſt public Specimen he gave of his great Abilities was in the Year 1699, when he wrote a Letter to Sir *Hans Sloane* concerning an Hydrocephalus, or Watry-head; and, in 1701, another Letter to the ſame Gentleman, in *Latin*, of ſome extraordinary Caſes attending Convulſions, which ſeized People at that Time in *Oxfordſhire*, which, made great Noiſe in *England* from its malignant Nature: In which our Author ſhewed great Penetration, and communicated his Sentiments with much Approbation and Uſefulneſs, which are printed in the *Philoſophical Tranſactions*, N°. 256, *September* 1699, and N°. 270 in 1701.

Being now well known and diſtinguiſhed among the Faculty, he began to meditate larger Works, read the Writings of *Borelli*, *Baglivi*, *Pitcairne*, and *Keille*, and, with ſome Succeſs, attempted to introduce the moſt conciſe and certain Method of inveſtigating medical Truths than had been known beforetime, and he reſolved to apply it to the moſt important Subjects in which the Learned were not agreed: For this Purpoſe, in 1703, he publiſhed his *Emmenologia:* Which has been eſteemed an excellent Performance, admirable for the Beauty of its Stile, the elegant Diſpoſition of its Parts, the wonderful Succinctneſs, and, at the ſame Time, Perſpicuity of the Whole.

In the Year 1704, he was choſen Profeſſor of Chemiſtry in the Univerſity of *Oxford*, and the Year after, for farther Improvement, he attended the Earl of *Peterborough* in his Expedition to *Spain*, as a Phyſician to the Army, where he continued two Years; thence made his Tour of *Italy*, and went to *Rome* to view the Antiquities and conſult with the Learned in diverſe Profeſſions. ——— On his Return to *England* in 1707, he found the Character of his illuſtrious Patron very rudely treated, which induced him, from a Spirit of Gratitude, to undertake his Defence, which underwent ſeveral Impreſſions and did Honour to his Character.

In *July*, 1707, he was created a Doctor in Phyſic by *Diploma*; and in 1709, he publiſhed his chemical Lectures, in which almoſt

moſt all the Operations of Chemiſtry are reduced to their true Principles and Laws of Nature. Theſe Lectures are dedicated to Sir *Iſaac Newton*. They were attacked by ſome *German* Philoſophers, who were ſomewhat alarmed at the new Principles: To which Dr *Freind* publiſhed an Anſwer in the *Philoſophical Tranſactions* in *Latin*; but both the Pieces have been ſince publiſhed in *Engliſh*.

In the Year 1712, he was elected a Member of the *Royal Society*, and the ſame Year attended the Duke of *Ormond* into *Flanders* as his Phyſician, and returned to *London* in 1714, where he reſided for ſome Years, applying himſelf with great Aſſiduity to the Diſcharge of his Profeſſion.

In 1716, he was choſen a Member of the College of Phyſicians, and publiſhed ſeveral valuable Pieces in that Science, though it occaſioned ſome Diſputes amongſt the Learned at that Time: The Diſputes were conducted with much Decency and apparent Uſefulneſs.

March the 7th, 1717, he read the *Gulſtonian* Lecture in the College of Phyſicians; and on the 18th of *October*, 1720, pronounced the Anniverſary Lecture before that learned Body, which was afterwards publiſhed and highly applauded.

In 1722, he was elected a Burgeſs in Parliament for *Launceſton* in *Cornwall*, and acted in that Station, as a Senator, with that Freedom and Regard to the Intereſt of his Country as was both natural and honourable.

About this Time he was ſuppoſed to have a Hand in *Atterbury*, the Biſhop of *Rocheſter*'s Plot, and was thereupon ſent to the *Tower*, *March* 15, 1722-3: He continued a Priſoner there 'till the 21ſt of *June* following, when he was bailed by Dr. *Mead*, Dr. *Hulſe*, Dr. *Levet*, and Dr. *Hale*; and in *November* following was diſcharged from his Recognizance.

The Leiſure afforded him by this Confinement was not ſo diſturbed by Uneaſy Thoughts as to divert him from thoſe Studies which were agreeable to his Abilities and Profeſſion; but he wrote there another Letter to Dr. *Mead* on the Subject of the Small-Pox ——— His Hiſtory of Phyſic, from the Time of *Galen* to the Beginning of the XVIth Century. This Work was juſtly eſteemed a laborious and maſterly Performance.

Soon

Soon after he obtained his Liberty, he was made Phyſician to the Prince of *Wales*, and, upon that Prince's Acceſſion to the Throne, he became Phyſician to the Queen, who honoured him with a large Share of her Confidence and Eſteem. But he did not enjoy this Favour long, for he died of a Fever the 26th of *July*, 1728, in the 52d Year of his Age.

Their Majeſties expreſſed the utmoſt Concern at his Death, and, in Conſideration of his Merit, ſettled a Penſion upon his Widow, who took Care of the Education of his only Son. He was buried at *Hitcham* in *Buckinghamſhire*, where a Monument was erected to his Memory. Several Gentlemen have attempted his Character. Dr. *James Keille* ſpeaks of him as "a Maſter of Writing and Teaching ſcarcely to be equally." Foreign Phyſicians and Philoſophers, as *Hoffman*, *Helvetius*, *Hecquet*, and *Boerhaave* have ſpoke of him with great Veneration: But Dr. *Edward Wilmot* more fully Characterizes him as a deep Philoſopher, a learned Phyſician, an elegant Writer, an Ornament to Society, and, to the utmoſt of his Power, the Friend of Mankind.

The LIFE of BERNARD DE FONTENELLE.

BERNARD DE FONTENELLE, a celebrated *French* Author, was born in *France* about the Year 1655: He wrote on Subjects of Tragedy in his younger Years, of polite Literature and Philoſophy in maturer Life, but was chiefly famous as a florid Eulogiſt. Some of his Productions of the firſt Kind were wrote before he was Twenty Years of Age, *viz. Thetis* and *Peleus*, *Æneas* and *Lavinia*. About the Year 1680, he wrote ſeveral other Pieces in the tragic Way, in ſome of which, it is ſaid, he diſcovered a Genius and Profoundneſs of Thought ſuperior to his other Works. In his poetical Performances, and Dialogues of the Dead, the Spirit of *Voiture* was diſcerned, but more extended and philoſophical. His Treatiſe on the *Plurality of Worlds* is a Work ſingular in its Kind: His Deſign therein was to preſent that Part of Philoſophy in a gay and pleaſing

pleaſing Dreſs. ——— He likewiſe wrote an entertaining Piece, which, though chiefly extracted from *Vandale*'s Oracles, in Purſuit of whoſe Scheme of exploding the Oracles for Human Impoſtures, he treated of ſome tender Points in ſuch Manner, which, though he diſplayed an accurate Genius, raiſed him ſome Enemies; and he found, ſays *Voltaire*, how dangerous it is for a Man, though in the Right, to differ in Opinion from thoſe whoſe Judgment receives a Sanction from Authority.

He now applied himſelf to Geometry and Natural Philoſophy; nor was he leſs ſucceſsful in the Study of theſe Sciences, than he had been in that of polite Literature. In this Part of his Life, he obtained much eſteem and Applauſe, and was appointed perpetual Secretary to the *Academy of Sciences*, which Truſt he diſcharged for more than Forty Years with general Approbation. ——— His *Hiſtory of the Academy of Sciences* often throws a great Light upon their Memoirs, which are generally very obſcure; but, at the ſame Time, it abounded with ſuch beautiful Flowers of Language as rendered them more juſtly admired.

The Elogies which he ſpoke on the deceaſed Members of the Academy have this peculiar Merit, that they excite a Reſpect for the Sciences as well as for the Author; and, upon the whole, he was looked upon as the great Maſter of the Art of teaching abſtracted Sciences in a Manner that made their Study at once eaſy and agreeable: Nor are any of his other Works void of Merit. All theſe natural Parts were aſſiſted by a Knowledge of the Languages and Hiſtory, and he certainly excelled many Men of Learning who have not had the Gift of Invention. He died in the Year 1756, ſomewhat more than 100 Years of Age.

The LIFE of Sir HANS SLOANE, Bart.

SIR *Hans Sloane*, an eminent Phyſician and Naturaliſt, and Founder of the *Britiſh Muſæum*, was of *Scottiſh* Extraction: His Father *Alexander Sloane*, being at the Head of that Colony

of

of *Scots* which King *James* I. ſettled in the North of *Ireland*, where our Author was born at *Killileagh*, *April* 16, 1660, he very early diſcovered a ſtrong Inclination to the Study of Natural Hiſtory, which being encouraged by a ſuitable Education, he applied thoſe Hours which Youth are apt to ſquander away in trifling Amuſements to the Study of Nature, and the Admiration of her Works. At the Age of ſixteen he was ſeized with a ſpitting of Blood, which interrupted the regular Courſe of his Studies for near three years; he had, however, learned enough of Phyſic to know that Malady could not be ſuddenly cured, and his Prudence directed him to abſtain from Wine and other inflammatory Liquors; and obſerving a ſtrict Temperance and Abſtinence, which he eſteemed the beſt Preſervatives that Nature has vouchſafed to Mankind, he was enabled to prolong his Life beyond the ordinary Age of Man. Soon after his Recovery, in a good Degree, from this Attack, his Deſire of perfecting himſelf in the ſeveral Branches of Phyſic (which he had choſen for his Profeſſion) led him to *London*, and upon his Arrival here he entered himſelf as a Pupil to the great *Stafforth*, an excellent Chemiſt bred under the illuſtrious *Stahl*, by whoſe Inſtructions he gained a very conſiderable Knowledge of the Compoſition and Preparation of the different Medicines of that Kind: At the ſame Time, he ſtudied Botany at *Chelſea*, and likewiſe aſſiduouſly attended the public Lectures of Anatomy and Phyſic in *London*, and, in ſhort, neglected nothing that had any Relation to his Profeſſion.———But his more diſtinguiſhing Talent and Merit was that of a Naturaliſt, and it was this Part of his Character that introduced him early into an Acquaintance with two the moſt eminent Perſons of the Age in that Science, *viz. Mr. Boyle*, and *Mr. Ray*, and he was very careful to improve their Friendſhip, by communicating to them every ſtriking Object of Curioſity and Uſe that fell under his Obſervation, often exciting their Wonder and engaging their Eſteem, which continued till their Death.———After about four Years cloſe Application to Study in *London*, *Mr. Sloane* reſolved upon viſiting foreign Countries for his farther Improvement, and with that View he firſt ſet out for *France*, accompanied with two other Students; one of them Sir *Tancred Robinſon*: this was about the Year 1683: He was elegantly entertained by the

the famous Mr. *Lemery*, a Chemiſt, in his Way to *Paris*; and on his Return he obliged Mr. *Lemery* with thoſe four different Kinds of Phoſporus, of which, 'till then, he had never the Opportunity of ſeeing. ——— Mr. *Sloane* ſpent his Time at *Paris*, much in the ſame Manner as he had done before in *England*; he attended the Hoſpitals; heard the Lectures of Meſſrs. *Tournefort*, *Du Verney*, and other eminent Maſters; viſited the Learned of every Faculty, who received him with particular Marks of Favour. ——— (Mr. *Tournefort* was one of thoſe celebrated *French* Botaniſts who made a moſt curious Collection of Plants, and wrote a Hiſtory of them, and with whom Mr. *Sloane* had ſuch Connections that were very much for his Improvement and his Honour: And Monſ. *Du Verney*, that famous Anatomiſt at *Paris*, who began very early to Study the natural Hiſtory of Animals, and, at length, by ſeveral Steps, became intimately acquainted with the human Frame, ſo as not only to be choſen a Member of the *Royal Academy of Sciences*, and publiſhed a curious Piece on the Organ of hearing; but was advanced to be a Tutor to the Dauphin, and had many diſtinguiſhing Favours both from his Majeſty and the *Royal Academy*, to which learned Body he bequeathed his valuable Collection, at his Deceaſe.) ——— From *Paris* our Author went to *Montpelier*, and having received Letters of Recommendation from Mr. *Tournefort*, he found an eaſy Acceſs to all the learned Men of that Province, particularly to Mr. *Magnol*, whom he always accompanied in his botanical Excurſions about the Neighbourhood of that City, where he beheld, with Pleaſure and Admiration, the Productions of Nature in that happy Climate; and he learned, under the Inſtructions of Mr. *Magnol*, to claſs them in their proper Order. Having found an ample Field for Contemplation entirely ſuited to his Taſte, he took Leave of his two Companions, whom a Curioſity of different Kind led into *Italy*, and he betook himſelf for one whole Year to make a Collection of Plants in that Province, and then took a Tour through *Languedoc* with the ſame View, and, paſſing through *Tholouſe* and *Bourdeaux*, returned again to *Paris*, where he made a ſhort Stay, and ſet out for *England* in the latter End of the Year 1684, with an Intent to ſettle in his Profeſſion: upon his Arrival at *London* he made it his firſt Buſineſs to viſit his two illuſtrious Friends, Mr. *Ray*

and Mr. *Boyle*, in order to communicate to them the Diſcoveries he had made abroad; but Mr. *Ray* being retired into *Eſſex* he ſent him a valuable Preſent of foreign Plants and Seeds, which were the more acceptable to him as he had deſcribed many of them in his *Hiſtoria Plantarum* on the Credit of other Authors. He continued this moſt agreeable Intercourſe with Mr. *Ray* 'till his Death, as before mentioned, which was in the Year 1706. About this Time our Author became acquainted with the celebrated Dr. *Sydenham*, who ſoon contracted ſuch a warm Affection for him, that he took him into his Houſe, and recommended him in the moſt earneſt Manner to his Patients.

He had not been long in *London* before he was recommended by Dr. *Liſter*, as a proper Member of the *Royal Society*, and, being approved, was accordingly elected, *January* the 21ſt following: And that Year, *viz.* 1685, he communicated ſeveral Curioſities to that Society, and continued to deliver many other curious Obſervations from Time to Time.

In 1687, he was choſen a Fellow of the College of Phyſicians in *London*. ——— Dr. *Tancred Robinſon* returning this Year, they both communicated to the *Royal Society* ſome Accounts of the Plant called the *Star of the Earth*, confirmed by Quotation from other Writers, and ſome Experiments of its Efficacy in curing the Bite of a mad Dog.

The ſame Year, our Author, in the Purſuit of farther Knowledge of this Kind, accepted the Offer of *Chriſtopher* Duke of *Albemarle*, to go with him as his Phyſician to *Jamaica*, whereof he was appointed Governor, and accordingly embarked at *Portſmouth*, *September* the 12th, and arrived the 19th of *December*. Here a new Field was opened for freſh Diſcoveries in natural Productions: The medical World, however, had been deprived of the Uſe of it had not our Author, by indefatigable Application, converted, as it were, his Minutes into Hours. The Duke of *Albemarle* dying almoſt as ſoon as he landed, and the Ducheſs his Conſort, determining to return to *England* as ſoon as poſſible, the Doctor could not entertain a Thought of leaving her in Diſtreſs. He improved all his Time in making Collections of natural Curioſities, inſomuch, that though his whole Stay at *Jamaica* was ſcarce Fifteen Months, yet he brought together ſuch a prodigious Number of Plants and other natural

Rarities,

Rarities, as greatly ſurprized his Friends at his Return. Mr. *Ray* ſays, "When I ſaw that Gentleman's Stock of dried Plants, collected in *Jamaica* and ſome of the *Caribbee* Iſlands, I was aſtoniſhed at the Number of the capillary Kind, not thinking there had been ſo many to be found in the *Indies*."

On his Arrival at *London* he applied himſelf to the Practice of Phyſic, and ſoon became ſo eminent, that he was choſen Phyſician to *Chriſt*'s *Hoſpital* on the 17th of *October* 1694, which he held 'till the Year 1730, and then, on Account of his great Age and many Infirmities, he found it neceſſary to reſign. What is ſingular, and deſerves the higheſt Commendation, is, that though he received the appointed Salary of that Office punctually, becauſe he would not introduce a bad Preſident, yet he conſtantly applied the Money to the Relief of thoſe who were the greateſt Objects of Compaſſion in that Hoſpital.

He had been elected Secretary to the *Royal Society* the 30th of *November*, 1693, and entered upon the Buſineſs of that Office by reviving the Publication of the *Philoſophical Tranſactions*, which had been omitted for ſome Time, and of which he continued the Editor 'till the Year 1712, and the Volumes publiſhed in this Period are Proofs of his Induſtry, many of the Pieces contained being written by himſelf. In the Interim, he publiſhed his *Catalogus Plantarum, quæ in Inſula* Jamaica, *ſponte proveniunt, &c. ceu prodromi Hiſtoriæ naturalis, Pars Prima*, which he dedicated to the *Royal Society*, and College of Phyſicians. The firſt Volume was publiſhed in 1707, but the Second not till 1725; by this very uſeful, as well as magnificent Work the *Materia Medica* was enriched with a great Number of excellent Drugs, not known before: A more particular Account of which the Reader may ſee in the Doctor's Life, *Biographia Britannica*, Vol. VI. Part. I. but will exceed the Limits of this Work. ——— At the ſame Time, he laid the Plan of a Diſpenſatory where the Poor might be furniſhed, at prime Coſt, with ſuch Remedies as their ſeveral Maladies ſhould require, which he afterwards, with the Aſſiſtance of the Preſident, and other Members of the College of Phyſicians, carried into Execution.

Our Author's Thirſt for natural Knowlege ſeems to have commenced with his Being, and his Cabinet of Rarities began with his very early Years, which he was continually en-

riching by the Search of ſome, and the Purchaſe of every other natural Curioſity brought to him: But even this Collection acquired but ſlow Additions 'till the Augmentation it received by the Death of *William Courton*, Eſq; a Gentleman who had employed all his Time, and the greateſt Part of his Fortune, in collecting Rarities, and who bequeathed the whole to Sir *Hans* on Condition of his paying a few Debts and Legacies, which our Author faithfully performed.

In 1708, the Doctor was elected a foreign Member of the *Royal Academy* at *Paris*, an Honour ſo much the more regarded as we were then at War with *France*, and the Queen's Conſent was neceſſary to the Acceptance of it: And, in Proportion as his Credit roſe among the Learned, his Practice increaſed among Perſons of the higheſt Rank; Queen *Ann* frequently conſulting him in her laſt Illneſs, and was bleeded by him.

Soon after the Acceſſion of King *George* I. to the Throne, *April*, 1716, the King created the Doctor a Baronet, an hereditary Title of Honour, to which no *Engliſh* Phyſician had ever before arrived; and, at the ſame Time, made him Phyſician-General to the Army, which he enjoyed 'till his Majeſty's Deceaſe, 1727.

Upon the Acceſſion of *George* II. to the Throne, he was appointed Phyſician in Ordinary to his Majeſty, and preſcribed for the Royal Family till his Death: He was particularly favoured by Queen *Caroline*, who placed the greateſt Confidence in his Judgment. ——— In the Interim, he had been choſen unanimouſly one of the Elects of the *College of Phyſicians*, *June* 1, 1716, and was elected Preſident of that College *Sept.* 30, 1719, in which Station he continued 16 Years, and gave the ſtrongeſt Proofs of his Zeal and Aſſiduity in the Diſcharge of that Truſt, ſupporting the Intereſt and Credit of that Body by many liberal Diſburſements.

He diſcovered the ſame Spirit of Generoſity to other learned Societies: He no ſooner purchaſed the Manor of *Chelſea*, than he gave the Company of Apothecaries the entire Freehold of their botanical Garden, in 1721, on Condition only, that they ſhould preſent to the *Royal Society* fifty new Plants annually, 'till the Number ſhould amount to 2000. He likewiſe gave ſeveral Donations for the Improvement of this Garden, the Situation of which,

which, on the Banks of the *Thames*, and near the Capital, was ſuch as rendered it peculiarly uſeful in two Reſpects, *viz.* 1. by producing the moſt rare medicinal Plants, and 2, by ſerving as an excellent School to young Botaniſts, an Advantage which he himſelf had drawn from it in the early Part of Life.

The Death of Sir *Iſaac Newton*, in 1727, made Way for the Advancement of Sir *Hans* to the Preſidency of the *Royal Society*. He had long been Vice-Preſident, and frequently ſat in the Chair for that great Man; and, by his long Continuance with that learned Body, had contracted a great Friendſhip for it; ſo that he, on ſome Occaſion, ſubſcribed 100 Guineas, and likewiſe cauſed a curious Buſt of King *Charles* II. to be ſet up in the Great Hall where they meet. He was alſo an Inſtrument in procuring Sir *Godfrey Copley*'s Benefaction of a Medal of Five Guineas, as an honorary Preſent to him that ſhould annually communicate the beſt Experiments to that Society.

Being now placed at the Head of it, he laid aſide the Thoughts of all further Promotions, and applied himſelf wholly to the Study and Diſcharge of his reſpective Offices, which were not a few, nor of ſmall Importance, to anſwer like an able Phyſician the high Opinion conceived of him; ——— to improve his own Knowledge in natural Philoſophy and communicate it to others; ——— to enlarge his Collection of valuable Curioſities, by Correſpondence at home and abroad: ——— With theſe and other laudible Purſuits he employed his Time, his Talents, and his Fortune, from the Year 1727 to 1740, when at the Age of Eighty, he choſe a more retired Life; reſigned the Preſidency, though againſt the Inclination of the *Royal Society*, who afterwards choſe *Martin Folkes*, Eſq; to ſucceed him, and, in a public Aſſembly, thanked him for the great and eminent Service he had done them, and deſired Permiſſion to retain his Name as a Member of their Council ſo long as he ſhould live.

In the Month of *January*, 1741, he began to remove his Library and Cabinet of Rarities, from his Houſe at *Bloomſbury* to that at *Chelſea*, and retired thither the 12th of *May* to enjoy the Tranquility of a well ſpent Life. He did not, however, paſs his Life in that Solitude which excludes Men from Society and Uſefulneſs: He received the Viſits of Perſons of Diſtinction, learned

learned Foreigners and Natives: The Royal Family ſometimes did him the Honour. But what was more to his Praiſe, he never refuſed Admittance, or giving Advice to the Poor: And that he might be more extenſively uſeful, he publiſhed many valuable Receipts for Diſtempers in the Eyes, for the Bite of a mad Dog, *&c.* and directed to a proper Regimen under theſe and other Diſorders.

