

A method of studying physick. Containing what a physician ought to know in relation to the nature of bodies, the laws of motion ... and the properties of fluids: chymistry, pharmacy, and botany: osteology, myology ... and dissection: the theory and practice of physick: physiology, pathology, surgery, diet, etc. And the whole Praxis medica interna; with the names and characters of the most excellent authors on all these subjects ... their best editions, and the method of reading them / Written in Latin ... Translated into English by Mr. Samber.

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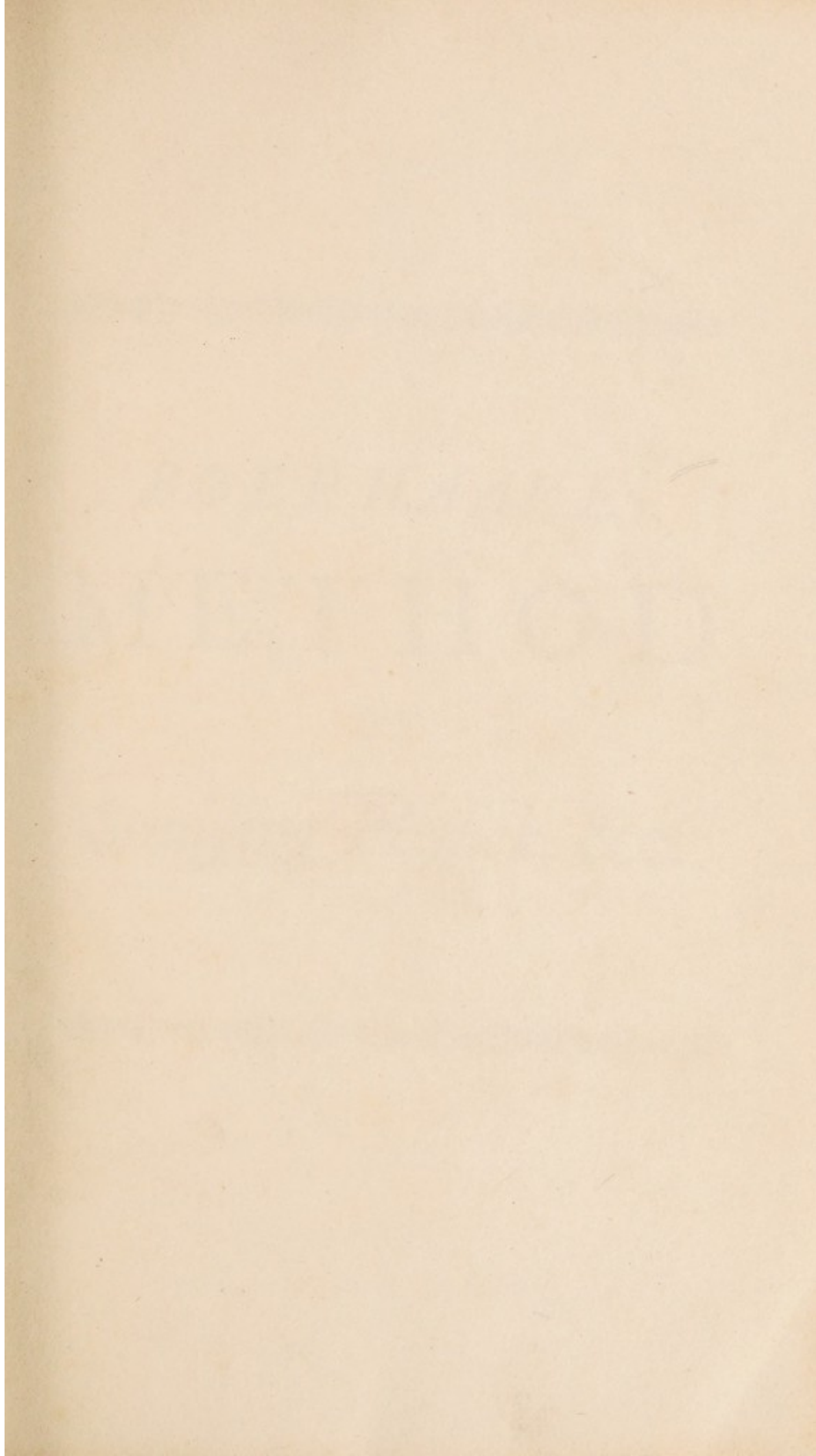
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