Hitherto the great Temperance and Self-Government of Sir *Hans* had preſerved him from feeling many of the Infirmities of old Age; but in his ninetieth Year he began to complain of Pains, and grew ſenſible of an univerſal Decay; but was often heard to ſay, that the Approach of Death brought no Terrors with it, that he had long expected the Stroke, and was ready to receive it whenever the great Author of his Being ſhould think fit. The long expected Moment arrived, after only three Days Illneſs, *January* 11, 1752. He was interred on the 18th at *Chelſea*, in the ſame Vault with his Lady: The Solemnity was attended by a great Concourſe of People of all Ranks. His Funeral Sermon was preached by *Zachary Pearce*, then Biſhop of *Bangor*, who forebore to enlarge on the exalted Qualities of the Deceaſed, by Reaſon of an expreſs Prohibition received from the Mouth of the Deceaſed a little before his Death. Such was his Humility, that he thought it a Degree of Profanation to debaſe, with the Praiſes of human Excellencies, the Pulpit, which ſhould be devoted to diſplay to Men the Greatneſs of the Supreme Being, and to inſtruct them in his Laws. ——— Sir *Hans Sloane* married, in 1695, *Elizabeth*, Daughter of Alderman *Langley* of *London*, who died in 1724, by whom he had one Son and three Daughters. ——— The Writer of his Eloge having obſerved that the Perſon of Sir *Hans* was tall and well proportioned, likewiſe adds, that his Manners were eaſy, free, and engaging; that his Converſation was ſprightly, familiar, and obliging; that nothing could equal his Courteſy to Strangers, he being always ready on the leaſt Notice to ſhew and explain to them his whole Cabinet, particularly to his Brethren of the *Royal Society*, who thought fit to viſit him. His Death was a great Loſs to many, eſpecially to the Poor, to whom he was a liberal Benefactor. He was a Governor to almoſt every Hoſpital in and about *London*, to each of which he gave 100*l.* in his Life-

Life-time, and conſiderable more at his Death. He was extremely ſollicitous leſt his Cabinet of Rarities, which he had taken ſo much Pains to collect, ſhould be again diſſipated at his Death, and yet, not willing that ſo large a Share of his Fortune ſhould be loſt to his Family, and at the ſame Time deſirous that his Countrymen ſhould enjoy the Pleaſure and Advantage of his Collection; he therefore bequeathed it to the Public, on Condition that 20,000*l.* ſhould be made good by Parliament to his Family, a Sum which, though large in Appearance, was ſcarce more than the intrinſic Value of the Gold and Silver Medals, the Ores and precious Stones found in it: There were, beſides his Library conſiſting of more than 50,000 Volumes, 347 of which were illuſtrated with Cuts finely engraved and coloured from Nature, 3566 Manuſcripts, and a great Number of rare and curious Books. ——— The Parliament accepted the Legacy, and fulfilled the Conditions: The Act for this Purpoſe, which paſſed in 1753, is entitled, "*An Act for the Purchaſe of the Muſæum, or Collection of Sir* Hans Sloane, *Bart. and of the* Harleian *Collection of MSS, and for procuring one general Repoſitory for the better Reception, and more convenient Uſe of the ſaid Collection, and of the* Cottonian *Library, and Additions thereto.*" In purſuance of this Act, the Sum of 300,000 was raiſed by Lottery, which abundantly enabled the Parliament to compleat their whole Deſign; according to which, beſides the required Sum of 20,000*l.* paid for Sir *Hans*'s Collection, the *Harleian* MSS were purchaſed at the Rate of 10,000*l.* that magnificent Edifice called *Montague Houſe* in *Ruſſel-ſtreet*, *Bloomſbury*, was alſo purchaſed at the Rate of 10,000*l.* To this Houſe, not only the two laſt mentioned Collections, but the *Cotton* Library with all the Additions thereto, including that of *Arthur Edwards* of *Hanover-ſquare*, bequeathed by his Will in 1738, were removed. By the ſaid Act, ſundry great Officers of State, and Biſhops for the Time being, are appointed Truſtees, and incorporated by the Name of *Truſtees for the* Britiſh *Muſæum*; and any deputed Number of theſe, not leſs than three, have a Power to chuſe Officers, or make any other neceſſary Regulations, 30,000*l.* being placed out to Intereſt in the public Funds towards the Payment of Salaries, *&c.* The whole Collection being placed in proper Order, the *Muſæum* was opened for public Uſe in

1759,

1759, when ſeveral Statutes and Rules relating to the Inſpection and Uſe of it were publiſhed by Order of the Truſtees: The Subſtance of which is as follows:

The *Muſæum* will be kept open every Day except *Saturday*, *Sunday*, *Chriſtmas-day*, and one Week after; one Week after *Eaſter-day* and *Whit-Sunday*; *Good-Friday*, and every *public Faſt* and *Thankſgiving-day*, from IX in the Morning to III in the Afternood; but on *Mondays* and *Fridays* in *May*, *June*, *July* and *Auguſt*, from IV to VIII in the Afternoon.

Perſons deſirous to ſee the Muſæum muſt, in Writing, give in their Names, Condition, and Places of Abode, who will have Tickets delivered them appointing the Day and Hour when they will be admitted, which are at IX, X, XI, or XII in the Morning; and at IV or V in the Afternoon, on thoſe Days in which the *Muſæum* is opened: At that Time they are to be attended by proper Officers in the reſpective Apartments, who will give the Spectators proper Information relative to the Part of the Collection under his Care.

That the Spectators may view the whole *Muſæum* in a regular Order, they will firſt be admitted to ſee the Manuſcripts and Medals, then the natural and artificial Productions, and afterwards the printed Books, one Hour allowed to the ſeveral Companies, ſo that the whole may be viewed in three Hours.

If any Perſon come after the Hour marked in his Ticket, but before the three Hours are expired, he may, if he deſires it, be permitted to join the Company appointed for the ſame Hour on his removing into another Department.

Any Perſon may apply for a Ticket in the Manner abovementioned, as often as he pleaſes, provided that no one Perſon have Tickets at the ſame Time for more Days than one.

No Children will be admitted.

No Officer, or Servant, muſt take any Fee, Reward, or Gratuity.

With Regard to Perſons who deſire to make Uſe of the Muſæum for Study: No one will be admitted but by Leave of the Truſtees, or of the Committee, and that for ſix Months only, without a freſh Application: The Names of ſuch Perſons, with the Dates of the Orders and their Duration, will be entered in a Book.

A large convenient Room is alotted, in which they may ſit and read or write without Interruption, during the Time the *Muſæum* is kept open: A proper Officer attends in the Room. They muſt give Notice in Writing the Day before, what Book or Manuſcript they deſire to peruſe the Day following, which will be provided in readineſs to deliver to them, except a few which the Truſtees do not permit to be carried out of the Room where they are depoſited, without ſpecial Leave.

Such Perſons will be allowed to take one or more Extracts from any printed Book or MSS. the Tranſcriber muſt not lay the Paper on which he writes upon any Part of the Book or MSS he is uſing.

Every Perſon intruſted with the Uſe of any Book is to deliver it to the proper Officer before he leaves the Room, who returns it to the Library, if done with, or places it in a Book-Caſe in the ſame Room for his farther Uſe.

Any Perſon engaged in a Work, who ſhall have Occaſion to make any drawing of any of the natural or artificial Productions, or to examine it more carefully than can be done in the common Way of viewing the *Muſæum*, muſt apply to the Committee, who meet every other *Friday* at the *Muſæum*.

No Part of the Collections belonging to the *Muſæum* muſt at any Time be carried out of the general Repoſitory, except Books, Charters, Deeds, or MSS, to be made uſe of in Evidence: And theſe, when requeſted, muſt be carried and brought back by one of the under Librarians, or Aſſiſtants, on proper Satisfaction made him.

And if any perſon ſhall behave in an improper Manner, and contrary to the Rules preſcribed by the Truſtees, he is liable to be diſmiſſed from the *Muſæum*, and not re-admitted.

It is eaſy to perceive the Advantage that will reſult to the public from this immenſe Collection. To have Acceſs to ſuch a Cabinet as this, is, in effect, to Men of Taſte, like making the Tour of the World, and having for their Tutor a Catalogue of 38 Volumes in Folio, and 8 in Quarto, containing a ſhort Deſcription of each Curioſity, with a Reference to the Authors who treat of it more largely.

N. B. His preſent Majeſty likewiſe, ſoon after his Acceſſion to the Throne, preſented a large and valuable Collection of Books and MSS to the *Muſæum*, conſiſting of more than 10,000 Volumes, chiefly relative to the Reign of King *Charles* I. the *Interregnum*, and the Reign of King *Charles* II.

The LIFE of M. VARIGNON.

PETER VARIGNON, born at *Caen*, in *France*, in 1654, was an Architect's Son, in middling Circumſtances. He had two Brothers, who followed their Father's Buſineſs, but himſelf was deſigned for the Church.

In the Courſe of his Studies, uſual at College, various Accidents concurred to favour his natural Inclination to a Study which he aſſiduouſly improved.

As Architects, and, ſometimes, the common Maſons, know how to make Dials, Mr. *Varignon* ſoon obtained ſuch a Knowledge of that Art as to gain a tolerable Livelihood. He learned the coarſe Part of the Work, which was all his Maſters could teach him, but was apprehenſive that the whole depended upon ſome general Theory; but this only excited a fruitleſs Uneaſineſs.

One Day as he was attending a Courſe of Philoſophy among the Jeſuits at *Caen*, looking over ſome Books for his Amuſement, at a Bookſeller's Shop, he met with an *Euclid*. He read a few Pages, at the Beginning, and was not only delighted with the Order and Chain of Ideas, but with the Eaſe with which he comprehended them. How can the Human Underſtanding but love that which bears Witneſs to its Powers? He brought the Book away with him, and was always pleaſed with it, for the ſame Reaſons that at firſt engaged his Attention to it.

That eternal Uncertainty, ſophiſtical Embarraſment, unprofitable Obſcurity, and, frequently, Conceitedneſs, in School-Philoſophy, greatly contributed to make him reliſh the Clearneſs, Connection, and Certainty of geometrical Truths.

The Study of Geometry led him to the Works of *Deſcartes*, and

and there he was ſtruck with that new Light which has, from thence, ſpread itſelf through all the thinking World. *

He abridged himſelf of the Neceſſaries of Life to purchaſe Books of this Kind, or rather conſidered them of that Number, as indeed they ought to be. What contributed to heighten this Paſſion in him was, that he ſtudied in private; for his Relations, obſerving that the Books he ſtudied were not ſuch as were commonly uſed by others, ſtrongly oppoſed his Application to them. As there was a neceſſity for his being an Eccleſiaſtic he continued his theological Studies, yet not entirely ſacrificing his favourite Study to them.

He frequently diſputed in the philoſophical Claſſes, and appeared an able Diſputant; his Underſtanding and Conſtitution being both happily adapted for that Purpoſe; for on the one Hand his Reaſonings were clear and ſtrong, and on the other, his Cheſt was well formed; and he had an excellent Voice.

At this Time the *Abbe St. Pierre*, who ſtudied Philoſophy in the ſame College, became acquainted with him. A Taſte, in common, for rational Subjects, whether Phyſics, or Metaphyſics, and continual Diſputations, formed the Bonds of their Friendſhip. They were mutually ſerviceable to each other in the Subjects of their Enquiries. Their Contrariety of Tempers formed a compleat and happy Mixture; one by the boldneſs of his Ideas, fruitful Imagination, and the heat of his Reaſonings; and the other by a cloſe Examination, a ſcrupulous Exactneſs, and by a diſcreet ingenious Deliberation examined every Thing.

The *Abbe*, to enjoy *M. Varigon*'s Company with greater Eaſe, lodged with him, and, growing more ſenſible of his Merit, reſolved to give him a Fortune that he might completely purſue his Genius, and improve his Talent. Yet this *Abbe*, a younger Brother of *Normandy*, had but an Income of eighteen Hundred Livres; three Hundred of which he aſſigned over to *M. Varignon*. This little, which was much with Reſpect to the Goodneſs of the Giver, was alſo much as to the Wants of the Receiver. The one found himſelf rich in what he had received, and the other more ſo by what he had given.

* The *Geometry*, not the *Philoſophy*, of *Deſcartes* is here to be underſtood.

The *Abbe*, perſuaded that he could not do better than to go to *Paris* to ſtudy Philoſophy, ſettled there, in 1686, with *M. Varignon*, in the Suburb of *St. Jacques*. There each ſtudied his own Way; the *Abbe*, abandoning tireſome uſeleſs Subtilities, principally applied himſelf to the Study of Man, Manners, and the Principles of Government; whilſt *M. Varignon* was wholly taken up with Mathematics.

I,* who was their Countryman, often went to ſee them, and, ſometimes, ſpent two or three Days with them. They had alſo Room for a couple of Viſiters, who came from the ſame Province. We joined together with the greateſt Pleaſure. We were young, full of the firſt Ardour of Knowledge, ſtrongly united, and, what we were not then, perhaps, diſpoſed to think ſo great a Happineſs, little known. *M. Varignon*, who had a ſtrong Conſtitution, at leaſt in his youth, ſpent whole Days in Study, without any Amuſement, or Recreation, except walking, ſometimes in fine Weather. I have heard him ſay, that the ſtudying after Supper, as he uſually did, he was often ſurpriſed to hear the Clock ſtrike two in the Morning; and was much pleaſed, that four Hours Reſt were ſufficient to refreſh him. He did not leave his Studies with that Heavineſs that they uſually create; nor with that Wearineſs that a long Application might occaſion. He left off gay and lively, filled with Pleaſure and impatient to renew it. In talking of Geometry he would laugh ſo freely, that it ſeemed as if he had ſtudied for Diverſion. No Condition was ſo much to be envied as his; his Life was a continual Enjoyment, and he entirely loved Quietneſs. Yet if one had looked for a happy man, it would have been natural to have ſearched far from him, and much above him; but it would not have been found except there.

In the ſolitary Suburb of *St. Jacques*, he did not miſs making a Connection with many learned Men, and the moſt illuſtrious, ſuch as *du Hamel*, *du Verney*, *de la Hire*. *Du Verney* frequently aſked his Aſſiſtance in thoſe Part of Anatomy connected with Mechanics; they examined together the Poſitions of the Muſcles, and their Directions; and *M. Varignon* learned a good deal of Anatomy from *M. Du Verney*, which he repayed by the Application of mathematical Reaſoning to Anatomy.

At

* *Fontenelle*, to whom we are indebted for this Life.

At Length, in 1687, *M. Varignon* made himſelf known to the Publick by a *Treatiſe on New Mechanics*, dedicated to the *Academy of Sciences*. His Thoughts on this Subjects were, in Effect, really new. He diſcovered Truths and laid open their Sources, Things which at firſt appear inſeparable, but which are yet often divided. In this Work, as a Mechanic, he demonſtrated the Neceſſity of an *Equilibrium*, in ſuch Caſes as it happens in, though the Cauſe of it is not exactly known. This is what *M. Varignon* hath diſcovered by the Theory of compound Movements; and is what this Eſſay turns upon. The eſſential Principles once diſcovered, the Verity of them flows with a lightful Eaſe into the Mind. The Connection is, at the ſame Time, very ſimple and cloſe; a View of their Production free and agreeable; and this Production being more legitimate in ſome Sort is alſo more fruitful.

This new Treatiſe on Mechanics was greatly admired by the Geometricians, and procured the Author two conſiderable Places, one of Geometrician in the *Academy of Sciences*, the other of Profeſſor of Mathematics in the *College of Mazarine*; to which he was the firſt Perſon raiſed.

He was led by the natural Bent of his Genius to make his mathematical Enquires as general as poſſible. A Landſkip cannot be properly ſaid to be ſeen when all its Parts have been viewed ſeparately, it muſt be contemplated from an Eminence where one Glance may unite a Variety of different Objects in a ſingle Group. The Caſe is juſt the ſame with geometrical Truths, there are a great many to be ſeen diſperſed here and there without any Connection, but, in order to ſee them at one View, a Man is obliged to ſoar very high, and that requires both Labour and Addreſs. The general Rules of Algebra are the Eminences from whence the wide extended Country may be obſerved. Perhaps no Geometrician ever better knew, or has better ſhewn the Utility of theſe Rules than *M. Varignon*.

He therefore could not fail to catch eagerly at the Geometry of *Infiniteſimals* as ſoon as it appeared in the World, it is conſtantly raiſing itſelf to the higheſt Point of View poſſible to the infinite, and there it takes in an infinite Extent of Space. With what Tranſport did he ſee a new Geometry and new Pleaſure ariſe! when that beautiful and ſublime Method was attack-

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ed in the Academy itſelf, (for it could not eſcape the Fate of all Innovations,) he became one of its moſt zealous Defenders, and in its Favour he put a Violence upon his natural Character, which abhorred all Contention. He ſometimes lamented to me, that this Diſpute had interrupted him in his Inquiries into integral Calculation ſo far, that it would be difficult for him to reſume his Diſquiſition where he had diſcontinued it. He ſacrificed infiniteſimals to the Intereſt of infiniteſimals, and gave up the Pleaſure and Glory of making a farther Progreſs in them when called on by Duty to undertake their Defence.

All the printed Volumes of the Academy bear Witneſs to his Application and Induſtry. His Works are never detached Pieces, but complete Theories of the Laws of Motion, central Forces, and the Reſiſtance of Mediums to Motion. In theſe he makes ſuch Uſe of his Rules, that nothing eſcapes him that has any Connection with the Subject he treats. Beſides the new diſcovered Truths, others are to be traced in them known before, which, coming from a Variety of different Quarters, conſpire to prop his Syſtem. Theſe united form a Body and the void Spaces which were left before are ſoon filled up.

Geometrical Certainty is by no Means incompatible with Obſcurity and Confuſion, and they are ſometimes ſo great that it is ſurpriſing a Geometrician ſhould not miſs his Way in ſo dark and perplexing a Labyrinth. The Works of *M. Varignon* never occaſion this diſagreeable Surpriſe, he makes it his chief Care to put every Thing in the cleareſt Light; he does not as ſome great Men do, conſult his Eaſe by declining to take the Trouble of being methodical, a Trouble much greater than that of Compoſition itſelf; he does not endeavour to acquire a Reputation for Profoundneſs, by leaving a great deal to be gueſſed by the Reader.

He was perfectly acquainted with the Hiſtory of Geometry. He learned it not merely out of Curioſity, but becauſe he was deſirous of acquiring Knowledge from every Quarter. This hiſtorical Knowledge is, without Doubt, an Ornament in a Geometrician, but it is an Ornament which is by no Means without its Utility. Indeed, it may be laid down as a Maxim, that the more different Ways the Mind is occupied in upon a Subject, the more it improves.

Though

Though *M. Varignon*'s Conſtitution did not ſeem eaſy to be impaired, Aſſiduity and conſtant Application brought upon him a great Diſeaſe in 1705. Great Abilities are generally dangerous to the Poſſeſſors. He was ſix Months in Danger, and three Years in a languid State, which proceeded from his Spirits being almoſt entirely exhauſted: He told me, that ſometimes, when delirious with a Fever, he thought himſelf in the Midſt of a Foreſt, where all the Leaves of the Trees were covered with algebraical Calulations. Condemned by his Phyſicians, his Friends and himſelf, to lay aſide all Study, he could not, when alone in his Chamber, avoid taking up a Book of Mathematics, which he hid as ſoon as he heard any Body coming. He again reſumed the Attitude and Behaviour of a ſick Man, and ſeldom had Occaſion to counterfeit.

In regard to his Character it ſhould be obſerved, that it was at this Time that a Writing of his appeared, in which he cenſured Mr. *Wallis* for having advanced that there are certain Spaces more that infinite, which that great Geometrician aſcribes to Hyberbolas. He maintained, on the Contrary, that they were finite. The Criticiſm was ſoftened with all the Politeneſs and Reſpect imaginable; but a Criticiſm it was, and he had wrote it only for himſelf. He let *M. Carré* ſee it, when he was in a State that rendered him indifferent about Things of that Kind, and he, influenced only by the Intereſt of the Sciences, cauſed it to be printed in the Memoirs of the Academy of Sciences, unknown to the Author, who thus made an Attack againſt his Inclination.

He recovered from his Diſeaſe and languid Condition, but the Remembrance of what he had ſuffered did not make him more prudent for the future. The whole Impreſſion of his *Project, for a new Syſtem of Mechanics*, having been ſold off, he formed a Deſign to publiſh a ſecond Edition of it, or rather a Work entirely new, though upon the ſame Plan, but more extended; ſo that the Name of *Project* could no longer ſuit with it. It would be eaſy to perceive how much Learning he had acquired in the Interval; but he often complained, that he wanted Time, though he was by no Means diſpoſed to loſe any. Frequent Viſits either of *French* or of Foreigners, ſome of whom went to ſee him that they might have it to ſay they had ſeen him;

him; and others, to conſult him and improve by his Converſation; Works of Mathematics, which the Authority of ſome, or the Friendſhip he had for others, engaged him to examine, and which he thought himſelf obliged to give the moſt exact Account of; a literary Correſpondence with all the chief Geometricians of *Europe*, to whom he could ſend no Letters but ſuch as were learned and wrote with Care; for a Man can no more neglect ſuch Friends than the Public; all this greatly hurted the Book he had undertaken to write. Thus a Man acquires Reputation by having a great deal of leiſure Time, and he loſes this precious Leiſure as ſoon as he has acquired Reputation. Add to this, that his beſt Scholars, whether in the *College* of *Mazarine* or the *Royal College*, for he had a Profeſſor's Place in both, ſometimes deſired private Lectures of him. The Pleaſure it gave him to ſee them deſire Inſtruction, his Zeal for the Mathematics, his Goodneſs of Heart, and his Propenſity rather to do more than Duty required of him than leſs, gave them this Right, and freed them from the Apprehenſion of carrying it too far. He ſighed for two or three Months of Vacation, for that was all the leiſure Time he had in the Year; no ſooner were they come but he retired to the Country, where his Time was entirely his own, and every Day ſeemed quickly ended.

Notwithſtanding his great Diſpoſition to Peace, at the latter End of his Life he was involved in a Conteſt. An *Italian* Monk, well verſed in Mathematics, attacked him upon Tangents and the Angle of Contact in Curves, ſuch as they are conceived in the Geometry of Infiniteſimals. He thought himſelf under a Neceſſity of anſwering, though indeed all indifferent Perſons would have thought otherwiſe; I do not think I quit the Character of an impartial Hiſtorian when I aſſert that his Reputation ran no Riſk, but that was his tendereſt Part, or rather all his Senſibility was there; he anſwered by the laſt Memorial he ever gave the Academy, and the only one which turned upon a Diſpute. His pacific Diſpoſition was, however, diſcoverable even there; he did not, in it, name his Adverſary, who had named him every Moment, whom all the World knew, who did not conceal himſelf, and though Remonſtrances were made to him upon the Weakneſs and Superſtition of his Silence, he perſiſted obſtinately to call him the Aggreſſor; true it is, he was

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not quite ſo tender of the falſe Reaſonings which he called by their true Name.

In the two laſt Years of his Life, he was attacked with a Rheumatiſm which was ſeated in the Muſcles of his Breaſt; he could not walk for a Time without being obliged to reſt himſelf in order to recover his Breath. This Illneſs encreaſed every Day, and all Remedies were ineffectual, which did not at all ſurprize him. He did not ceaſe from any of his cuſtomary Buſineſs; and, in fine, after having finiſhed his Lecture at the College of *Mazarine*, on *December* 22, 1722, he died ſuddenly the following Night, without having ſhewed any unuſual Symptoms of Illneſs.

His Character was as ſimple as his ſuperior Underſtanding could require. He was a Stranger to Jealouſy; true it is, he was at the Head of the *French* Geometricians, and one of the greateſt Geometricians of *Europe*. It muſt be owned, however, that when a new Idea was offered to him he was too haſty to object, the Fire of his Genius, the various Inſights into every Subject, made too impetuous an Oppoſition to thoſe that were offered; that it was not ſo eaſy to obtain from him a favourable Attention.

The LIFE of LEWIS CARRÉ.

LEWIS CARRÉ was born in the Year 1663. His Father, a ſubſtantial Farmer in the Province of *Brie*, dedicated him early to the Church, and applied him to the Studies fitteſt to qualify him for that State of Life; but Monſieur *Carré*, after going all the Lengths that could be expected from the moſt dutiful Son, choſe to incur his Father's Diſpleaſure, and be deſerted by him, rather than embrace a Profeſſion for which he did not find in himſelf as ſtrong a Vocation as he thought it required.

Being, by this Means, obliged to leave the Univerſity, and look out for Employment in the World, he had the good Fortune of being engaged as an Emanuenſis by the famous Father

Mallebranche, and of ſeeing himſelf tranſported all at once from the Mazes of ſcholaſtic Darkneſs, to the Source of the moſt brilliant and enlightened Philoſophy. He ſtudied, under this great Man, Mathematicks, and the moſt ſublime Metaphyſicks, and imbibed his Spirit ſo well, that, whereas the Generality of Mankind believe only what they ſee, he appeared to ſee every Thing he believed; ſo much had the Evidence of Reaſon obtained in his Mind its juſt Aſcendant over that of the Senſes.

But difficult as it may be to embrace a Theory that claſhes with the common Appearance of Things, it is much more difficult to obtain a full and peaceable Dominion over the Paſſions, and it is in drawing this Advantage from the new Syſtem that Monſieur *Carré*'s Glory chiefly conſiſts. His Metaphyſicks, which are a perpetual Union of Philoſophy and Chriſtianity, made him deſpiſe the occaſional Cauſes of Pleaſure to attach himſelf to the only efficient Cauſe of them.

Such an Uniformity of Sentiment between Maſter and Scholar had its natural Effect. Father *Mallebranche* and Monſieur *Carré* ſoon conceived the higheſt Eſteem and warmeſt Friendſhip for each other, and this alone, were other Subjects wanting, would be ſufficient to make the Panegyrick of either.

After ſeven Years ſpent in this excellent School, Monſieur *Carré* found it neceſſary, in order to procure himſelf ſome leſs precarious Eſtabliſhment, to teach the Mathematicks and Philoſophy in *Paris*, but eſpecially that Philoſophy, which, on Account of its Tendency to improve our Morals he valued more than all the Mathematicks in the World. And, accordingly, his greateſt Care was to make Geometry ſerve as an Introduction to his well beloved Metaphyſics, and his Endeavours ſeldom failed but with ſuch as were hardened in their old Syſtems.

Moſt of Monſieur *Carré*'s Pupils were of the fair Sex. The firſt of them, who immediately perceived that his Language was not very elegant and correct, told him pleaſantly, that, as an acknowledgment for the Pains he took to teach her Philoſophy, ſhe would teach him *French*; and he has ſince owned that her Leſſons were of great Service to him. In general, he ſeemed to ſet more Value upon the Genius of Women than that of Men; perhaps, becauſe not being previouſly duped in Favour

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of any other Syſtem, they more readily yielded to his; perhaps becauſe he found them more ſtedfaſt in adhering to it; perhaps, in fine, becauſe that natural Propenſity, we have towards them, operated in him without his knowing it, and made them appear more Philoſophers in his Eyes than they really were. Be that as it will, he never ſo much as mentioned their Names, and never ſaw them but with as much Precaution as if it had been on a quite different Errand. His Behaviour to his Pupils in general was as generous, as this to his female Pupils in particular was diſcreet. He never called twice upon any of them for what they owed him, ſo that they were at Liberty to uſe him ill, and, what is more, were ſure of being never reproached by him with their ill Uſage.

Monſieur *Carré* was very far from deſpiſing the Mathematicks, though he gave Metaphyſicks the Preference over them; and accordingly while he taught both, he took Care to make himſelf acquainted with all the new Diſcoveries in the former. This was all his conſtant Attendance on his Pupils would allow him to do till the Year 1697, when Monſieur *Varignon* of the *Royal Academy of Sciences* at *Paris*, ſo remarkable for his being extremely ſcrupulous in the Choice of his *Eleves*, took Monſieur *Carré* to him in that Station. Soon after, (in the Year 1700,) Monſieur *Carré*, thinking himſelf bound to do ſomething that might render him worthy of that Title, publiſhed the firſt compleat Work on the *Calculus Integralis*, under the Title of, *A Method of meaſuring Surfaces and Solids, and finding their Centers of Gravity, Percuſſion, and Oſcillation.* In his Preface to this Work he mentions it as nothing more than the moſt ſimple and eaſy Method of applying the *Calculus Integralis*, which was ſaying of it exactly what it deſerved. He afterwards, however, diſcovered ſome Errors in it, and was great enough to own and correct them in a ſubſequent Edition.

In a little Time Monſieur *Carré* became Aſſociate and, at length, one of the Penſioners of the Academy; and, as this was a ſufficient Eſtabliſhment for one, who knew ſo well how to keep his Deſires within juſt Bounds, he gave himſelf up entirely to Study, and as he enjoyed a Place of Mechanician, applied himſelf more particularly to Mechanics. He took a Survey of every Branch relating to Muſick, ſuch as the Doctrine

of Sounds, the Deſcription of muſical Inſtruments, *&c.* He neglected the Practice of Muſick as one of the principal Sources of ſenſual Pleaſure, and attended to the Theory of it, merely becauſe it requires a Number of painful Reſearches. The Reader may meet with ſome Sketches of his Ingenuity and Induſtry this Way in the Memoirs of the *Royal Academy of Sciences* of *Paris*. Mr. *Carré* likewiſe compoſed ſome Treatiſes on other Branches of natural Philoſophy, and ſome on mathematical Subjects, all which he bequeathed to the ſame illuſtrious Body; but it does not appear that any of them have been as yet publiſhed. It is probable, that he was hindered from putting the laſt Hand to them by a Train of Diſorders proceeding from a bad Digeſtion, which, after harraſſing him for five or ſix Years, at laſt brought him to the Grave in the forty-eight Year of his Age.

The LIFE of Dr. RICHARD MEAD.

DR. *Richard Mead*, Archiater to King *George* II. and the moſt eminent Phyſician in his Time, deſcended from a conſiderable Family in *Buckinghamſhire*, and the Son of Dr. *Mead*, a celebrated Divine of one of the principal Congregations of Independents in *London*: But being ejected by the *Bartholomew* Act, 1662, he removed to a Houſe in the ſame Pariſh; and having a numerous Family and a handſome Fortune, took a private Tutor into his Houſe to aſſiſt him in the Education of his Children, thirteen in Number, of whom *Richard*, the Subject of our Biographical Hiſtory, was the Eleventh, being born in the Pariſh of *Stepney*, *Auguſt* 11, 1673. He continued with the reſt of the Family till the pretended Diſcovery of that called the Fanatic Plot, when the old Gentleman, being accuſed of ſome Privity thereto, and knowing the Violence of the Times, thought proper for his Safety (though entirely innocent) to retire to *Holland*, firſt placing this Son, who had a grammatical Education, for his greater Proficiency in Learning, under the Care of an excellent Maſter, under whom this Youth ſoon diſtinguiſhed

tinguiſhed himſelf for his great Talents and Vivacity of Parts; and having acquired a ſufficient Skill in the *Greek* and *Latin* Languages, he was ſent to *Utrecht*, in the Year 1689, to compleat this preparatory Education under the illuſtrious *Grævius* (to whom his eldeſt Brother had been before a Pupil.) After three Years Reſidence at *Utrecht*, he removed to *Leyden*, where he attended *Herman*'s Botanical Lectures, and the famous *Pitcairn*'s Lectures, on the Theory and Practice of Phyſic. He ſpent three Years under this Part of his academical Studies, improving greatly by Converſation, very frequently with this Profeſſor. His eldeſt Brother, with two other Students, taking a Tour through *Italy*, he likewiſe joined them, as having a Taſte for every Thing great and beautiful, and, at the ſame Time, a proper Regard to his Improvement in the Profeſſion. At *Florence*, after ſome Difficulty, he found that Piece of Antiquity called the *Tabula Iſiaca*.

At *Padua*, *Auguſt* 16, 1695, he took his Degree of Doctor of Philoſophy and Phyſic, and after ſpending ſome Time at *Naples* and *Rome*, he returned home in 1696, when he ſettled in the Houſe where he was born, and purſued the Practice of his Profeſſion.

In 1702, he publiſhed that remarkable Work of his which he had been preparing for ſome Years, *viz.* his *Mechanical Account of Poiſons*. Theſe Eſſays were a Credit to our Author at their firſt Publication; but a much greater Honour he acquired by an Edition, near 40 Years afterward, improved by Experiments and other Helps, retracting whatever Miſtakes he had found, hereby ſetting a noble Example to his own Pupils. Such is the Progreſs of Science, at every Step we aſcend, the Horizon widens, but grows leſs diſtinct: We begin with thinking every Thing is to be explained, we end by finding in Reality our own Deficiency. This Obſervation was never better illuſtrated than by the Syſtem our Author attempted to eſtabliſh in his ſecond Work, *viz.* the *Influence of the Sun and Moon upon human Bodies*, which had been admitted by all Antiquity, but it appeared to him to be deduceable from the Principles of planetary Attraction, then lately diſcovered by Sir *Iſaac Newton*. This Piece came out in 1704, when it was thought a conſiderable Thing to underſtand the Syſtem of that Philoſopher. However, our Au-

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thor's Genius, as well as a proper Mixture of Ambition, made him attentive to Philoſophical Enquiries, and his Labours were rewarded with growing Honours. The *Analyſis*, which he preſented to the *Royal Society*, of Dr. *Bonomo*'s Diſcovery in relation to the cutaneous Worm that generates the Itch, together with his Account of Poiſons, obtained him a Fellowſhip in that learned Body. Two Years after, he was choſen one of the Council, which was renewed in 1707, where he continued all his Life; and in *December*, 1717, was choſen by Sir *Iſaac* one of the Vice Preſidents.

May 5, 1703, he was choſen Phyſician to St. *Thomas*'s *Hoſpital:* ——— In 1711, appointed by the Company of Surgeons to read the anotomical Lectures in their Hall; which Offices he diſcharged for ſeven Years with much Applauſe. In the mean Time, he was honoured by the Univerſity of *Oxford* with the Degree of Doctor of Phyſic, by a Diploma dated *December* 4, 1707, probably from Dr. *Radcliffe*'s Recommendation, as well as his own amiable Endowments: As his Manners were naturally gentle, his Heart good, his Soul noble, adorned with and ſuſceptible of the beſt Impreſſion, ſcorning Flattery and Inſincerity even to Princes: And as his great Reputation was unqueſtionably eſtabliſhed, he was called in Conſultation to Queen *Ann*, about two Days before her Death, when he frankly and perhaps too freely declared, ſhe would not hold it out long; an Opinion which did not readily gain Credit, or thought by ſome adviſeable to drop: However, he communicated to Dr. *Ratcliffe* more freely, and his Judgment was verified.

April 9, 1716, he was admitted Fellow of the *College of Phyſicians*, and was afterwards one of the Phyſicians in the Royal Family, from 1719 to 1724.

In 1723, Dr. *Mead* having in his Turn ſpoke the *Harveyan* Speech at the *College of Phyſicians*, they thought proper to publiſh it in Honour to the Faculty.

On the Acceſſion of the late King *George* II. to the Throne, the Doctor was appointed Phyſician in ordinary to his Majeſty. And not long after, when Dr. *Friend* was committed to the Tower on Suſpicion of being concerned in what was called *Atterbury*'s Plot, Dr. *Mead*, though attached to the Government by Principle and Gratitude, was pleaſed to viſit him, and

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be one of his Bail for his Enlargement: Nor was the Doctor's Generosity confined only to his physical Brethren; he had a Greatness of Mind which extended to the Studious and Ingenious in all Arts and Sciences, and of every Party.

His Treatise *De Morbis Biblicis*, or the Diseases mentioned in the Bible, was the Product of those Hours which among wise Men constitute the Interval between old Age and Death. —— The last, and perhaps most valuable Part of his Works, is his medical Precepts and Cautions. Herein, with a Candour and Simplicity so characteristical to a great Man, he freely communicates all the Discoveries that his long Practice and Experience had opened to his View: And concludes with many salutary Cautions for preserving the Organs of the Body and the Faculties of the Mind perfect and entire, to a good old Age. This may be esteemed a valuable Legacy to Posterity, and shews his great good Intention to be able to account, in such a Manner, for the Employment of his Time, shewed him worthy to live and prepared to die: And his Decline soon after was very visible, no longer able to finish, much less project any Thing: After a short Confinement to his Bed, about three Days, and scarce any Pain, he expired the 16th of *February*, 1754, aged 71, and was buried in the Temple Church. The Inscription he had chosen for his Motto was NON SIBI SED TOTI. The Doctor was twice married, in *July* 1699, to *Ruth* Daughter of *John Marsh*, Merchant in *London*, by whom he had eight Children: —— And *August* 14, 1724, he married *Ann* Daughter of Sir *Rowland Alston*, of *Odell*, in *Bedfordshire*, Bart. who survives him, but had no Children. During almost half a Century he was at the Head of his Business, ever studious and active, whereby he acquired, as well as by Marriage, a great Fortune: But his generous and benevolent Temper was constantly exercised in Acts of Charity; Clergymen, and, in general, all Men of Learning were welcome to his House, and the Indigent always to his Advice and frequent Assistance; so that he did not die rich, esteeming his Acquisitions best bestowed for the Encouragement of Learning and public Usefulness. His Library was indeed large and valuable, sparing no Expence for the best and scarce Editions of the most valuable Books, and many of them in the richest Binding, not less in Number than 10,000 Volumes.

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His *Latin*, *Greek*, and *Oriental* Manuſcripts made no inconſiderable Part of his Literary Monuments. His Collection of Antiques, Medals, Coins, Prints and Drawings, were equalled by none in the Kingdom in private Hands. Theſe Collections ſold for ſeveral Thouſand Pounds, beſides his Pictures, which yielded 3400*l.* And his valuable Collection of Books were not confined to his own Uſe, but freely opened to the Inſpection of the Curious: Ingenious Men were ſure of finding at Dr. *Mead*'s the beſt Helps in many Difficult Branches of Study, and always made the Encouragement of Artiſts of all Kinds his Aim, employing many, or purchaſing, from any, whatever was curious in its Kind, and might embelliſh his Collection. The reſt of his Character is drawn to Advantage by the Author of the Authentic Memoirs of his Life. See alſo, *Biographia Britannica*.

The LIFE of ROGER COTES.

ROGER COTES, an excellent Mathematician and Philoſopher, was born at *Burbage* in *Leiceſterſhire*, *July* 10, 1682, of which Place his Father was Rector. He was firſt placed at *Leiceſter* School; and about the Age of 12 Years diſcovered ſuch an Inclination and Genius for the Mathematics, that, when it was known to his Uncle, the Rev. Mr. *John Smith*, he gave him all imaginable Encouragement and Aſſiſtance; and prevailed with his Father to ſend him for ſome Time to his Houſe, that he might put him forward in thoſe Studies. Here he laid the Foundation of thoſe Sciences, for which he was afterwards ſo deſervedly famous. He removed from thence to *London*, and was ſent to St. *Paul*'s School, under the Care of Dr. *Thomas Gale*, where he made a great Progreſs in claſſical Learning; yet found ſo much Leiſure as to keep a conſtant Correſpondence with his Uncle, not only in the Mathematics, but alſo in Metaphyſics, Philoſophy, and Divinity. This Fact was often mentioned by the celebrated Profeſſor *Saunderſon*. His next Remove was to *Cambridge*; where, upon the 6th of *April*, 1699, he was admitted of *Trinity College*; and, at *Michaelmas* 1705, choſen

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Fellow of it. He was at the ſame Time Tutor to *Anthony* Earl of *Harold*, and the Lord *Henry de Grey*, to whom he had the Honour to be related.

In *January*, 1705-6, he was appointed Profeſſor of Aſtronomy and experimental Philoſophy, upon the Foundation of Dr. *Thomas Plume*, Archdeacon of *Rocheſter*; being the firſt who enjoyed that Office, to which he was unanimouſly choſen, on Account of his high Reputation and Merits.

He took the Degree of Maſter of Arts in 1706, and went into Holy Orders in 1713. The ſame Year, at the Deſire of Dr. *Bentley*, he publiſhed, at *Cambridge*, the ſecond Edition of Sir *Iſaac Newton*'s *Mathematica Principia Philoſophiæ Naturalis*; and inſerted all the Improvements, which the Author had made to that Time. To this Edition he produced an ingenious Preface, in which he explained the true Method of philoſophizing, ſhewed the Foundation on which the *Newtonian* Philoſophy was built, and refuted the Objections of all other Philoſophers againſt it.

It may not be amiſs to tranſcribe a Paragraph from this Preface, in which the Editor has given an Anſwer to thoſe, who ſuppoſed, that Gravity or Attraction, in Sir *Iſaac Newton*'s Syſtem, was in no wiſe a clearer Principle, and fitter to explain the Phænomena of Nature upon, than the occult Qualities of the Peripateticks; becauſe there are ſtill Philoſophers, ſuch as they are, who perſiſt in the ſame abſurd Suppoſition. Gravity, ſay the Objectors, is an occult Cauſe; and occult Cauſes have nothing to do with true Philoſophy. To whom Mr. Cotes replies, that "Occult Cauſes are, not thoſe whoſe Exiſtence is moſt clearly demonſtrated by Obſervation and Experiment, but thoſe only whoſe Exiſtence is occult, fictitious, and ſupported by no Proofs. Gravity therefore can never be called an occult Cauſe of the planetary Motions; ſince it has been demonſtrated from the Phænomena, that this Cauſe does really exiſt. Thoſe rather have Recourſe to occult Cauſes, who make Vortices to govern the heavenly Motions; Vortices, compoſed of a Matter intirely fictitious, and unknown to the Senſes. But ſhall Gravity therefore be called an occult Cauſe, and on that Account be baniſhed from Philoſophy, becauſe the Cauſe of Gravity is occult, and as yet undiſcovered? Let thoſe, who affirm this,

beware of laying down a Principle, which will ſerve to undermine the Foundation of every Syſtem of Philoſophy, that can be eſtabliſhed. For Cauſes always proceed, by an uninterrupted Connexion, from thoſe that are compound, to thoſe are more ſimple; and when you ſhall have arrived at the moſt ſimple, it will be impoſſible to proceed farther. Of the moſt ſimple Cauſe therefore no mechanical Solution can be given; for if there could, it would not be the moſt ſimple. Will you then call theſe moſt ſimple Cauſes Occult, and baniſh them from Philoſophy? You may ſo; but you muſt baniſh at the ſame Time the Cauſes that are next to them, and thoſe again that depend upon the Cauſes next to them, till Philoſophy at Length will be ſo thoroughly purged of Cauſes, that there will not be one left, whereon to build it."

The Publication of this Edition added greatly to the Reputation Mr. *Cotes* had already acquired, among the greateſt Men of the Age, for his profound Knowledge in the abſtruſeſt Parts of the Mathematics: Nor was the high Opinion the Public conceived of him in the leaſt diminiſhed, but rather increaſed, by ſeveral Productions of his own about that Time, which was afterwards known. ——— He gave a Deſcription of the great Meteor, that was ſeen on the 6th of *March* 1715-16, which was publiſhed in the *Philoſophical Tranſactions*, a little before his Death. He left behind him alſo ſome admirable and judicious Tracts, Part of which, ſince his Deceaſe, have been publiſhed by Dr. *Robert Smith*, his Couſin and Succeſſor in his Profeſſorſhip, now Maſter of *Trinity College*, *Cambridge*. ——— His *Harmonia Menſurarum*, or *Harmony of Meaſures*, containing a *New Analyſis and Syntheſis* advanced by the Meaſures of Ratios and Angles, was publiſhed at *Cambridge* in the Year 1722, in Quarto; and dedicated to Dr. *Mead* by the learned Editor, who gives us a copious Account of the Performance itſelf, the Pieces annexed to it, and of ſuch other of the Author's Works, as are yet unpubliſhed. He tells us, how much this Work was admired by Profeſſor *Saunderſon*, and how dear the Author of it was to Dr. *Bentley*. The firſt Treatiſe of the Miſcellaneous Works annexed to the *Harmonia menſurarum*, is, concerning the Eſtimation of Errors in mixed Mathematics. The Second is, concerning the differential Method; which he handles in a Manner

Manner ſomewhat different from Sir *Iſaac Newton*'s Treatiſe upon that Subject, having wrote it before he had ſeen that Treatiſe. The Name of the third Piece is *Canonotechnia*, or concerning the Conſtruction of Tables by Differences. The Book concludes with three ſmall Tracts concerning the Deſcent of Bodies, the Motion of Pendulums in the Cycloid, and the Motion of Projectiles: Which Tracts, the Editor informs us, were all compoſed by Mr. *Cotes*, when he was very young. He wrote alſo a Compendium of Arithmetic, of the Reſolutions of Equations, of Dioptricks, and of the Nature of Curves. Beſides theſe Pieces in *Latin*, he drew up a Courſe of hydroſtatical and pneumatical Lectures in *Engliſh*, which were publiſhed by Dr. *Smith* in the Year 1737, and are held in high Repute.

This uncommon Genius in Mathematics died, to the Regret of the Univerſity, and all Lovers of that Science, upon the 5th of *June*, 1716, in the very Prime of his Life; for he was advanced no farther than to the thirty-third Year of his Age. And ſo high an Opinion had Sir I. NEWTON of Mr. *Cotes*'s Genius that he uſed to ſay —— "*If Mr.* Cotes *had lived, we had known ſomething.*" He was buried in the Chapel of *Trinity College*; and an Inſcription fixed over him, written by the celebrated Dr. *Bentley*, who was his conſtant Friend and Patron, and runs in the following Terms:

H. S. E.
Rogerus Roberti *filius* Cotes,
Collegii hujus S. Trinitatis *ſocius,*
Aſtronomiæ et experimentalis philoſophiæ
Profeſſor Plumianus:
Qui
Immatura morte præreptus,
Pauca quidem ingenii ſui pignora reliquit,
Sed egregia, ſed admiranda,
Ex inacceſſis matheſeos penetralibus
Felici ſolertiâ tum primum eruta.
Poſt magnum illum Newtonum
Societatis hujus ſpes altera
Et decus gemellum.
Cui ad ſummam doctrinæ laudem
Omnes morum virtutumque dotes
In cumulum acceſſerunt:

Eo magis ſpectabiles amabileſque,
Quod in formoſo corpore gratiores venirent.

Natus Burbagii *in* Agro Leiceſtrienſi
Jul. x. 1682, *obiit* Jun. v. 1716.

The LIFE of Dr. NICHOLAS SAUNDERSON.

DR. *Nicholas Saunderſon*, an illuſtrious Profeſſor of Mathematics in the Univerſity of *Cambridge*, and Fellow of the *Royal Society*, was born in *January* 1682, at *Thurlſton* near *Penniſton*, in *Yorkſhire*, where his Father poſſeſſed a ſmall Eſtate. When he was 12 Months old he was deprived of his Sight, by the Small-Pox, ſo entirely that he had no more Idea of Light and Colours than if he had been born blind. He was, nevertheleſs, ſent early to the Free-School at *Penniſton*, and there laid the Foundation of that Knowledge of the *Greek* and *Roman* Languages, which he afterwards improved ſo far, by his own Application to the Claſſic Authors, as to hear the Works of *Euclid*, *Archimedes*, and *Diophantus* read in their original *Greek*.

As ſoon as he had acquired a grammatical Education, his Father began to inſtruct him in the common Rules of Arithmetic: Here it was his incomparable Genius firſt appeared; for he very ſoon became able to work the common Queſtions, to make very long Calculations by the Strength of his Memory, and to form new Rules to himſelf for the more ready ſolving of ſuch Problems as are often propoſed to Learners, more with a Deſign to perplex than to inſtruct.

At the Age of Eighteen, our Author was introduced to the Acquaintance of *Richard Weſt*, of *Underbank*, Eſq; a Gentleman of Fortune and a Lover of the Mathematics, who, obſerving Mr. *Saunderſon*'s uncommon Capacity, took the Pains to inſtruct him in the Principles of Algebra and Geometry, and gave him every Encouragement in his Power to the Proſecution of theſe Studies. Soon after, he became acquainted with Dr. *Nettleton*, who took the ſame Pains with him: And it was to theſe two Gentlemen that Mr. *Saunderſon* owed his firſt Inſtitution

tion in the mathematical Sciences: They furniſhed him with Books, and often read and expounded them to him. But he ſoon ſurpaſſed his Maſters, and became fitter to teach, than to learn any Thing from them.

Our Author's Paſſion for Learning increaſing, his Father encouraged it, and ſent him to a private Academy near *Sheffield*. Logic and Metaphyſics, it ſeems, made up the principal Learning of this School, which made his Stay ſhort: but remained ſome Time after in the Country, proſecuting his Studies in his own Way, ſtanding moſt in Need of good Authors and a Perſon to read to him, being able, by the Strength of his own Genius to ſurmount whatever Difficulties occurred. His Education had hitherto been carried on at his Father's Expence, which, from his numerous Family, became a Burden to him: His Friends, therefore, began to think of providing both for his Learning and Support, otherways, his own Inclination led him ſtrongly to *Cambridge*, and at length it was determined he ſhould try his Fortune there, not as a Scholar, but as a Maſter: For his Friends, obſerving in him a peculiar Felicity in conveying his Ideas to others, hoped that he might teach the Mathematicks with Credit and Advantage even in the Univerſity: Or if this Deſign ſhould not ſucceed, they promiſed themſelves Succeſs in opening a School for him at *London*.

Accordingly, in the Year 1707, being now 25 Years of Age, Mr. *Saunderſon* went for *Cambridge* with Mr. *Joſhua Dunn*, then a Fellow-commoner of *Chriſt College*, where he reſided with his Friend, but was not admitted a Member of the College.

The Society were much pleaſed with ſo extraordinary a Gueſt, allotted him a Chamber, the Uſe of their Library, and indulged him in every Privilege that could be of Advantage to him: But many Difficulties obſtructed his Deſign. He was placed here with but very few Friends, without Fortune, a young Man, untaught himſelf, to be Teacher of Philoſophy in a Univerſity where it then flouriſhed in the greateſt Perfection. —— Mr. *Whiſton* was all this Time in the mathematical Profeſſor's Chair, and read Lectures in the Manner propoſed by Mr. *Saunderſon*; ſo that an Attempt of this Kind looked like an Encroachment on the Privilege of his Office; but, as a good natured Man, and an Encourager of Learning, he readily conſented

ſented to the Application of Friends made in Behalf of ſo uncommon a Perſon. Mr. *Dunn* had been very aſſiduous in making his Character known, ſo that his Fame had in ſome Meaſure filled the Univerſity: Men of Learning and Curioſity became fond of his Acquaintance; ſo that his Lecture, as ſoon as opened, was frequented by many, and, in a ſhort Time, very much crouded: The *Principia Mathematica*, *Optics*, and *Arithmetica Univerſalis* of Sir *Iſaac Newton* were the Foundation of his Lecture, and they afforded a noble Field to diſplay his Genius in. It will be Matter of Surprize to many, that our Author ſhould read Lectures in Optics, Diſcourſe on the Nature of Light and Colours, explain the Theory of Viſion, the Effect of Glaſſes, the Phænomena of the Rainbow, and other Objects of Sight: But if we conſider that this Science is altogether to be explained by Lines, and is Subject to the Rules of Geometry, it is eaſy to conceive that he might be Maſter of theſe Subjects.

As Mr. *Saunderſon* was inſtructing the academical Youth in the Principles of the *Newtonian* Philoſophy, it was not long before he became acquainted with the incomparable Author, although he had left the Univerſity many Years, and enjoyed his frequent Converſation concerning the more difficult Parts of his Works. He lived in Friendſhip alſo with the moſt eminent Mathematicians of the Age, with *Halley*, *Cotes*, *De Moivre*, *&c.* Upon the Removal of Mr. *Whiſton* from his Profeſſorſhip, Mr. *Saunderſon*'s mathematical Genius was ſo well known, that an extraordinary Step was taken in his Favour, to qualify him with a Degree, which the Statute requires. Upon Application made by the Heads of the Colleges to the Chancellor, then Duke of *Somerſet*, a Mandate was readily granted by the Queen for conferring on him the Degree of Maſter of Arts, upon which he was choſen *Lucaſian* Profeſſor of the Mathematics, *November* 11, 1711, Sir *Iſaac Newton* intereſting himſelf greatly in his Favour. His firſt Performance, after he was ſeated in the Chair, was an inauguration Speech made in very elegant *Latin*, and a Style truly *Ciceronean*; for he was well verſed in the Writings of *Tully*, who was his Favourite in Proſe, as *Virgil* and *Horace* were in Verſe. From this Time he applied himſelf cloſely to the reading of Lectures, and gave up his whole

Time

Time to his Pupils. He continued among the Gentlemen of *Chriſt-College* 'till the Year 1723, when he took a Houſe in *Cambridge*, and ſoon after married a Daughter of the Rev. Mr. *Dickens*, Rector of *Boxworth* in *Cambridgeſhire*, by whom he had a Son and a Daughter.

In the Year 1728, when King *George* honoured the Univerſity with a Viſit, he was pleaſed to ſignify his Deſire of ſeeing ſo remarkable a Perſon; and accordingly our Profeſſor waited upon his Majeſty in the Senate, and was there created Doctor of Laws by royal Favour.

Dr. *Saunderſon* was naturally of a ſtrong healthy Conſtitution; but being too ſedentary, and conſtantly confining himſelf to the Houſe, he became a Valetudinarian: And in the Spring of the Year 1739, he complained of a Numbneſs in his Limbs, which ended in a Mortification in his Foot. He died the 19th of *April* that Year, in the 57th Year of his Age, and was buried according to his Deſire in the Chancel at *Boxworth*.

He was a Man rather to be admired than loved: He had much Wit and Vivacity in Converſation: So that none could be a better Companion. He had alſo a great Regard to Truth, and was one of thoſe ſincere Men who think it their Duty to ſpeak it at all Times: And therefore his Sentiments on Men and Opinions, his Praiſes or Cenſures, his Friendſhip or Diſregard without Partiality or Reſerve, which muſt eaſily be imagined would raiſe him up many Enemies: But the Conſciouſneſs of his Integrity was ſuperior to the little Occaſion of Diſcompoſure from the Cenſure of others, that he met his approaching End with a Calmneſs and Serenity not very common.

A blind Man, moving in the Sphere of a Mathematician, ſeems a Phænomenon difficult to be accounted for, and has excited the Admiration of every Age in which it has appeared. *Tully* mentions it as a Thing ſcarce credible in his own Maſter in Philoſophy, *Diodotus*; that he exerciſed himſelf therein with more aſſiduity after he became blind; and what he thought next to impoſſible to be done without Sight, that he profeſſed Geometry deſcribing his Diagrams ſo exactly to his Scholars, that they could draw every Line in its proper Direction. St. *Jerom* relates a more remarkable Inſtance in *Didymus* of *Alexandria*, who, though blind from his Infancy, and therefore ignorant of the

very

very Letters, not only learnt Logic, but Geometry alſo to very great Perfection, which ſeems moſt of all to require Sight. But, if we conſider that the Ideas of extended Quantity, which are the chief Objects of Mathematics, may as well be acquired from the Senſe of feeling as that of Sight, that a fixed and ſteady Attention is the principal Qualification for this Study, and that the Blind are by Neceſſity more abſtracted than others; for which Reaſon, *Democritus* is ſaid to have put out his Eyes, that he might think more intenſely. We ſhall, perhaps, find Reaſon to ſuppoſe, that there is no other Branch of Science ſo much adapted to their Circumſtances.

It was by the Senſe of Feeling that Dr. *Saunderſon* acquired moſt of his Ideas at firſt, and this he enjoyed in great Acuteneſs and Perfection; as it commonly happens to the Blind, whether by the Gift of Nature, or, as is moſt probable, by the Neceſſity of Application: Yet he could not, as ſome have imagined, diſtinguiſh Colours by that Senſe, and, having made trial, he uſed to ſay it was pretending to Impoſſibilities: But he could, with great Nicety and Exactneſs, diſcern the leaſt Difference of rought and ſmooth in a Surface, or the leaſt Defect of poliſh. Thus he diſtinguiſhed, in a Set of *Roman* Medals, the genuine from the falſe, though they had been counterfeited with ſuch Exactneſs as to deceive a Connoiſſeur who had judged by the Eye. His Senſe of Feeling was alſo very accurate in diſtinguiſhing the leaſt Variation in the Atmoſphere; and he has been ſeen, in a Garden, when Obſervations have been making on the Sun, to take Notice of every Cloud that interrupted the Obſervation almoſt as juſtly as they who could ſee it. He could tell when any Thing was held near his Face, or when he paſſed by a Tree at no great Diſtance, provided there was a calm Air and little or no Wind: Theſe he did by the different Pulſe of the Air upon his Face.

An exact and refined Ear are what ſuch are commonly bleſſed with who are deprived of their Eyes. Our Profeſſor was perhaps inferior to none in the Excellence of his Hearing; he could readily diſtinguiſh to the fifth Part of a Note, and by his Performance on the Flute, (which he had learned as an Amuſement in his younger Years) diſcovered ſuch a Genius for Muſic, as if he had cultivated the Art, would probably have appeared as

wonderful

wonderful as his Skill in the Mathematics. By his Quickneſs in this Senſe he not only diſtinguiſhed Perſons with whom he had ever once converſed ſo long as to fix in his Memory the Sound of their Voice, but, in ſome Meaſure, Places alſo. He could judge of the Size of a Room into which he entered, of the Diſtance he was from the Wall; and if ever he had walked over a Pavement in Court, Piazzas, *&c.* which reflected a Sound, and was afterwards conducted thither again, he could tell where about in the Walk he was placed merely by the Note it ſounded.

There was ſcarce any Part of the Mathematics on which he had not wrote ſomething for the Uſe of his Pupils: But he diſcovered no Intention of publiſhing any of his Works, till the Year 1733, then his Friends, alarmed by a violent Fever that had threatened his Life, and unwilling that his Labours ſhould be loſt to the World, importuned him to ſpare ſome Time from his Lectures and employ it in finiſhing ſome Part of his Works, which he might leave behind him as a valuable Legacy both to his Family and the Public. He yielded ſo far to theſe Intreaties as to compoſe, ſoon after, his *Elements of Algebra*, which he left perfect, and tranſcribed fair for the Preſs. It was publiſhed by Subſcription at *Cambridge*, 1740, in two Volumes Quarto, with a good *Mezzotinto* Print of the Author, and an Account of his Life and Character, from whence this is principally collected.

It would be wrong to conclude this Account of Dr. *Saunderſon* without mentioning the profound Veneration he had for Sir *Iſaac Newton*, always declaring, that the more he read his Works, the more Reaſon he found to admire the Juſtneſs and Care, as well as Happineſs of Expreſſion of that incomparable Philoſopher. He has left ſome valuable Comments on his *Principia*, which not only explain the more difficult Parts, but often improve upon the Doctrines, and though far ſhort in their preſent State of what he would himſelf have publiſhed on the Subject; yet they might be no unacceptable Preſent to the Public. Theſe are publiſhed in *Latin* at the End of his TREATISE *on* FLUXIONS, which is a valuable Work, and printed ſince the Author's Death. And his Manuſcript Lectures on moſt Parts of Natural Philoſophy, which are not publiſhed, muſt be deemed a great Loſs to the Public.

The LIFE of Signor BIANCHINI.

SIgnor *Bianchini* was born at *Verona* in the Year 1662. We are not told what Rank or Profeſſion his Parents were of. He very early embraced the eccleſiaſtical State, but not from any ambitious or avaricious Views, as the whole Tenor of his ſucceeding Conduct has ſufficiently demonſtrated.

Not content with that Branch of Learning, which every Clergyman is more particularly bound to poſſeſs, he made it his Buſineſs to be thoroughly acquainted with what are generally conſidered as the polite ones; and ſoon made himſelf Maſter not only of all the Books written in the learned Languages, but of Medals, Inſcriptions, Bas-reliefs, in a Word, all the precious Remains of Antiquity, Treaſures common enough in *Italy*, to prove that her Capital had been once that of the whole World.

When he had amaſſed an almoſt inconceivable Quantity of this Kind of Riches, he formed the Deſign of an Univerſal Hiſtory, as well eccleſiaſtical as profane, from the Creation of the World down to his own Times, but without mixing the eccleſiaſtical with the profane Part. Nay, he carried his Scrupulouſneſs in this Reſpect ſo far, as to employ no Materials in the latter which the former alone could furniſh him with. Hiſtory, unſupported by Chronology, muſt be too inaccurate to ſatisfy the Mind, and mere chronological Tables in which the Events ſtand unconnected one with another, too dry to pleaſe it. He therefore reſolved to unite both, ſaying, that a Series of muſical Notes, however regular, is never ſo eaſily retained as when it forms an Air. For this Purpoſe too he reſolved to adorn and illuſtrate his Hiſtory at proper Intervals with the Repreſentation of the moſt curious Monuments of Antiquity relating to the Facts contained in the preceding Portion of it.

But ſo many Avocations interfered, that he never publiſhed but one Volume of this grand and uſeful Work. This Volume appeared in the Year 1697, under the Title of *La Iſtoria Univerſale prorata con Monumenti, et figurata con Simboli de gli Antichi*, that is, An univerſal Hiſtory proved by Monuments, and

and illuſtrated by the Symbols of the Antients. This, though in Point of Duration, a very ſmall Part of univerſal Hiſtory, as it comes no lower than the Ruin of the *Aſſyrian* Empire, is, in other Reſpects, one of the moſt conſiderable, conſidering the great Obſcurity in which that early Period lies buried; beſides, he has handled it in ſuch a maſterly Manner as to give us juſt Cauſe to regret his not having had Time to complete his Deſign.

In this Volume the Ages of the profane Part preceding the Deluge, void thro' his not being able to borrow any Thing from the ſacred, are filled up with the Invention of the moſt neceſſary and uſeful Arts, according to the moſt certain Relations, and probable Conjectures of the Ancients. The Ages ſucceeding the Deluge offer every where a grand yet regular Scene, formed not only by the Teſtimonies of the beſt Hiſtorians, but by juſt Reflections drawn from the Nature of Things by the Author himſelf, who thus gives Life and Soul to what would otherwiſe be but a vaſt Heap of inanimate Events. Nothing can exceed his Accounts of the Eſtabliſhment of the firſt Nations, their Tranſmigrations and Colonies; the Origin of the great Monarchies, or Republics; the Navigations of Merchants and of Conquerors. In treating of this laſt Article, Signor *Bianchini* builds greatly upon what he calls *Thalaſſocracy*, that is the Empire, or, at leaſt, the free Uſe of the Sea. The Importance of this Thalaſſocracy, though known and felt in the moſt early Ages of the World, is now more known and felt than ever it was; and the different Nations of *Europe* ſeem to agree, that real Power is more the Conſequence of Riches gained by peaceful Commerce, than of Extent of Territory gained by violent Conqueſts. According to Mr. *Bianchini*, it was not the Elopement or Rape of *Helen* that ſet the *Greeks* and *Trojans* by the Ears, but the Navigation of the *Egean* Sea, and the *Pontus Euxinus*, a much more rational and intereſting Subject of Diſpute, and the War ended, not by the Deſtruction of *Troy*, but by a Treaty of Commerce. There are not wanting Monuments of Antiquity to confirm this Conjecture. However, it leads him to a ſtill more ſurprizing Paradox. This is, that the *Iliad* is no more than an Allegorical Hiſtory in the oriental Manner. Thoſe Gods, ſo often objected, in Bar of his Title,

to the divine *Homer*, are fully juſtified in two Words. They are not Gods, but Men or Nations. *Seſoſtris*, King of *Arabia*, or the Eaſtern *Ethiopia*, had conquered *Egypt*, all *Aſia Minor*, a conſiderable Part of *Aſia Major*, and after his Death the Princes whom he had rendered tributary, little by little ſhook off the Yoke. The *Jupiter* of *Homer* is that Succeſſor of *Seſoſtris*, who reigned during the *Trojan* War. His Dominion over the Gods, that is to ſay, the Princes his Vaſſels, is very limited, inſomuch that he cannot preſent their taking Part, as their Intereſt or Paſſions led them, in the Quarrel between the *Greeks* and *Trojans*. *Juno* is the *Syria*, called the *White*, allied to, in ſome Meaſure dependant on, the Eaſtern *Ethiopia*, and this *Syria* is characterized by the *White Hands* of *Juno*. *Minerva* is the learned *Egypt*; *Mars* a Confederacy of the Inhabitants of *Armenia*, *Colchis*, *Thracia*, and *Theſſaly*, and ſo on. By Means of this Allegory *Homer* is, in Signor *Bianchini*'s Opinion, reſtored to his Title of Divine; others, probably, will think that he never forfeited it.

The Turns of Mind requiſite to form the Scholar and the Mathematician are ſo oppoſite, that one very often deſpiſes the the other; and beſides, the Occupations themſelves, for Want of Time, are ſeldom compatible in one Perſon. This, however was not the Caſe with Signor *Bianchini*. When Pope *Clement* XI. inſtituted a Congregation for the Reformation of the Calender, Signor *Bianchini*, whom he appointed their Secretary, compoſed two Works relative to that grand Undertaking and his new Dignity, in which he had an Opportunity of proving himſelf both a Scholar and a Mathematician. Theſe Works he publiſhed in 1703 under the following Title, *De Calendario et Cyclo Cæſaris, ac de Canone Paſchali Sancti Hippolyti Martyris, Diſſertationes duæ.* That is, Two Diſſertations: One on the *Julian* Calender and Cycle; the other on the Paſchal Canon of St. *Hippolite Martyr.* In this Performance, which it would be only disfiguring to attempt giving the Reader any adequate Idea of it, he proves that the Paſchal Canon of St. *Hippolite*, which the great *Scaliger* had boldly taxed with Puerility, is the moſt beautiful Work on the Subject that ever appeared before the Reformation of the Calender by *Gregory* XIII.

Signor

Signor *Bianchini* was likewiſe employed by the ſame Pope *Clement* XI. in the Conſtruction of a great Gnomon in the *Carthuſian* Church at *Rome*, like that already conſtructed by the great *Caſſini* in the Church of St. *Petronius* at *Bologna*. Other Gnomons have been ſince conſtructed elſewhere. *Clement* ordered a Medal to be ſtruck to perpetuate the Memory of this uſeful Erection, and Signor *Bianchini* publiſhed an ample Diſſertation, *De Nummis & Gnomone Clementino*; that is, on the *Clementine* Medals and Gnomon.

In the Year 1726 there was diſcovered near *Rome* on the *Appian* Way, a magnificent marble ſubterraneous Building of three large Halls, whoſe Walls conſiſted of a great Number of little Cells like thoſe of our modern Pigeon-houſes. Moſt of theſe Cells contained, each, four Cinerary Urns, accompanied with Inſcriptions of the Name and Office of the Perſon whoſe Aſhes they contained, all Slaves or Freed-men and Women of the Houſhold of *Auguſtus*, eſpecially that of *Livia*. On this Occaſion Signor *Bianchini* felt all the Joy ſuitable to a profeſſed Virtuoſo, and engaged with great Ardour in the agreeable Taſk of perpetuating theſe precious Remains of Antiquity. Accordingly he publiſhed the Year following under the Title of *Camera ed Inſcrizioni Sepolchrali de' Liberti, Servi, ed Ufficiali della Caſa di Auguſto, &c.* that is, the Sepulchral Vault and Inſcriptions of the Freed-men and Women, the Slaves, and Officers of the Houſhold of *Auguſtus*, *&c.* an exact Deſcription of this Pigeon-houſe, and a Diſſertation upon every Thing ſuggeſted by the Inſcription of it, particularly the ſeveral Names of Office, which though expreſſed in the beſt *Latin*, conſidering the Date of them, are a *Latin* now almoſt entirely unknown. The Number of Perſons, whoſe Aſhes are encloſed in this Monument and in another of the ſame Kind diſcovered before, and which belonged entirely to the Houſhold of *Auguſtus*, is made by Signor *Bianchini* to amount to ſix Thouſand, excluſive of what muſt have been conſtructed here and there at a greater Diſtance from *Rome*. This Number will not ſurprize us, when we are informed, by the Names of Office mentioned in theſe Inſcriptions, into how many Details the Service was divided. One female Slave had nothing to do but weigh out the

Wool

Wool for the Empreſs's ſpinning; another to keep her Ear-Rings; another to take Care of her Lap dog.

While Signor *Bianchini* ſpent the Day as an Antiquarian in examining this ſepulchral Monument, he continued to ſpend the Night as an Aſtronomer, in examining the Planet *Venus*, whom he had been ſtudying for a great many Years. He ſet out by endeavouring to aſcertain her Parallax by the ingenious Method invented by M. *Caſſini* for the Parallax of *Mars*. This Method conſiſts in comparing the Motion of the Planet, whoſe Parallax is wanted, with ſome fixed Stars very near it, and that for ſome conſiderable Space of Time, but a fair Opportunity of doing it ſeldom happens. It was, however, Signor *Bianchini*'s good Fortune to meet with one in the Beginning of *July* 1716, when *Venus* and *Regulus* came to the Meridian ſo nearly together, that he could diſtinguiſh them both in the ſame Field of his refracting Teleſcope. By three Obſervations made the 3d, 4th, and 5th, he found by Monſieur *Caſſini*'s Method, which he confirmed by another, that the Parallax of *Venus* was of 24 Seconds. But, after all, it is his Ingenuity and Induſtry which we are to admire moſt upon this Occaſion; for by his Obſervation, the Parallax of the Sun would be 14 Seconds, whereas M. *Caſſini* makes it but 10, and Monſieur *de la Hire* but 6.*

Signor *Bianchini* was much more ſucceſsful in contriving a Method of applying to the Obſervation of the Spots of *Venus*, a Thing of much more Importance, the Glaſſes of 100 and 120 Feet Focus made by *Campani* and *Divini*; for all the Tubes conſtructed for theſe Glaſſes were found to bend in the Middle, and Monſieur *Huygens*'s Method of uſing teleſcopical Glaſſes without Tubes was attended with much Trouble and many Inconveniencies, inſomuch that without Signor *Bianchini*, the Work of thoſe excellent Artiſts might have been loſt to the Public, not yet acquainted with the reflecting Teleſcope. Signor *Bianchini* brought his Machine to *Paris* in the Year 1712, and exhibited it to the Royal Academy there, who found it, beyond Expectation, ſimple, portable, manageable, and Expeditious, and therefore gave a Deſcription of it in their Memoirs for

* By Obſervations of the late TRANSIT of VENUS, the Sun's Parallax is found to be nearly 9 Seconds.

for the Year 1713. By Means of this Machine, Signor *Bianchini* diſcovered the Spots on the Diſc of *Venus* ſo diſtinctly, that he thought himſelf authorized to attribute ſeveral Seas, and Streights to that Planet, which he called by the Names of the King of *Portugal*, from whom he had received ſome Favours, ſuch of the *Portugueſe* Generals and Navigators as had moſt diſtinguiſhed themſelves, and ſome learned Men of his own Country.

The Fruits of this Diſcovery of the Spots of *Venus* were that of the Inclination of her Axis to her Orbit, which Signor *Bianchini* found to be 15 Degrees, of her revolving about her Axis in 24 Days 8 Hours, and in fine, the conſtant Paralleliſm of her Axis with itſelf in every Part of her Orbit, like that which *Copernicus* attributed to the Axis of the Earth as neceſſary in his Syſtem, but which has been ſince aſcertained by actual Obſervation. We have an Account of all theſe Things in a Work publiſhed by him in 1728 under the Title of *Heſperi & Phoſphori nova Phænomena, ſive Obſervationes circa Planetam Veneris*; that is, New Phænomena of the Planet *Venus*, or Obſervations on the Evening and Morning Star. His other Works are, a new Edition of the Lives of the Popes by *Anaſtatius* the Librarian, in three Volumes Folio, illuſtrated by a great Number of very learned Reſearches; and ſeveral ſmall Volumes inconſiderable only by their Bulk, ſome of them are Pieces of Eloquence, and it is ſaid, he did not neglect Poetry. In Fact, his Writings abound with evident Marks of a poetical Genius.

His Book on *Venus* makes mention of a Meridian, which he intended to have traced the whole Length of *Italy*: But after dedicating all his Leiſure Hours during the Space of eight Years to the Preparations neceſſary for ſo grand an Undertaking, he died, of a Dropſy, without being able even to begin it, in the Year 1729, leaving behind him evident Proofs that he was too great a Philoſopher not to be a good Chriſtian. Nothing could ſurpaſs his Candour, Affability, and Deſire of being uſeful, which he carried ſo far, that to ſatisfy it he never thought much of leaving abruptly the moſt important Occupations.

In 1705, the *Royal Academy of Science* admitted him among the ſmall Number of her Foreign Aſſociates. Benedict XIII. appointed him one of his domeſtic Prelates, and *Clement* XI. beſides

ſides the Secretaryſhip of the Congregation of the Calendar, made him one of his honorary Chamberlains, and Surveyor General of all the Antiquities of *Rome*, which were not to be touched without his Permiſſion. He had, beſides, as a Clergyman, ſome eccleſiaſtical Benefices. But a great deal more Honour and Profit would not have been too much for one, who knew ſo well how to employ them.

The LIFE of Monſieur REYNEAU.

CHARLES REYNEAU, now known only by the Name of Father *Reyneau*, was the Son of a Surgeon at *Briſſac* in the Province of *Anjou*. In the Year 1676, being about Twenty, he entered himſelf amongſt the Oratorians, a Kind of religious Order, whoſe Members live in Community without making any Vows, and apply themſelves chiefly to the Education of Youth without expecting any Stipend but the bare Neceſſaries of Life. We are not told in what Manner Monſieur *Reyneau* ſpent his Time till this Period, yet it is impoſſible almoſt to be miſtaken in gueſſing it, from that uniform love of Religion and the Sciences, which ſo ſtrongly characterized the Remainder of his Life.

Soon after Monſieur *Reyneau* engaged in this laudable Career, his Superiors ſent him to teach Philoſophy at *Pezenas*, and then at *Toulon*. This was the *Carteſian*, then diſtinguiſhed all over what we may now call learned *Europe*, as it is to this Day in *Spain* and *Portugal*, by the Name of the modern Philoſophy; and conſequently required in him ſome Acquaintance with Geometry, which Acquaintance was afterwards improved into a particular Affection for that Science by the Orders of his Superiors, who, in the Year 1683, ſent him to teach the Mathematics at *Angers*.

In this Occupation Father *Reyneau* not content with making himſelf Maſter of every Thing worth knowing, which the modern Geometry, ſo fruitful in ſublime Speculations and ingenious Diſcoveries had already produced, undertook to reduce into one

Body,

Body, for the Uſe of his Scholars, the principal Theories ſcattered here and there in *Newton*, *Deſcartes*, *Leibnitz*, *Bernouilli*, the Acts of *Leipſic*, the Memoirs of the *Royal Academy of Sciences* of *Paris*, and in other Books perhaps leſs known; Treaſures, which by being ſo widely diſperſed, proved infinitely leſs uſeful than otherwiſe they might have been. The Fruit of this Undertaking was his *Analiſe demontrée*, or Analyſis demonſtrated, which he publiſhed in 1708.

Though all the Diſcoveries in modern Geometry are Truths, and conſequently, not like the Syſtems of Hiſtorians, Chronologiſts, and even natural Philoſophers, eaſily reconcileable with one another; yet, conſidering the immenſe Variety of the Truths and of the Sources from which they are derived, it muſt have proved a Work of no ſmall Labour and Ingenuity to unite them all, as it were, into one common Bed, and make them flow from one common Spring; inſomuch, that the Public, whatever Admiration it may beſtow on thoſe who invent, is perhaps more indebted to thoſe who, like Father *Reyneau*, unite and harmonize, and in ſo doing ſhew themſelves more particularly intent upon ſerving Mankind.

Father *Reyneau* called this uſeful Work of his *Analyſis demonſtrated*, becauſe he demonſtrates in it ſeveral Methods, which had not been demonſtrated by the Authors of them, or at leaſt not with ſufficient Perſpicuity and Exactneſs; for it often happens, that, in Matters of this Kind, one is often clear in a Thing without being able to demonſtrate it. Some Perſons too have been ſo miſtakingly fond of Glory as to make a Secret of their Demonſtrations in order to perplex thoſe, whom it would become them much better to inſtruct. This Book of Father *Reyneau*'s was ſo well approved, that it ſoon became a Maxim, at leaſt in *France*, that to follow him was the beſt, if not the only Way to make any extraordinary Progreſs in the Mathematics. This was conſidering him as the firſt Maſter, as the *Euclid* of the ſublime Geometry.

Father *Reyneau*, after thus giving Leſſons to thoſe who underſtood ſomething of Geometry, thought proper to draw up ſome for ſuch as were utterly unacquainted with that Science. This was in ſome Meaſure a Condeſcenſion in him, but his Paſſion to be uſeful made it eaſy and agreeable. In 1714 he

publiſhed a Volume in Quarto on Calculation, under the Title of *Science du Calcul*; of which the then Cenſor Royal, a moſt intelligent and impartial Judge, ſays, in his Approbation of it, that *though ſeveral Books had already appeared upon the ſame Subject, ſuch a Treatiſe as that before him was ſtill wanting, as in it every Thing was handled in a Manner ſufficiently extenſive, and at the ſame Time with all poſſible Exactneſs and Perſpicuity.* In fact, though moſt Branches of the Mathematicks had been well treated of before that Period, there were yet no good Elements, even of ſimple Geometry. Thoſe, who knew no more than what preciſely ſuch a Book ought to contain, know too little to complete a good one; and thoſe who knew more, thought themſelves, probably, above the Taſk; whereas Father *Reyneau* poſſeſſed at once all the Learning and Modeſty neceſſary to undertake and execute ſuch a Work.

As ſoon as the *Royal Academy of Sciences* at *Paris*, in Conſequence of a Regulation made in the Year 1716, opened its Doors to other learned Men, under the Title of *Free Aſſociates*, Father *Reyneau* was admitted of the Number. The Works, however, which we have already mentioned, are the only ones he ever publiſhed, or, probably, ever compoſed, except moſt of the Materials for a ſecond Volume of his laſt, which he left behind him in Manuſcript. The laſt Years of his Life were attended with too much Sickneſs to admit of any extraordinary Application. He died in the Year 1728, not more regretted on Account of his great Learning, than of his many Virtues, which all conſpired in an eminent Degree to make that Learning agreeable to thoſe about him, and uſeful to the World. The firſt Men in *France* deemed it an Honour and a Happineſs to count him among their Friends. Of this Number were the Chancellor of that Kingdom, and Father *Mallebranche*, of whom Father *Reyneau* was a zealous and faithful Diſciple.

The LIFE of NICHOLAS HARTSOCKER.

NICHOLAS HARTSOCKER was born at *Gouda*, a City of *Holland*, in the Year 1656, of a Houſe long known in the Country of *Drenthe*. His Father, a Clergyman, like moſt other Fathers, applied his ſon early to the Studies which were fitteſt to qualify him for the Station he himſelf filled or ſome other equally uſeful; little dreaming that his Views would be thwarted, as they were, by the Stars and Planets, which little *Hartſocker* uſed to contemplate, with the greateſt Pleaſure and Curioſity, both in the Heavens and in all the Almanacks he could lay hold of. And having heard, at the Age of thirteen or fourteen, that it was impoſſible to underſtand ſuch Things properly without ſome Knowledge of the Mathematicks, and finding his Father utterly averſe to his engaging in that Branch of Learning, he carefully ſaved as much as he could of the little Money allowed him for his Recreations in order to be able to acquire it, if poſſible, with his own Hands.

At length, thinking himſelf rich enough, he applied to a Teacher of the Mathematicks, who promiſed to be very expeditious, and kept his Word. However, our young Student's Savings were but juſt ſufficient to procure him ſix Months teaching; to make the moſt of ſo ſhort a Period, he uſed to ſit up whole Nights at his Books, making no Uſe of his Bed-clothes but that of covering the Windows of his Chamber, for fear the Family ſhould diſcover what he was about.

His Maſter had ſome iron Baſons, in which he uſed to grind, with tolerable Exactneſs, Optic Glaſſes of ſix Feet Focus, and young *Hartſocker* ſoon caught the Method of performing the Operation as well as his Maſter. But this was but a Prelude to his future Succeſſes this Way, for one Day happening to preſent, merely by Way of Amuſement, a ſmall Glaſs Thread to the Flame of a Candle, and obſerving that the End of it contracted a globular Form, he immediately recollected that a glaſs Globe always magnified the Objects placed in its Focus, and having ſeen Microſcopes at Mr. *Leuvenhoeck*'s, and obſerved their Conſtruction, he conſtructed one himſelf with

the little Globe he had accidentally formed, and which had dropt of itſelf from the End of the Thread, and trying it upon a Hair, had the unſpeakable Satisfaction of finding it a good one, and that he could now make Microſcopes almoſt for nothing. Mr. *Lewvenhoeck*, a Man of no Learning, was the firſt that diſcovered this Method of magnifying ſmall tranſparent Bodies, by Means of ſmall glaſs Globules placed between them and the Eye.

Mr. *Hartſocker*, now Eighteen, having, among other Objects that came in his Way, examined the human Seed with his new invented Microſcopes, was ſurprized to find it full of little Animals hitherto neither obſerved, nor even dreamed of by the boldeſt Naturaliſts. But he attributed it to ſome Diſorder, and therefore thought no further of it, till having, in obedience to his Father, ſpent ſome Years at *Leyden* and *Amſterdam* under the ableſt Profeſſors of the *Belles Lettres*, *Greek*, Philoſophy, and Anatomy, he came to *Amſterdam* in 1672 in his Way to *France* where he intended to finiſh his Studies. Here he reſumed his Microſcopical Obſervations, and finding the Appearance of the Human Seed to be ſtill the ſame, he had the Boldneſs to communicate his Diſcovery to his Maſter of Mathematicks and another Friend, who verified it. They then extended their Reſearches to the Semen of Dogs, Cocks and Pigeons, and found Animalcules in every one of them; with this Difference, that whereas in that of Men and Dogs they are almoſt alike, and reſemble young Frogs, with large Heads, long Tails, and a very quick Motion, thoſe of the Cock and Pigeon appear like Eels or Worms. Nothing of the Kind was to be found in Females.

When theſe three Confidents of Nature ſhewed this Phænomenon, they gave out that Spittle was the Subſtance in which it appeared. But it is certain, that Spittle contains no ſuch Thing, ſo that it muſt have been out of mere Shame not to ſee what had been obſerved by others, that Mr. *Leuvenhoeck* wrote to one of his Friends, that he had obſerved a great Number of Animalcules in human Spittle.

Monſieur *Huygens* having heared of theſe Animalcules in a Tour he made to the *Hague* for the Recovery of his Health, and expreſſed a great Deſire of ſeeing them, Mr. *Hartſocker*, proud

of

of an Opportunity of being acquainted with ſo great a Man, immediately ſet out from *Amſterdam* to wait upon him, and let him know what the Liquor containing theſe Animalcules really was. In Return for this Confidence and Civility Monſieur *Huygens* promiſed Mr. *Hartſocker* Letters of Recommendation for *Paris*, but thinking better of it, took him there along with himſelf in the Year 1678. But their Friendſhip ſoon met with a terrible Shock; Monſieur *Huygens* publiſhed, in the *Journal des Scavants*, that he had made ſome very curious Diſcoveries by Means of a new invented Microſcope, and principally that of the Animalcules, without making the leaſt Mention of Mr. *Hartſocker*, who, to defend his Right, thought it high Time to own himſelf the firſt Inventor of the new Microſcope in queſtion, and the firſt Obſerver of the Animalcules diſcoverable by it. This encreaſed the Number of Enemies which Monſieur *Huygens*'s Merit had already created; and all, taking Advantage of Mr. *Hartſocker*'s Reſentment, not only inſtigated him to fall upon Mr. *Huygens* in Print, but, as he was not yet Maſter enough of the *French* to do it himſelf, offered him their Pens for that Purpoſe; and every one of them threw their Shaft againſt Monſieur *Huygens*.

But the Publiſher of the *Journal des Scavants*, in which they intended their Memoir ſhould be inſerted, had the Precaution to ſend it to Mr. *Huygens*, who, after reprimanding Mr. *Hartſocker*, as he deſerved, for ſuffering himſelf to be thus made a Tool of, drew out a Memoir for the Journal, in which he did him all the Juſtice he could deſire, leaving him aſhamed, as he has himſelf ſince owned, of ſo raſh a Proceeding, which, however, the Heat of Youth, and Fondneſs of Glory, but above all his ingenious Confeſſion of it, may ſerve to palliate.

Mr. *Hartſocker* having obſerved that the teleſcopical Glaſſes of the Obſervatory at *Paris* were not large enough, however excellent in other Reſpects, made one larger, and carried it to Mr. *Caſſini*, who found it worth nothing. A ſecond ſucceeded no better, at laſt, a third was found tolerable. This Perſeverance made Mr. *Caſſini* foretel, that this young Man, if he went on as he ſet out, would do great Things; and the Prediction itſelf was, perhaps, the Cauſe of its Accompliſhment. Mr. *Hartſocker*, encouraged by it, ſoon made good Glaſſes of all Sizes,

Sizes, and at length one of ſix hundred Feet Focus, which, on Account of its Rarity, he never would part with. In Regard to theſe Glaſſes of ſo long a Focus, he one Day told Monſieur *Varignon* and the Abbe St. *Pierre*, that he thought it impoſſible to form them in a Baſon, but that by trying Pieces of Glaſs intended to be quite flat, one might happen to meet with ſome that were Segments of a Sphere of a very long Radius, and that he had in this Manner light upon one of twelve hundred Feet Focus; that this Sphericity depended upon ſome inſenſible Unevenеſſes in the Tables of poliſhed iron upon which the melted Glaſs is ſtretched out, or on the Manner of loading the Glaſſes to poliſh them one againſt another; that theſe Trials were more tedious than difficult. And this was all they could get out of him on the Subject.

In 1694, being at *Paris*, he there publiſhed his firſt Work, under the Title of *Eſſai de Dioptrique*, an Eſſay on Dioptricks. In this Work he delivers, demonſtrated with great Perſpicuity, the whole Theory of that Science, as far as it is converſant about ſpherical Glaſſes, for he rejects all other Figures as uſeleſs. He then adds the Methods, many of them peculiar to himſelf, which, however, he ſpeaks out without Reſerve, of grinding and poliſhing Glaſſes, and the Names and Quantities of the Ingredients to be made uſe of for forming them. Had he done no more, he would have fulfilled his Title; but he goes ſtill further. A general Syſtem of Refraction, along with his Experiments, lead him to the different Refrangibility of the Rays of Light, and he pretends to have been the firſt to aſſign their different Velocities as the Cauſe of it.

Thus his Eſſay on Dioptricks is likewiſe an Eſſay on the firſt Principles of natural Philoſophy. He reckons but two Elements, one a Subſtance, infinite, perfectly fluid, always in Motion, and no Part of which is ever perfectly ſeparated from the reſt; the other a Collection of little Bodies different in Size and Figure, perfectly hard and unalterable, confuſedly ſwimming in the fluid Element, where they meet, unite, and become the different ſenſible Bodies. With theſe two Elements he forms every Thing, and accounts for the Weight and Hardneſs of Bodies, as he does elſewhere, from the ſame Syſtem, for their Elaſticity.

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Led, at length, by the general Phænomena of Nature, to the Formation of the Sun, the Planets, and Comets, he advances, that the Comets are Spots of the Sun, ponderous enough to have been diſcharged with great Impetuoſity by this great Globe of Fire, that after they have reached to a certain Diſtance they fall back into the Sun, which abſorbs them again, and either diſſolves them, or ſends them upon another Journey. But this Doctrine of his is, at preſent, univerſally exploded. The Nature of the Comets is now, in general, well known, and even the Revolution of ſome of them in a great Meaſure aſcertained. Allowing the Stars to be the Suns of ſo many different Syſtems, the Comets ſeem to be the Links, as it were, intended by the great Creator to unite them all.

Mr. *Hartſocker* then gives a Hiſtory of the ſeveral Diſcoveries made in the Heavens by Means of the Teleſcope, with Reflexions upon ſo many ſtrange and unforeſeen Phænomena; and concludes with an Account of microſcopical Obſervations, in which one may be ſure his Animalcules are not forgot. He conſiders them as ſwimming in the Air in great Numbers, ſo as to be conſtantly entering the Bodies of Men, and other Animals in the act of Reſpiration and Deglutition, and proceeding, in the Species adapted to them, to thoſe Parts from whence they they are to paſs into the Eggs of the Females. Mr. *Leibnitz* was weak enough to think of improving upon this Syſtem by fancying that theſe primitive Animals never periſhed, but that, after eſcaping from that coarſe Covering, that Kind of Maſk, which, for Example, made Men of them, they launched, in their primitive Form, into the Air, and there continued roving about till more favourable Accident converted them again into Men.

This Work procured Mr. *Hartſocker* the Eſteem of many Men of Learning, particularly Father *Mallebranche* and the Marquis *de l' Hopital*, who, finding him well verſed in the old Geometry, would fain have gained him over to the new Geometry, of Infinites, of which they themſelves were ſo full: But he conſidered it as of too little Service in Natural Philoſophy, his favourite Study, to be converted by their Arguments. For the ſame Reaſon he made very little of the abſtruſer Parts of Algebra, which, according to him, were of no Uſe to ſome who

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ran ſo much after them, than that of procuring them the Glory of being unintelligible to the Bulk of Mankind. No doubt, if we conſider Geometry merely as an Inſtrument of Natural Philoſophy, there is ſeldom any Neceſſity for its being ſo very exquiſite. But then Geometry is far from being a mere Inſtrument; it poſſeſſes a ſublime Beauty independent of any Uſe that can be made of it. If, therefore, Mr. *Hartſocker* was afraid, as he uſed to ſay, of having his Thoughts diverted from Natural Philoſophy, he had ſome Reaſon to fly the Charms of the new Geometry.

Encouraged by the Succeſs of his Dioptrics, he two Years after publiſhed, at *Paris*, his *Principes de Phyſique*, or Principles of Natural Philoſophy, in which he explains at large the Syſtem he had already given in Miniature, adding to it his own Sentiments and thoſe of many others on ſome Subjects which he had not before handled, ſo as to form a pretty compleat Courſe of Natural Philoſophy, at the ſame Time that, by avoiding too great Minuteneſs, he rendered it ſufficiently perſpicuous.

On the Revival of the *Royal Academy of Sciences* at *Paris*, in 1699, he was named a Foreign Aſſociate, and was ſoon after choſen Member of the *Royal Society* of *Berlin*. But, what is very remarkable, he never gave himſelf either of theſe Titles, nor any other, in any of the Works he afterwards publiſhed. It is probable, however, that they were of ſome Service to his Reputation at leaſt, eſpecially on the following Occaſion. *Peter* the Great, on his Arrival at *Amſterdam*, having deſired the Magiſtrates of that City to let him have ſomebody capable of inſtructing him, and opening to him the Source of thoſe Branches of Learning he was deſirous of acquiring, theſe Gentlemen pitched upon Mr. *Hartſocker* for that Purpoſe; and he won the Czar's Affections to ſuch a Degree, that that Monarch would have prevailed upon him to follow him to *Moſcovy*. But the Length of the Journey for a numerous Family, and the Difference between the *Ruſſian* Manners and thoſe of the People among whom he had hitherto lived, hindered him from accepting the Czar's Propoſal. The Magiſtrates of *Amſterdam*, to acknowledge the Honour he had done to their Choice of him upon this Occaſion, erected a ſmall Obſervatory for

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him on one of their Baſtions. This was rewarding him in a diſtinguiſhed Manner though at little Expence.

In the Year 1704, after three Years Sollicitation by the Elector Palatine *John William*, a Lover of Learning and learned Men, he repaired to the Court of that Prince, who appointed him his firſt Mathematician, and honorary Profeſſor of Philoſophy in the Univerſity of *Heidelberg*. In this Station it was, that being informed by the Elector, of that ſurprizing Phænomenon, the Re-production of the Claws of Lobſters, and finding himſelf unable to Account for it mechanically, he imagined that the Lobſters were poſſeſſed of a *plaſtic* Soul, which had the Art of renewing their Claws, and ſoon proceeded ſo far as to attribute thoſe plaſtic Souls to all other Animals, Man not excepted. But as in Man, and many other Animals, theſe plaſtic Souls were not known to produce new Members, rather than that they ſhould be idle, he aſſigned them the Taſk of forming the Animalcula which perpetuate the Species; and this new Syſtem, not unlike Mr. *Cudworth*'s, except in its attributing Intelligence to its plaſtic Souls, pleaſed Mr. *Hartſocker* in the Beginning ſo much, that he openly retracted his former Opinion of them as *ſtrange and abſurd*, Expreſſions which the moſt ingenious Authors ſeldom employ. But at Length, unable to find any ſatisfactory Anſwer to the terrible Objections ſtarted to this his new Conceits, he found himſelf obliged to give them up as he had done his firſt.

After publiſhing, in 1707 and 1708, in two Volumes, the Lectures he had given the Elector Palatine, under the Title of *Conjectures Phyſiques*, or Phyſical Conjectures, a Work in the ſame Taſte with his Dioptrics and phyſical Eſſays already mentioned, containing Word for Word many Things already delivered in them, he took his Leave, for a Time, of his Electral Highneſs in order to viſit the Learned in other Part of *Germany*, or ſtudy Natural Hiſtory, and Mines in particular. At *Caſſel* he repeated the Experiments made by Mr. *Homberg* with the Langrave's Burning-glaſs conſtructed by Mr. *Tſchirnhaus*, but without being able to vitrify even Lead, inſomuch that he abſolutely denied the Fact, affirming that what Monſieur *Homberg* took for vitrified Gold was a Subſtance iſſuing from the

Charcoal that ſupported it mixed perhaps with ſome of the heterogeneous Parts of the Metal itſelf.

From *Heſſe Caſſel*, where his Honor and Diſtintereſtedneſs got the better of all the Temptations which the Langrave could decently throw in his Way to exchange his Service for that of the Elector Palatine, Mr. *Hartſocker* repaired to *Hanover*, where Mr. *Leibnitz*, the profeſſed Friend of all Men of Learning, preſented him to the Elector, afterwards *George* I. and the Electoral Princeſs, the late Queen, ſo famous for her Talents and good Taſte, who gave him a very gracious Reception. About this Time, the Elector Palatine hearing ſpeak of the Burning-glaſs of Monſieur *Tſchirnhaus*, aſked Mr. *Hartſocker* if he could make him ſuch a one. Upon this Mr. *Hartſocker*, cauſed three to be caſt in the Glaſs-houſe at *Newbourg*, and having ſoon finiſhed them, the Elector preſented him with the largeſt, which was three Feet and five Inches *Rhinland* Meaſure in Diameter, nine Feet Focus, and this Focus perfectly circular, of the Size of a *Louis D'Or*, and ſo ponderous, that two Men had much ado to move it.

In 1710 he publiſhed a Volume intitled *Eclairciſſements ſur les Conjectures Phyſiques*, being Anſwers to Objections moſt of which he attributes to Mr. *Leibnitz*, and two Years after he publiſhed another Volume by Way of Sequel to it, and in 1722 a Collection of ſeveral ſeparate Pieces on the ſame Subject. In theſe three Works he attacked, very freely, ſeveral reſpectable Names in the Republic of Letters, proteſting all the while, that if he did not eſteem them, he would have given himſelf no Trouble about them, and that they were very wellcome to criticize upon him in their turn. But in Spite of theſe Proteſtations, there appears a great itch for carping, and no ſmall Degree of Virulence in his Manner of treating them. Neither *Newton*, nor *Leibnitz*, nor *Huygens*, nor the other Members of the *Royal Academy of Sciences* at *Paris*, eſcaped him on this Occaſion. The Academy, however, notwithſtanding ſuch Behaviour, continued to conſider him as one of her Members, ſubject to Fits of ill Humour, and the ſeveral Members, inſtead of anſwering him, ſtuck to their Reſearches as of much more Conſequence to the Public.

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In the ſecond Work he takes up and extends his Syſtem of Plaſtic Souls. In Man, according to him, the rational Soul iſſues its Orders, and a *vegetative* Soul, which is the plaſtic, not only intelligent, but more intelligent than even the rational, immediately executes theſe Orders, beſides ſuperintending or carrying on the whole animal Œconomy of the Circulation of Liquids, Nutrition and Accretion, Operations, in his Opinion, above the Reach of mere mechanics. But it was immediately objected that rational Soul, that vegetative Soul, is ourſelves, and how can we do all theſe Things without knowing it? This Difficulty he ſolves by a Compariſon, which is at leaſt ingenious. Suppoſe, ſays he, a dumb Man alone in a Room, and Servants placed in the adjacent Rooms to wait upon him. He is made to underſtand that when he has a Mind to eat, he has only to ſtrike the Floor with his Stick. Accordingly he ſtrikes, and immediately ſees his Table covered with Diſhes. Now how can he conceive that this Noiſe, which he has not heard, and of which he has not even any Idea, ſhould have brought the Servants to him? Mr. *Hartſocker* not content with attributing theſe intelligent plaſtic Souls to Men, and Animals, now gives them to Plants, nay and the celeſtial Bodies; Beings which one would imagine had been exploded never to make their Appearance again. But this is but one Inſtance out of many, that there was no Opinion in the antient Philoſophy ſo much proſcribed as to deſpair of appearing again on the Stage of the learned World.

The Elector Palatine dying in 1716, Mr. *Hartſocker* quitted the Palatine Court, the Year following, when the Dowager Electreſs, a Princeſs of the Houſe of *Medicis*, in whom a Taſte for Learning was hereditary, returned to *Italy*, her native Country. As ſoon as the Landgrave of *Heſſe* ſaw him diſengaged, he did him the Honour to ſollicit him a ſecond Time to come and reſide with him. But Mr. *Hartſocker* thought his Days too few to ſpend in a Court, where it is impoſſible for a Philoſopher not to think himſelf often in a ſtrange Climate. He therefore removed to *Utrecht*, where he undertook a Courſe of natural Philoſophy, and made an Extract of all the curious and uſeful Obſervations buried here and there among a Heap of uſeleſs Matter in Monſieur *Leuvenhoeck*'s Letters. And having received ſome

Reproaches from *Paris* on Account of the Freedoms he had taken with the *Royal Academy of Sciences* of that City, he began an Apology for them, but his Conſtitution coming to break all at once, even faſt, he had not Time to finiſh it. He died in the Year 1725. He was briſk, facetious, obliging, and of an eaſy Temper which falſe Friends often abuſed, and theſe Qualities are the beſt Apology for the Exceſſes into which a Spirit of Criticiſm, too often apt to degenerate into ill Nature, has hurried him in Many of his Works.

The LIFE of Monſieur MARALDI.

JAMES PHILIP MARALDI was born in the Year 1665 at *Perinaldo* in the County of *Nice*, a Place already honoured by the Birth of his maternal Uncle the famous *Caſſini*.

After going with his Applauſe through the uſual Courſe of Studies, he applied himſelf through Taſte to the ſublimer Sciences, particularly the Mathematicks, and had made ſuch Progreſs in them by the Age of twenty-two, that his Uncle, who had been ſettled in *France* a long Time, invited him there in the Year 1687, in order to cultivate himſelf ſo promiſing a Genius, and make it known in a Country where uſeful Talents both in Natives and Foreigners were now ſo much cheriſhed.

Monſieur *Maraldi* no ſooner applied himſelf to the Contemplation of the Heavens, than he conceived the Deſign of forming a Catalogue of the fixed Stars, the Foundation of all the aſtronomical Edifice. Theſe Bodies, though they have indeed ſome Motion, yet becauſe that Motion is extremely ſlow, and the Quantity of it tolerably well aſcertained, and likewiſe becauſe they always retain their Situation in Reſpect to one another, are conſidered as ſo many fixed Points, to which all the Motions performed under them are referred. From hence it appears of what Conſequence it is to be well acquainted with them; but then it is equally difficult and laborious. The Watchings, upon which the Learned and even the Poets value

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themſelves ſo much, taken in the moſt literal Senſe are nothing to thoſe of an Aſtronomer ſtationed in the open Air and at all Seaſons. However, Monſieur *Maraldi*, though at no ſmall Expence, that of his Health, became ſo intimate with the fixed Stars, that on being ſhewn any one of them however ſmall, he could immediately tell what Conſtellation it belonged to, and its Place in that Conſtellation. He has been known to diſcover thoſe ſmall Comets, which Aſtronomers often take for the Stars of the Conſtellation in which they are ſeen, for want of knowing preciſely what Stars the Conſtellation conſiſts of, when others, on the ſame Spot, and with Eyes directed equally to the ſame Part of the Heavens, could not for a long Time ſee any Thing of them.

In 1700 he engaged under Monſieur *Caſſini* in the Prolongation of the *French* Meridian to the northern Extremity of *France*, and had no ſmall Share in compleating it. He then ſet out for *Italy*, where *Clement* XI. happy to poſſeſs an Aſtronomer formed under Monſieur *Caſſini*, invited him to aſſiſt at the Aſſemblies of the Congregation then ſitting in *Rome* to reform the Calendar. Mr. *Bianchini* availed himſelf of his Aſſiſtance to conſtruct the great Meridian of the *Carthefian* Church in that City. In 1718 Monſieur *Maraldi*, with three other Academicians prolonged the *French* Meridian to the ſouthern Extremity of that Kingdom.

Theſe were all his out-of-Door Occupations, for he ſpent moſt of his Time in waiting upon the heavenly Bodies within the Walls of the Obſervatory of *Paris*, but with a Succeſs equal to the Fatigue of it, as, independent of his Catalogue, appears by the Pieces of his publiſhed in the *Memoirs of the Royal Academy of Sciences* of that City. Theſe conſiſt in daily Obſervations, and others for which Opportunities ſeldom offer, ſuch as the Phaſes of *Saturn*'s Ring, the Returns of the fixed Stars; ingenious Applications of the Methods laid down by Monſieur *Caſſini*; Verifications of Theories with which it is of Conſequence to be acquainted; and laſtly, Corrections of other Theories ſuſceptible of Improvement. As to his Catalogue of fixed Stars he never publiſhed it. Juſt as he had placed a Mural Quadrant on the Terras of the Obſervatory, in order to determine ſome towards the North and the Zenith, he fell

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ſick, and in Spite of the greateſt Abſtemiouſneſs, a Remedy which he had hitherto employed with Succeſs, and the only one he relied upon, he died the 1ſt of *December*, 1729.

His Character was that which the Sciences generally give to thoſe who give themſelves up entirely to them, Serioufneſs, Simplicity of Manner, and Uprightneſs. But the ſhining Part of it was his Gratitude to his Uncle Monſieur *Caſſini*, who had another Son in him.

When Monſieur *Maraldi* amuſed himſelf it was with Natural Hiſtory. His moſt important terreſtrial Obſervations were upon Bees, which, though to him in Compariſon of his celeſtial Obſervations, but a mere Relaxation, would have been reckoned by others a very laborious Taſk. They are inſerted in the *Memoirs of the Royal Academy of Sciences* for the Year 1712.

The LIFE of COLIN MACLAURIN.

COLIN MACLAURIN, a moſt eminent Mathematician and Philoſopher, was the Son of a Clergyman, and born at *Kilmoddan* in *Scotland*, in *February* 1698. He was ſent to the Univerſity of *Glaſgow* in 1709, where he continued five Years, and applied himſelf to Study in a moſt intenſe Manner. His great Genius for mathematical Learning diſcovered itſelf ſo early, as at twelve Years of Age, when having accidentially met with an *Euclid* in a Friend's Chamber, he became in a few Days Maſter of the firſt ſix Books without any Aſſiſtance; and it is certain, that in his ſixteenth Year he had invented many of the Propoſitions, which were afterwards publiſhed under the Title of *Geometrica Organica*. In his fifteenth Year, he took the Degree of Maſter of Arts; on which Occaſion he compoſed and publicly defended a Theſis, *On the Power of Gravity*, with great Applauſe. After this he quitted the Univerſity, and retired to a Country-ſeat of his Uncle, who had the Care of his Education, for his Parents had been dead ſome Time; and here he ſpent two or three Years in purſuing his favourite Studies; but in 1717, he offered himſelf a Candidate for the Profeſſor-

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ſhip of Mathematicks in the Mariſhal-college of *Aberdeen*, and obtained it after a ten Day's Trial with a very able Competitor. In 1719, he went to *London*, where he became acquainted with Dr. *Hoadly*, then Biſhop of *Bangor*, Dr. *Samuel Clarke*, Sir *Iſaac Newton*, and other eminent Men; at which Time alſo he was admitted a Member of the *Royal Society:* And in another Journey in 1721, he contracted an Intimacy with *Martin Folkes*, Eſq; who was the Preſident of it, which laſted to his Death.

In 1722, Lord *Polwarth*, Plenipotentiary of the King of *Great-Britain*, at the Congreſs of *Cambray*, engaged Mr. *Maclaurin* to go as Tutor and Companion to his eldeſt Son, who was then to ſet out on his Travels. After a ſhort Stay at *Paris*, and viſiting ſome other Towns in *France*, they fixed in *Lorrain*; where Mr. *Maclaurin* wrote his Piece *On the Percuſſion of Bodies*, which gained the Prize of the *Royal Academy of Sciences*, for the Year 1724. But his Pupil dying ſoon after at *Montpelier*, he returned immediately to his Profeſſion at *Aberdeen*. He was hardly ſettled here when he received an Invitation to *Edinburgh*, the Curators of that Univerſity being deſirous that he ſhould ſupply the Place of Mr. *James Gregory*, whoſe great Age and Infirmities had rendered him incapable of teaching. Mr. *Maclaurin* had ſome Difficulties to encounter, ariſing from Competitors, who had good Intereſt with the Patrons of the Univerſity, and alſo from the Want of an additional Fund for the new Profeſſor; which, however, at length, were all ſurmounted, upon the receipt of two Letters from Sir *Iſaac Newton*. In one, addreſſed to Mr. *Maclaurin*, with Allowance to ſhew it to the Patrons of the Univerſity, Sir *Iſaac* expreſſes himſelf thus: "I am very glad to hear, that you have a Proſpect of being joined to Mr. *James Gregory*, in the Profeſſorſhip of the Mathematics at *Edinburgh*; not only becauſe you are my Friend, but principally becauſe of your Abilities; you being acquainted as well with the new Improvements of Mathematicks as with the former State of thoſe Sciences. I heartily wiſh you good Succeſs, and ſhall be very glad to hear of your being elected." In a ſecond Letter to the then Lord Provoſt of *Edinburgh*, he writes thus: "I am glad to underſtand, that Mr. *Maclaurin* is in good repute amongſt you for his Skill in Mathematicks, for I think he deſerves it very well: And to ſatisfy

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you that I do not flatter him, and alſo to encourage him to accept the Place of aſſiſting Mr. *Gregory*, in order to ſucceed him, I am ready, if you pleaſe to give me Leave, to contribute 20*l.* *per Annum* towards a Proviſion for him, till Mr. *Gregory*'s Place becomes void, if I live ſo long, and I will pay it to his Order in *London*."

In *November* 1725, he was introduced into the Univerſity; as was, at the ſame Time his learned Colleague and intimate Friend, Dr. *Alexander Monro*, Profeſſor of Anatomy. After this, the Mathematical Claſſes ſoon became very numerous, there being generally upwards of 100 young Gentlemen attending his Lectures every Year; who being of different Standings and Proficiency, he was obliged to divide them into four or five Claſſes, in each of which he employed a full Hour every Day, from the firſt of *November* to the firſt of *June*. In the firſt Claſs, he taught the firſt ſix Books of *Euclid*'s *Elements*, plain Trigonometry, practical Geometry, the Elements of Fortification, and an Introduction to Algebra. The ſecond ſtudied Algebra, the 11th and 12th Books of *Euclid*, Spherical Trigonometry, Conic Sections, and the general Principles of Aſtronomy. The third went on in Aſtronomy and Perſpective, read a Part of Sir *Iſaac Newton*'s *Principia*, and had a Courſe of Experiments for illuſtrating them performed: He afterwards read and demonſtrated the Elements of Fluxions. Thoſe in the fourth Claſs read a Syſtem of Fluxions, the Doctrine of Chances, and the reſt of Sir *Iſaac Newton*'s *Principia*. Beſides the Labours of his public Profeſſion, he had frequently many other Employments and Avocations. If an uncommon Experiment was ſaid to have been made any where, the curious were deſirous of having it repeated by Mr. *Maclaurin*: If an Eclipſe or Comet was to be obſerved, his Teleſcopes were always in Readineſs.

In 1734, Dr. *Berkeley*, Biſhop of *Cloyne*, publiſhed a Piece called, *The Analyſt*; in which he took Occaſion, from ſome Diſputes that had ariſen concerning the Grounds of the fluxionary Method, to explode the Method itſelf, and alſo to charge Mathematicians in general with Infidelity in Religion. Mr. *Maclaurin* thought himſelf included in this Charge, and began an Anſwer to the Biſhop's Book: But, as he proceeded, ſo many Diſcoveries, ſo many new Theories and Problems occurred

red to him, that inſtead of a vindicatory Pamphlet, his Work came out a complete Syſtem of Fluxions, with their Application to the moſt conſiderable Problems in Geometry and Natural Philoſophy. This Work was publiſhed at *Edinburgh* in 1742, in two Volumes in Quarto; and as it coſt him infinite Pains, ſo it is the moſt conſiderable of all his Works, and will do him immortal Honour. In the mean Time, he was continually obliging the Public with ſome Performance or Obſervation of his own; many of which were publiſhed in the fifth and ſixth Volumes of the Medical Eſſays, at *Edinburgh*. Some of them were likewiſe publiſhed in the *Philoſophical Tranſactions*, as the following: 1. Of the Conſtruction and Meaſure of Curves, N°. 356. 2. A new Method of deſcribing all Kinds of Curves, N°. 359. 3. A Letter to *Martin Folkes*, Eſq; on Equations with impoſſible Roots, *May* 1726, N°. 394. 4. Continuation of the ſame, *March* 1729, N°. 408. 5. *December* the 21ſt, 1732, On the Deſcription of Curves; with an Account of farther Improvements, and a Paper dated at *Nancy*, *November* 27, 1722, N°. 439. 6. An Account of the Treatiſe of Fluxions, *January* 27, 1742, N°. 467. 7. The ſame continued, *March* 10, 1742, N°. 469. 8. A Rule for finding the Meridional Parts of a Spheroid with the ſame Exactneſs as of a Sphere, *Auguſt*, 1741, N°. 461. 9. Of the Baſis of the Cells, wherein the Bees depoſit their Honey, *November* 3, 1743, N°. 471.

In the Midſt of theſe Studies, Mr. *Maclaurin* was always ready to lend his Aſſiſtance in contriving and promoting any Scheme, which might contribute to the Service of his Country. When the Earl of *Morton* ſet out, in 1739, for *Orkney* and *Shetland*, to viſit his Eſtates there, he deſired Mr. *Maclaurin* to aſſiſt him in ſettling the Geography of thoſe Countries, which is very erroneous in all our Maps; to examine their Natural Hiſtory, to ſurvey the Coaſts, and to take the Meaſure of a Degree of the Meridian. Mr. *Maclaurin*'s Family Affairs, and other Connections, would not permit him to do this: He drew however a Memorial of what he thought neceſſary to be obſerved, furniſhed the proper Inſtruments, and recommended Mr. *Short*, as a fit Operator for managing them. Mr. *Maclaurin* had ſtill another Scheme for the Improvement of Geography and Navigation, of a more extenſive Nature;

which was, the opening a Paſſage from *Greenland* to the *South Sea* by the North Pole. That ſuch a Paſſage might be found, he was ſo fully perſuaded, that he has been heard to ſay, if his Situation could admit of ſuch Adventures, he would undertake the Voyage, even at his own Charge. But when Schemes for finding it were laid before the Parliament in 1744, and himſelf conſulted by ſeveral Perſons of high Rank, concerning them, before he could finiſh the Memorials he propoſed to ſend, the Premium was limited to the Diſcovery of a North-weſt Paſſage: And Mr. *Maclaurin* uſed to regret, that the Word Weſt was inſerted, becauſe he thought that Paſſage, if at all to be found, muſt lie not far from the Pole.

Mr. *Maclaurin* is ſaid to have been a very good, as well as a very great Man, and worthy of Love as well as Admiration. His peculiar Merit, as a Philoſopher, was, that all his Studies were accommodated to general Utility; and we find, in many Places of his Works, an Application even of the moſt abſtruſe Theories, to the perfecting of mechanical Arts. He had reſolved, for the ſame Purpoſe, to compoſe a Courſe of practical Mathematics, and to reſcue ſeveral uſeful Branches of the Science from the bad Treatment they often meet with in leſs ſkilful Hands. But all this his Death prevented; unleſs we would reckon, as a Part of his intended Work, the Tranſlation of Dr. *David Gregory*'s *Practical Geometry*, which he reviſed, and publiſhed with Additions, in the Year 1745. In his Life-time, however, he had frequent Opportunities of ſerving his Friends and his Country, by his great Skill. Whatever Difficulty occurred concerning the conſtructing or perfecting of Machines, the Working of Mines, the Improvement of Manufactures, the conveying of Water, or the Execution of any other public Work, Mr. *Maclaurin* was at Hand to reſolve it. He was likewiſe employed to terminate ſome Diſputes of Conſequence, that had ariſen at *Glaſgow*, concerning the gauging of Veſſels; and for that Purpoſe preſented to the Commiſſioners of Exciſe two elaborate Memorials, with their Demonſtrations, containing Rules by which the Officers now act. He made alſo Calculations, relating to the Proviſion, now eſtabliſhed by Law, for the Children and Widows of the *Scotch* Clergy, and of the Profeſſors in the Univerſities, intitling them to certain Annuities and

Sums,

Sums, upon the voluntary annual Payment of a certain Sum by the Incumbent. In contriving and adjuſting this wiſe and uſeful Scheme, Mr. *Maclaurin* beſtowed a great deal of Labour, and contributed not a little towards bringing it to Perfection. It may be ſaid of ſuch a Man as Mr. *Maclaurin*, that "He lived to ſome Purpoſe;" which can hardly be ſaid of thoſe, how uncommon ſoever their Abilities and Attainments, who ſpend their whole Time in abſtract Speculations, and produce nothing to the real Uſe and Service of their Fellow-creatures.

Of Mr. *Maclaurin*'s Works, we have mentioned his *Geometria Organica*, in which he treats of the Deſcription of Curve Lines by continued Motion. We need not repeat what has been ſaid concerning his Piece, which gained the Prize of the *Royal Academy of Sciences* in 1724. In the Year 1740, the Academy adjudged him a Prize, which did him ſtill more Honour, for ſolving the Motion of the Tides from the Theory of Gravity: A Queſtion which had been given out the former Year, without receiving any Solution. He had only ten Days to draw this Paper up in, and could not find Leiſure to tranſcribe a fair Copy; ſo that the *Paris* Edition of it is incorrect. He afterwards reviſed the whole, and inſerted it in his Treatiſe of Fluxions; as he did alſo the Subſtance of the former Piece. Theſe with the Treatiſe of Fluxions, and the Pieces printed in the *Philoſophical Tranſactions*, of which we have given a Liſt, are all the Writings which our Author lived to publiſh. Since his Death, two Volumes more have appeared, his Algebra, and his Account of Sir *Iſaac Newton*'s Philoſophical Diſcoveries. His Algebra, though not finiſhed by himſelf, is yet allowed to be excellent in its Kind; containing, in one large Volume 8vo. a compleat elementary Treatiſe of that Science, as far as it has hitherto been carried. His Account of Sir *Iſaac Newton*'s Philoſophy was occaſioned in this Manner: Sir *Iſaac* dying in the Beginning of the Year 1728, his Nephew, Mr. *Conduitt*, propoſed to publiſh an Account of his Life, and deſired Mr. *Maclaurin*'s Aſſiſtance. The latter, out of Gratitude to his great Benefactor, chearfully undertook, and ſoon finiſhed, the Hiſtory of the Progreſs which Philoſophy had made before Sir *Iſaac*'s Time: And this was the firſt Draught of the Work in Hand, which not going forward, on Account of Mr. *Conduitt*'s Death,

was returned to Mr. *Maclaurin*. To this he afterwards made great Additions, and left it in the State in which it now appears. His main Deſign ſeems to have been to explain only thoſe Parts of Sir *Iſaac*'s Philoſophy which have been, and ſtill are, controverted: And this is ſuppoſed to be the Reaſon, why his grand Diſcoveries concerning Light and Colours are but tranſiently and generally touched upon. For it is known, that ever ſince the Experiments on which his Doctrine of Light and Colours is founded, have been repeated with due Care, this Doctrine has not been conteſted: Whereas his accounting for the celeſtial Motions, and the other great Appearances of Nature, from Gravity, is Miſunderſtood, and even ridiculed to this Day. The weak Charge of occult Qualities has been frequently repeated; foreign Profeſſors ſtill amuſe themſelves with imaginary Triumphs; and even the polite and ingenious Cardinal *de Polignac*, has been ſeduced to lend them the Harmony of his Numbers.

To the latter of theſe Works is prefixed, *An Account of the Life and Writings of Mr. Maclaurin:* From which, as it is very authentic, we have taken the Subſtance of the preſent Memoir.

In 1745, having been very active in fortifying the City of *Edinburgh* againſt the rebel Army, he was obliged to fly from thence to the North of *England*; where he was invited by Dr. *Herring*, then Archbiſhop of *York*, to reſide with him, during his Stay in this Country. "Here, ſays he, in a Letter to one of his Friends, I live as happily as a Man can do, who is ignorant of the State of his Family, and who ſees the Ruin of his Country." In this Expedition, however, being expoſed to Cold and Hardſhips, and naturally of a weak and tender Conſtitution, he laid the Foundation of an Illneſs, which put an End to his Life. It was a Dropſy in the Belly, and he died of it on *June* 14, 1746, aged forty-eight Years. There is a Circumſtance recorded of him during his laſt Moments, which ſhews him to have poſſeſſed great philoſophic Serenity and Strength of Reaſon: And this was deſiring his Friend, Dr. *Monro*, to Account for a Phænomenon he then obſerved in himſelf, *viz.* "Flaſhes of Fire ſeeming to dart from his Eyes, while in the mean Time his Sight was failing, ſo that he could ſcarce diſtinguiſh one Object from another."

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Mr. *Maclaurin* lived a Bathelor to the Year 1733; but being very much formed for Society, as well as Contemplation, he then married *Anne*, the Daughter of Mr. *Walter Stewart*, Solicitor-general to his late Majeſty for *Scotland*. By this Lady he had ſeven Children, of which, two Sons and three Daughters, together with his Wife, ſurvived him.

The LIFE of PETER the GREAT, CZAR *of* MUSCOVY.

PETER the GREAT, ſo juſtly celebrated for his mechanical, mathematical, and philoſophical Knowledge, was born the 30th of *May*, 1672, and was the Son of the Czar *Alexis Michaelowitz* by a ſecond Wife. *Alexis* dying, in 1676, *Theodore*, his eldeſt Son by his firſt Wife, ſucceeded to the Throne, and died in 1682. *Peter* was then, though but ten Years of Age, proclaimed Czar, to the Excluſion of *John*, his elder Brother, who was of a weak Body, and weaker Mind. ——— The *Ruſſian* Education was, at that Time, like the Country, illiberal and barbarous, ſo that he could derive no Advantages from thence. But, notwithſtanding, he very early diſcovered a Strength of Genius ſuperior to Difficulties, and an Abhorrence of thoſe Pleaſures which tend to enervate and deprave the Mind. And, to improve himſelf in the moſt uſeful Arts and Sciences, he viſited the Courts of many other Kingdoms and States of *Europe*; the *Royal Academy of Sciences* at *Paris*; the Univerſities of *England*, *Denmark*, *&c.* and, by his indefatigable Diligence in acquiring political and ſcientifical Knowledge, laid a Foundation for thoſe high Atchievements in military and naval Affairs, and for thoſe remarkable Improvements and Regulations in the Government of his Empire, as rendered him the Admiration of all *Europe*, and juſtly merited the Title of PETER *the* GREAT.

It would be endleſs to enumerate all the various Eſtabliſhments for which the *Ruſſians* are indebted to this great Emperor; *Fontenelle*

tenelle has recorded ſome of the principal, which alſo claim a Place here.

He eſtabliſhed, 1. A Body of 100,000 Foot, under as regular a Diſcipline as any in *Europe*. 2. A Navy of 40 Ships of the Line, and 200 Gallies. 3. Fortifications in all main Towns, and an excellent Civil Government in the great Cities, which before were as dangerous in the Night, as the moſt unfrequented Deſerts. 4. An Academy for Naval Affairs and Navigation, where all the Nobility are obliged to ſend ſome of their Children. 5. Colleges at *Moſcow*, *Peterſburg*, and *Kiof*, for Languages, polite Literature, and Mathematics; and Schools in the Villages, where the Children of the Peaſants are taught to read and write. 6. A College of Phyſicians, and a noble Diſpenſatory at *Moſcow*, which furniſhes Medicines to the great Cities, and to the Armies; whereas before, there was no Phyſician but the Czar's, and no Apothecary in all his Dominions. 7. Public Lectures in Anatomy, a Word never heard before in *Ruſſia*. Mr. *Voltaire* relates, that the Czar had ſtudied this Branch of Knowledge under the celebrated *Ruyſch* at *Amſterdam*, and made ſuch Improvements under this Maſter, as to perform even chirurgical Operations himſelf. He afterwards purchaſed the Cabinet of that Anatomiſt, which contained an immenſe Collection of the moſt curious, inſtructive, and uncommon Preparations. 8. An Obſervatory, not only for the Uſe of Aſtronomers, but as a Repoſitory for natural Curioſities. 9. A Phyſic Garden, to be ſtocked with Plants, not only from all Parts of *Europe*, but from *Aſia*, *Perſia*, and even the diſtant Parts of *China*. 10. Printing-houſes, where he aboliſhed their old barbarous Characters, which, through the great Number of Abbreviations, were almoſt become unintelligible. 11. Interpreters for all the Languages of *Europe*; and likewiſe for the *Latin*, *Greek*, *Turkiſh*, *Calmuck*, *Mogul*, and *Chineſe*. 12. A Royal Library, compoſed of three very large ones. which he purchaſed in *England*, *Holſtein*, and *Germany*.

Theſe, and many more, were particular Inſtitutions and Eſtabliſhments: But the Czar made general Reformations, to which indeed the other were only ſubſervient. He changed the Architecture, which was ugly and deformed; or, to ſpeak more properly, he firſt introduced that Science into his Dominions. He

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ſent for a great Number of Pictures from *Italy* and *France*, and by this Means inſtructed in the Art of Painting a People, who knew no more of it, than what they could collect from the wretched Daubing of their Saints Painters. He ſent Ships laden with Merchandize to *Genoa* and *Leghorn*, which returned freighted with Marble and Statues: And Pope *Clement* XI. pleaſed with his Taſte, preſented him with a fine Antique, which the Czar, not caring to truſt by Sea, ordered to be brought to *Peterſburg* by Land. Religion was not neglected in this general Reform: Ignorance and Superſtition had over-run it ſo much, that it ſcarcely merited the Name of Chriſtian. The Czar introduced Knowledge where it was miſerably wanted; and this Knowledge enabled him to aboliſh Faſts, Miracles, and Saint-worſhip, in a good Degree, at leaſt. He ventured further than to the Correction of Rites: He aboliſhed the Patriarchate, though pretty much independent on him; and by that Means got rid of a Power, which was always interrupting and diſconcerting his Meaſures. He took away Part of the Revenues of thoſe Churches and Monaſteries, which he thought too wealthy; and leaving only what was neceſſary for their Subſiſtence, added the Overplus to his own Demeſnes. He made many judicious and uſeful eccleſiaſtical Canons, and ordered preaching in the *Ruſſian* Language. Laſtly, he eſtabliſhed a general Liberty of Conſcience throughout his Dominions; and, if we had no other Proof of his civilized Spirit, this would be ſufficient. There is one more Reformation, and perhaps as neceſſary and uſeful as any of the former, which he made even in his laſt Illneſs, though it was exceedingly painful. When the Senators and great Perſonages, then about him, mentioned the various Obligations which *Ruſſia* lay under to him, for aboliſhing Ignorance and Barbariſm, and introducing Arts and Sciences, he told them, that he had forgot to reform one of the moſt important Points of all, *viz.* the male Adminiſtration of Juſtice, occaſioned by the tedious and litigious Chicanery of the Lawyers; and ſigned an Order from his Bed, limiting the Determination of all Cauſes to eleven Days, which was immediately ſent to all the Courts of his Empire.

This wonderful Perſon died of the Strangury, cauſed by an Impoſthume in the Neck of his Bladder, on the 28th of *Janu-*

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ary, 1725, aged 53 Years. He was tall, and remarkably well ſhaped: He had a noble Countenance, Eyes ſparkling with Vivacity, and a robuſt Conſtitution. His Judgment was ſound, which, as *Voltaire* has obſerved, may juſtly be deemed the Foundation of all real Abilities: And to this Solidity was joined an active Diſpoſition, which put him upon the moſt arduous Undertakings. Whoever reflects upon the Interruptions, Difficulties and Oppoſitions, that muſt unavoidably occur in civilizing and reforming a large and barbarous Empire, muſt ſuppoſe the Czar to have been, as indeed he really was, a Perſon of the greateſt Firmneſs and Perſeverance.

Animated by the laudible Ambition of ſupporting the Dignity, and anſwering the Ends of Government; and it was happy for him, that this Ambition was equalled by his diſtinguiſhed Talents, improved by every Advantage he could poſſibly procure, and rewarded not only with public Applauſe, but by (that which infinitely exceeds it) the Satisfaction, and Tranquility of his own Mind.

The Czar wrote ſeveral Pieces upon Naval Affairs, and other occaſional Tracts, ſo that his Name is juſtly added to the ſhort Catalogue of Sovereigns who have honoured the Public with their Writings.

The Czarina, his Widow, whom he nominated his Succeſſor, was, upon his Death, immediately acknowledged Empreſs of *Ruſſia* by the ſeveral Eſtates thereof. The Hiſtory of this Lady is curious and extraordinary, and therefore we ſhall give the following conciſe Memoir of her from Mr. *Voltaire*'s Hiſtory of *Peter*, tho' it may be thought a Digreſſion, *viz.* "The Lenity of this Princeſs, ſays he, has been carried to a Degree unparalleled in the Hiſtory of any Nation. She had promiſed, that during her Reign no Body ſhould be put to Death; and ſhe has kept her Word. She is the firſt Sovereign that ever ſhewed this Regard to the Human Species. Malefactors are now condemned to ſerve in the Mines and other public Works; a Regulation, not leſs prudent than humane, ſince it renders their Puniſhment of ſome Advantage to the State. In other Countries, they only know how to put a Malefactor to Death, with the Apparatus of an Executioner, but are not able to prevent the Commiſſion of Crimes."

The LIFE of BENJAMIN ROBINS.

MR. *Robins* was born at *Bath*, in 1707. As his Parents were not wealthy, and alſo Quakers, it was much feared, leſt the ſurprizing Progreſs he had by himſelf early made in various Branches of Literature, would be interrupted through Want of due Encouragement; eſpecially amongſt a People, who profeſs not the ſame Eſteem, as the reſt of the World, for the Learning they ſtyle Human; ſuppoſing it not requiſite either to the Underſtanding or explaining divine Subjects.

However, ſome particular Friends of Mr. *Robins* being very deſirous that he might continue his Purſuits, and his Merit not be loſt in Obſcurity; wiſhed for this Purpoſe, that he could be properly recommended to teach in this Town the Mathematics, which had been one of the principal Objects of his Studies. With this View therefore they communicated to a Gentleman here a Paper written by him, in order to learn what Judgment Perſons of Knowledge might make of his Abilities. This was ſhewn to Dr. *Pemberton*, who, thence conceiving a good Opinion of the Writer, for a farther Trial of his Proficiency ſent him ſome Problems, of which the Doctor required elegant Solutions, not thoſe founded on Algebraical Calculations; adding an Example of ſuch a Solution, that the young Geometer might the more readily comprehend his Meaning. An Anſwer was returned by Mr. *Robins*, that gave a very advantageous Idea of his Taſte, as well as Invention.

Upon this he came to *London*; where his Preſence ſtill encreaſed the favourable Sentiments that had been entertained of his Talents. For beſides his Acquaintance with divers Parts of Learning, there was in him to an ingenuous Aſpect, joined an Activity of Temper, together with a great Facility in expreſſing his Thoughts with Clearneſs, Brevity, Strength and Elegance; Endowments, which do not always accompany ſtudious Perſons. But though Mr. *Robins* was poſſeſſed of much more Skill than is uſually required in a common Teacher; yet being very young, it was thought proper, that he ſhould employ ſome Time in peruſing the beſt Writers on the ſublimer Parts of the

Mathematics, before he undertook publicly the Inſtruction of others. In this Interval, beſides improving himſelf in the modern Languages, he had Opportunities of reading, in particular, the Works of *Apollonius*, *Archimedes*, *Fermat*, *Huygens*, *De Wit*, *Sluſius*, *James Gregory*, Dr. *Barrow*, Sir *Iſaac Newton*, Dr. *Taylor*, and Mr. *Cotes*. Theſe Authors he readily underſtood without any Aſſiſtance; of which he gave frequent Proofs to his Friends. Amongſt others, one was a Demonſtration of the laſt Propoſition of Sir *Iſaac Newton*'s Treatiſe on Quadratures, which was thought not undeſerving a Place in the *Philoſophical Tranſactions*.

Not long after, an Occaſion offered for him to exhibit to the Public a Specimen alſo of his Knowledge in natural Philoſophy. The *Royal Academy of Sciences* at *Paris* had propoſed, amongſt their Prize Queſtions, to demonſtrate the Laws of Motion in Bodies impinging on one another. The celebrated M. *John Bernoulli* here condeſcended to be a Candidate; and though his Diſſertation loſt the Reward, he appealed to the learned World by printing it. He therein endeavoured to eſtabliſh M. *Leibnitz*'s Opinion of the Force of Bodies in Motion, from the Effects of their ſtriking againſt ſpringing Materials; as Signor *Poleni* had before attempted to evince the ſame Thing from Experiments of Bodies falling on ſoft and yielding Subſtances. But as the Inſufficiency of Signor *Poleni*'s Arguments had formerly been demonſtrated; ſo Mr. *Robins* publiſhed in a *Journal*, called *The preſent State of the Republic of Letters*, an unanſwerable Confutation of M. *Bernoulli*'s Performance.

It may indeed ſeem ſtrange, that a mere Tyro ſhould thus overcome ſo redoubted a Veteran. But though M. *Bernoulli* muſt be allowed to have had a conſiderable Share of Invention in pure Mathematics; yet, when any phyſical Cauſe intervened, he ſeldom could avoid falſe Reaſonings; being deficient in that Diſtinctneſs of Conception, ſo neceſſary for ſecuring againſt Error in theſe more complex Subjects, and which was poſſeſſed by Mr. *Robins* in a ſupreme Degree.

Now the Recommendations of his Friends, ſupported by ſuch authentic Teſtimonies of his Abilities, ſoon procured him many Scholars; amongſt theſe, ſeveral were of real Genius, who at preſent make an eminent Figure in public Affairs.

But

But it may be here obſerved, that about this Time he quitted the peculiar Garb and Profeſſion of a Quaker; for not having the leaſt Tincture of Obſtinacy, Superſtition or Enthuſiaſm in his Nature; he ſoon got over the Prejudices of Education, and had an utter Averſion to act a feigned Part. However, he continued to cultivate a Friendſhip with ſeveral deſerving Perſons of that Perſuaſion; not being ignorant that at all Times, and in all Places, there have been great Numbers of Learning, Sagacity, and even Honeſty too, who through the Force of early Impreſſions and a certain Caſt of Temper, have made moſt palpable Abſurdities the Objects of their Faith.

Mr. *Robins*'s Way of inſtructing was generally ſimilar to the Courſe he had followed himſelf; but as he only taught Perſons ſingly, and not in Claſſes, it was in his Power to vary his Method according to the Capacity or Intention of each Learner. However, he always began with the Elements of *Euclid*, not as interpolated by *Campanus* and *Clavius*, or anatomiſed by *Herigone* and *Barrow*, or depraved by *Tacquet* and *Dechalles*; but according to the Original handed down to us by Antiquity; much leſs did he uſe any of the new modelled Elements, that at preſent every where abound.

By what is here ſaid, I would not be underſtood to diſſuade the conſulting *Clavius*'s *Euclid* at a proper Time; for as in it there is nothing inconſiſtent with the Strictneſs of Demonſtration, ſo it contains many curious Particulars relating to Geometry. And indeed the contracted Form, into which Dr. *Barrow* has reduced the Elements, may be of Uſe for refreſhing the Memory, after the Original has been well conſidered; the ſame Judgment may be paſſed on his *Archimedes*, *Apollonius*, and *Theodoſius*.

For want of ſuch a Beginning in his Studies, many a Mathematician, who has acquired no ſmall Fame, has been altogether incapable of framing a ſynthetic Demonſtration, as it ought to be, or even of readily comprehending one ſo conſtituted; but would be apt, though it had all the Perfections poſſible, to imagine it tedious and obſcure, through his not being acquainted with the genuine Expreſſion of the true Geometry. Hence the Writings of great Part of the Moderns on mathematical Subjects abound with inartificial Computations. The

Conſideration of which led Mr. *Robins* often to repeat a Saying of that elegant Writer *Joannes della Faille: Mathematica multi ſciunt, matheſin pauci.*

Amongſt Mr. *Robins*'s Scholars, ſuch as went afterwards to *Cambridge*, in order to qualify themſelves for one of the learned Profeſſions, were wont, as is the Cuſtom of young Men, frequently to enter into warm Conteſts with the Diſciples of Mr. Profeſſor *Saunderſon*, that Gentleman uſing there a very different Method of Inſtruction. And indeed I have met with ingenious Perſons, who, though they allowed *Euclid*'s Elements to be the perfecteſt Book of the Kind; yet did not think it the moſt proper Introduction for the Generality of Students, at leaſt when ranged in Claſſes, the Way of teaching principally followed in Univerſities; but the Contrary of this Opinion appears to be true from the conſtant and very ſucceſsful Practice of the late famous Mr. *Maclaurin*, who, I obſerved with Pleaſure, always begun his academical Courſes with the Elements of *Euclid*.

And theſe Elements well deſerve to be carefully conſidered even by ſuch as do not intend to devote much of their Time to mathematical Speculations; for they are more uſeful, in order to acquire a Habit of ſtrict Reaſoning, than the moſt laboured Syſtems of Logic: That Art owing, in great Meaſure, its Original, and indeed being beſt fitted for making formal Anſwers, to the childiſh and ridiculous Conceits of thoſe quibbling Sophiſts, whoſe Impertinence *Plato* has ſo juſtly expoſed; appears ſo far from being the moſt natural Means of diſcovering and judging of Truth, that the great Maſter of the Art itſelf was a very bad Reaſoner.

The two chief Grounds of falſe Reaſoning are Ambiguity in the Uſe of Words and Principles haſtily taken up; ſcarce any one ever offending againſt the Rules of Mode and Figure in Syllogiſms. But the ſureſt Defence againſt theſe two Grounds of Error, is exerciſing the Mind in Subjects, where a Courſe of Reaſoning is followed free from Perplexity in the Terms, and diſintangled from Uncertainty in the Principles; by which we may gain a Habit of diſtinguiſhing between perfect Reaſoning, and whatever, in different Degrees, takes only the Appearance of it.

Euclid,

Euclid, in his Elements, has the Advantage of a Subject, the Simplicity of which keeps it almoſt neceſſarily free from any Ambiguity of Terms, and his Demonſtrations are conducted with the moſt expreſs Deſign of reducing the Principles aſſumed to the feweſt Number and moſt evident, that might be; and in a Method the moſt natural, as it is the moſt conducive towards a juſt and compleat Comprehenſion of the Subject, by beginning with ſuch Particulars, as are moſt eaſily conceived, and flow moſt readily from the Principles laid down, thence by gradually proceeding to ſuch as are more obſcure, and require a longer Chain of Argument.

And this great Regard to Perſpicuity in the Method and Form of Reaſoning was ſo peculiarly the Characteriſtic of the moſt ancient Geometers, that Mr. *Robins* choſe to initiate thoſe under his Inſtruction in the Elements of the Conics by *Apollonius* in Preference to any modern Author.

As to the Principles of Algebra, Mr. *Robins* uſed to deliver ſhort Precepts of his own, free from the Intricacies and Miſconceptions, by which the Generality of Writers had obſcured a Matter in itſelf very plain and eaſy to be comprehended. The interpreting the Terms of Affirmative and Negative, which, in reality, expreſſed only the Relation of one Quantity to another, as implying ſome abſolute Quality in the Quantities to which they are prefixed, has occaſioned all that Air of Myſtery, by which Learners are ſo unneceſſarily perplexed.

Mr. *Robins* explained the Doctrine of Fluxions, and what is uſually ſtyled the ſublime Geometry, after a clear and genuine Manner; not having the leaſt Recourſe to the abſurd Notion of Indiviſibles or Infiniteſimals, but as it is delivered truly, though very briefly, by its great Inventor in the Introduction to his admirable Treatiſe on Quadratures.

I ſhall not proceed to deſcribe Mr. *Robins*'s Way of inſtructing in the ſeveral Branches of mixt Mathematics; whereof he was a moſt perfect Maſter, and on which he could deliver himſelf with the utmoſt Clearneſs. I ſhall only obſerve, that as he well grounded his Scholars in true Geometry; it was eaſy for him to inform them of the practical Parts in a more ſcientific Manner, than they are handled in the vulgar Treatiſes.

The

The modern Authors, Mr. *Robins* chiefly valued, were ſuch as approached the neareſt, in their Manner of Writing, to that of the Ancients. Amongſt theſe the great *Huygens* ſtands in the firſt Place. But thoſe, who had the Care of publiſhing his poſthumous Works, ſeem to have been of a different Opinion, when they tell us, they once had Thoughts of changing his real Demonſtrations into Algebraical Calculations!

Mr. *Robins* alſo had the higheſt Eſteem for Dr. *Barrow*'s Lectures, and recommended them uſually to his Scholars; for in thoſe, that treat of the Mathematics in general, they would find amongſt other excellent Things concerning the Nature and Principles of the Science, a juſt Defence of *Euclid*, and a full Explanation of his Idea of Proportionality; and as the Subject is handled in a popular Manner, ſo the Author, beſides ſhewing much real Learning and exquiſite Choice in his Authorities, has not only ſupported his peculiar Sentiments with great Subtilty of Reaſon, but alſo adorned his Diſcourſe by a maſculine and true Eloquence.

In his optical Lectures they would ſee the Principles of Catoptricks and Dioptricks ſet forth in the compleateſt Manner. There the actual Interſections are determined, which the Rays of Light, iſſuing from any Point of an Object after Reflection or Refraction, make with each other, as alſo the Limits of thoſe Interſections, and how the Rays, the nearer they approach thoſe Limits, are more and more conſtipted; whence ſuch Limits are called the Foci, as the Line paſſing through them all has been ſince named the Cauſtic. Next the Author finds the principal Foci in different Lens's. Afterwards he treats, in general, of the apparent Magnitudes of Objects, and then particularly aſſigns the Images of plane Surfaces. The whole is intermixed with ſeveral curious Propoſitions in Geometry, and confirmed by moſt accurate Demonſtrations, which have been praiſed as ſuch by Sir *Iſaac Newton* himſelf; who ſuppoſes his Auditors well acquainted with theſe Lectures of his Predeceſſor, in order to underſtand perfectly the ſublime Diſcoveries, he was delivering to them.

I need not mention Mr. *Robins*'s Opinion of Sir *Iſaac Newton*, ſince he has had Occaſion to declare it ſo often in ſeveral Tracts he wrote. And, indeed, Sir *Iſaac Newton*'s Fame ſeems at preſent

ſent to have ſurmounted all Oppoſition. The Philoſophers of a neighbouring Nation acknowledge his Merit. Though they had for Years quite overlooked his Book of Optics; yet now they ſpeak of it in the higheſt Terms. And they have at length adopted Attraction under the Name of univerſal Gravitation; which they had long rejected as an occult Quality, on Account its Cauſe is not diſcovered. They might as well have neglected the Conſideration of the Laws of Motion; becauſe it is not known, why Motion ariſes from the Colliſion of Bodies; or the Contemplation of the Effects of Light, as it has not been found out, whether it is owing to Beams darted immediately from the luminous Object, or to Impreſſions made on a ſurrounding Medium, or to ſome more latent Cauſe. It is the Buſineſs of the true Philoſophy to explore the moſt ſimple Cauſes, and from their Combinations to account for the various Phænomena in Nature. But all the Objections that could be raiſed againſt this true Way of Philoſophizing, Sir *Iſaac Newton* had previouſly obviated in his Works. Of this, they ſeem, at laſt, to be ſenſible, from having conſidered them more attentively; and accordingly they are attempting to make Improvements on his Principles.

And here I cannot help declaring the Satisfaction Mr. *Robins* always expreſſed on obſerving the Progreſs a true Taſte for real Geometry made in *Scotland*. The mathematical Sciences have indeed been well cultivated by that learned Nation. To a *Scotchman*, the Lord *Napier*, we are beholden not only for the admirable Invention of Logarithms, and their Application to Trigonometry, but alſo for other very valuable Improvements he has made in that moſt uſeful Art, and probably his ill State of Health hindered his making farther Diſcoveries. The incomparable *James Gregory* was likewiſe of that Country, whoſe riſing Merit ſeems to have given Umbrage even to the great *Huygens*; and whoſe immature Death was an irreparable Loſs to the mathematical World; for which Loſs, I have been informed, Sir *Iſaac Newton* uſed always to ſhew very ſenſible Tokens of Grief, whenever Mr. *Gregory*'s Name happened to be mentioned to him.

In the Manner above recommended, were Mr. *Robins*'s younger Days employed in promoting the Knowlege of theſe Science;

Sciences; whoſe Aid is in ſome Meaſure required for eſtabliſhing even the firſt Foundations of civil Society; as the Property of each Individual of the Community muſt be aſcertained in Number, Meaſure, and Weight.

Mr. *Robins* printed, in the Year 1742, a ſmall Treatiſe, entitled *New Principles of Gunnery*, containing the Reſult of many Experiments he had made, whereby is diſcovered the Force of Gunpowder, and the Difference in the reſiſting Power of the Air to ſwift and ſlow Motions; whence it plainly appeared, that the Oppoſition of that Medium to Bullets and Shells, ſhot from Cannon and Mortars, far exceeded, what was generally imagined; and that the Tract deſcribed in their Motion, differed from that of a parabolic Line to a Degree undiſcovered by any, who had written expreſly on the Subject from the Days of the famous *Galileo* to the preſent Time.

Sir *Iſaac Newton* indeed, as Mr. *Robins* obſerved, was very ſenſible of the Effects of this Reſiſtance; and has propoſed how to aſſign, in particular Caſes, a Curve of a different Species from the Parabola, as more anſwerable to the Projectile's Motion. Nor was this great Man wholly unappriſed of the Increaſe of Reſiſtance both from the rotary Motion of the moving Body, and alſo from the Preſſure of the Fluid on the Body, becoming, by its Motion, greater on the fore Part than on the Hinder.

The Tract of Mr. *Robins* was preceded by an Account of the Progreſs modern Fortification had made from its firſt riſe; as alſo of the Invention of Gunpowder, and of what had already been performed in the Theory of Gunnery.

This was well received by the Public, and, it was thought, would have procured the Author Preferment, if he never had been Secretary to the ſecret Committee.

As Mr. *Robins*'s Experiments and Theories met with the greateſt Approbation from the beſt Judges here; ſo the Tract he had publiſhed did him much Honour abroad; for the famous M. *Euler* tranſlated it into *High Dutch*; accompanying this ſmall Piece with an immenſe Commentary; and beſtowing Praiſes on it, yet not without attempting to diſcover Errors. This was printed at *Berlin* in 1745, and Mr. *Robins* ſoon after declared, that M. *Euler*'s principal Objections aroſe from Miſtakes;

Miſtakes; the Source of which having found out, he intended to publiſh an Anſwer; but from that Time continual Interruptions prevented him.

It has alſo been tranſlated into *French* by M. *Le Roy*; and it is often mentioned with Applauſe in the Literary Journals of *Europe*.

The Reputation, he juſtly acquired by this Performance, made a foreign Profeſſor of the Mathematicks, when in *London*, pay him a Viſit; and his Eſteem for Mr. *Robins* was by that Interview greatly improved, inſomuch that on his Return home, he commended Mr. *Robins* ſo effectually to the late Prince of *Orange*, that he was invited over to aſſiſt in the Defence of *Bergen-op-Zoom*, then inveſted by the *French*; and he did accordingly ſet out for that Place; but it was entered by the Beſiegers, *September* 16, 1747, juſt after his Arrival in the *Dutch* Army.

Some Years after this Diſappointment, Mr. *Robins* had the good Fortune to be engaged in a Work, that proved of more Conſequence to him, than all he had hitherto written.

In 1741, Mr. *Anſon*, (late Lord *Anſon*, and at the Head of the Admiralty, when our Fleets carried Terror, wherever they appeared) as Commodore in the *Centurion* Man of War, accompanied with other Ships, began his Voyage round the World, which though by Diſaſters had not all the Succeſs, that might have been reaſonably expected; yet under this great Commander were produced many brave and ſkilful Officers, who at preſent do ſo much Honour to the *Britiſh* Navy. Of this Voyage the Public had for ſome Time been in Expectation of ſeeing an Account compoſed under his Lordſhip's own Inſpection. For this Purpoſe the Reverend Mr. *Richard Walter* was employed, as having been Chaplain aboard the *Centurion* for the greateſt Part of the Expedition. Mr. *Walter* had accordingly almoſt finiſhed his Taſk, having brought it down to his own Departure from *Macao* for *England*; when he propoſed to print his Work by Subſcription. Then Mr. *Robins* being recommended as a proper Perſon for reviewing it; on examination (notwithſtanding the Shortneſs of the Time, that could be allowed for ſuch an Undertaking) it was reſolved, that the whole ſhould be written

entirely by Mr. *Robins*; what Mr. *Walter* had done being, as Mr. *Robins* informed me, almoſt all taken *verbatim* from the *Journals*, was to ſerve as Materials only. And upon a ſtrict Peruſal of both the Performances, I find Mr. *Robins*'s to contain about as much Matter again as that of Mr. *Walter*'s; and indeed the Introduction entire, with many Diſſertations in the Body of the Book, were compoſed by Mr. *Robins*, without having received the leaſt Hint from Mr. *Walter*'s Manuſcript; and what he had thence tranſcribed regarded chiefly the Wind and the Weather, the Currents, Courſes, Bearings, Diſtances, Offings, Soundings, Moorings, and the Qualities of the Ground they anchored on, with ſuch Particulars, as generally fill up a Sailor's Account. So this famous Voyage was compoſed in the Perſon of the *Centurion*'s Chaplain by Mr. *Robins* in his own Style and Manner. Of this Mr. *Robins*'s Friends Mr. *Glover* and Mr. *Ockenden* are Witneſſes as well as myſelf, we having compared the printed Book with Mr. *Walter*'s Manuſcript.

And this was at that Time no Secret, for in the Counterpart of an Indenture now lying before me, made between *Benjamin Robins*, Eſq; and *John* and *Paul Knapton*, Bookſellers, I find, that thoſe Bookſellers purchaſed the Copy of this Book from Mr. *Robins* as the ſole Proprietor, with no other mention of Mr. *Walter*, than a Proviſo in relation to the Subſcriptions he had taken.

Thus as many of Mr. *Robins*'s ſmaller Pieces came abroad without a Name; ſo this larger Volume was printed in the Year 1748, under that of another. But though Mr. *Walter* appears in the Frontiſpiece; yet Mr. *Robins* was ſo well underſtood here to be the principal Author, that he was univerſally congratulated on its Succeſs. And indeed no Production of this Kind ever met with a more favourable Reception from the Public; four large Editions were ſold off in leſs than a Twelvemonth; and it has been tranſlated into moſt of the Languages of *Europe*; and it ſtill ſupports its Reputation, it being, in the Year 1761, printed here for the ninth Time.

Henceforward Mr. *Robins* had Opportunities of making farther Experiments in Gunnery, by the Favour of Lord *Anſon*; the Reſult of ſome of them is declared in ſome Diſcourſes that have

have been publiſhed, from the Author's Papers, by *James Wilſon*, M. D.*

He alſo not a little contributed to the Improvements made in the *Royal Obſervatory* at *Greenwich*, by uſing his Intereſt with the ſame noble Perſon to procure a ſecond Mural Quadrant, and other Inſtruments, whereby this Obſervatory is become, perhaps, the compleateſt of any in the World. The new Mural Quadrant, which was at firſt deſigned for obſerving towards the North, being ſtill of more exquiſite Workmanſhip than the former, is accommodated for Obſervations towards the South. This Obſervatory ſoon became famous from Mr. *Flamſtead*'s Obſervations being found to be the moſt accurate of any made at that Time by others.

Mr. *Robins*'s Reputation being now arrived at its full Height, neither his Backwardneſs in puſhing his Fortune, that conſtantly accompanied him, nor his inflexible Honeſty, that never permitted him to approve of the unwarrantable Actions of any Faction, being no longer able to prevent his Preferment, he was offered the Choice of two very conſiderable Employments. The firſt was to go to *Paris* as one of the Commiſſaries for adjuſting our Limits in *Acadia*; the other to be Engineer General to the *Eaſt-India* Company; whoſe Forts being in a moſt ruinous Condition, there was wanting a very capale Perſon to put them into a proper Poſture of Defence. This latter he accepted, as it was ſuitable to his Genius, and where, he believed, he ſhould be able to do real Service, as not being liable to be hindered through the Suggeſtions of Deſign or Ignorance, which by their Boaſting and Importunity, often inſinuating themſelves into the Direction of public Affairs, frequently render abortive the beſt concerted Schemes.

The Company's Terms were both advantageous and honourable: There was ſettled upon him 500 *l. per Annum* during his Life; on Condition that he continued in their Service five Years. He was alſo entruſted with the Appointment of all that were to be employed under him; and ſuch an Order was made for furniſhing him with what Sums of Money he ſhould think neceſ-

* This whole Life is extracted from Dr. *Wilſon*'s Account of Mr. *Robins* prefixed to the two Volumes of his Tracts, and that *verbatim*, except here and there a Sentence.

ſary towards carrying on the Works he undertook, as was never paſſed on the like Occaſion; ſo great was the Confidence the Company repoſed in Mr. *Robins*'s Integrity as well as Ability; in neither of which did they find themſelves deceived; and, indeed, he acted in all Occurrences, through every Scene of Life, with the utmoſt Generoſity and diſintereſtedneſs; and never offered to undertake any Thing, whereof he was not a perfect Maſter.

He deſigned, if he had remained in *England*, to have compoſed a ſecond Part of the Voyage round the World; as appears from the following Letter, which Lord *Anſon* did Mr. *Robins* the Honour to write to him on that Subject.

DEAR SIR,

When I laſt ſaw you in Town I forgot to aſk you, whether you intended to publiſh the ſecond Volume of my Voyage before you leave us, which I confeſs, I am very ſorry for. If you ſhould have laid aſide all Thoughts of favouring the World with more of your Works, it will be much diſappointed, and no one in it more than

Your very much obliged

Bath, the 22d of *October*, 1749. *Humble Servant*, ANSON.

If you can tell the Time of your Departure, let me know it.

The above Letter was printed not without the noble Lord's Conſent; who, being requeſted to permit, that this Teſtimony might be exhibited to the World of his Lordſhip's Eſteem for Mr. *Robins*, replied in the politeſt Manner, *That every Thing in his Power was due to the Memory of one, who had deſerved ſo well of the Public.*

Mr. *Robins* was alſo preparing an enlarged Edition of his *New Principles of Gunnery*, and as there would have been made great Improvements in what was already publiſhed; ſo the geometrical Part was intended to be added,* as is learnt from ſome Memorandums, he left behind him. From them, alſo, is underſtood, that he had the Theory of the Moon under Conſideration.

But,

* See a Geometrical Demonſtration of all the Propoſitions in this Treatiſe of GUNNERY in our INSTITUTIONS from Page 2027 to 3138, which was drawn up ſoon after that Book was publiſhed.

But, having provided himſelf with a compleat Set of aſtronomical and other Inſtruments for making Obſervations and Experiments in the *Indies*, he departed from hence at *Chriſtmas* in the Year 1749, to the great Sorrow of all his Acquaintance. This however was, in ſome Meaſure, alleviated, on Account of the Benefits the Public might receive from his preſent Situation in Life, and by the Hopes of ſeeing him return ſafe with Honour to his native Country. Not leſs ſenſibly moved was Mr. *Robins* at quitting the agreeable Society of his dear Friends, to many of whom he had been ſtrictly united from his firſt coming to this Place.

In the Voyage, his Ship was very near being caſt away; but he arrived at the *Indies* on the 13th of *July* 1750.

There he immediately ſet about his proper Buſineſs with unwearied Diligence; and he compleatly formed Plans for *Fort St. David* and *Madras*. But he lived not to put theſe in Execution. For the great Difference in the Climate was beyond his Conſtitution to ſupport; which was always delicate, though till then, he ſcarce ever had a Fit of Sickneſs.

In *September*, 1750, he was attacked by a Fever, out of which he recovered; but about eight Months after he fell into a languiſhing Condition, in which State he continued to his Death. When he had Reaſon to believe, that was not far off, he expreſſed himſelf diſpleaſed the Phyſicians had not made him acquainted with his real Caſe ſooner, that he might have loſt no Time in Expectation of recovering; and even then he exerted himſelf as much as poſſible in the Duty of his Office, expiring at *Fort St. David* the 29th of *July*, 1751, with his Pen in his Hand, as he was drawing up, for the Company, an Account of the Poſture of their Affairs.

This Account of *Mr. Robins* is given us by his Friend Dr. *Wilſon*; but it is always deemed equitable to hear both Sides, in Caſes where very different Characters are given of the ſame Perſon; for this Purpoſe the Reader is referred to the Polemical Tracts between Mr. *Robins* and Profeſſor EULER, BERNOUILLI, and others abroad; and Dr. JURIN, Dr. SMITH, *&c.* at home, for his unprejudiced Opinion of this Writer.

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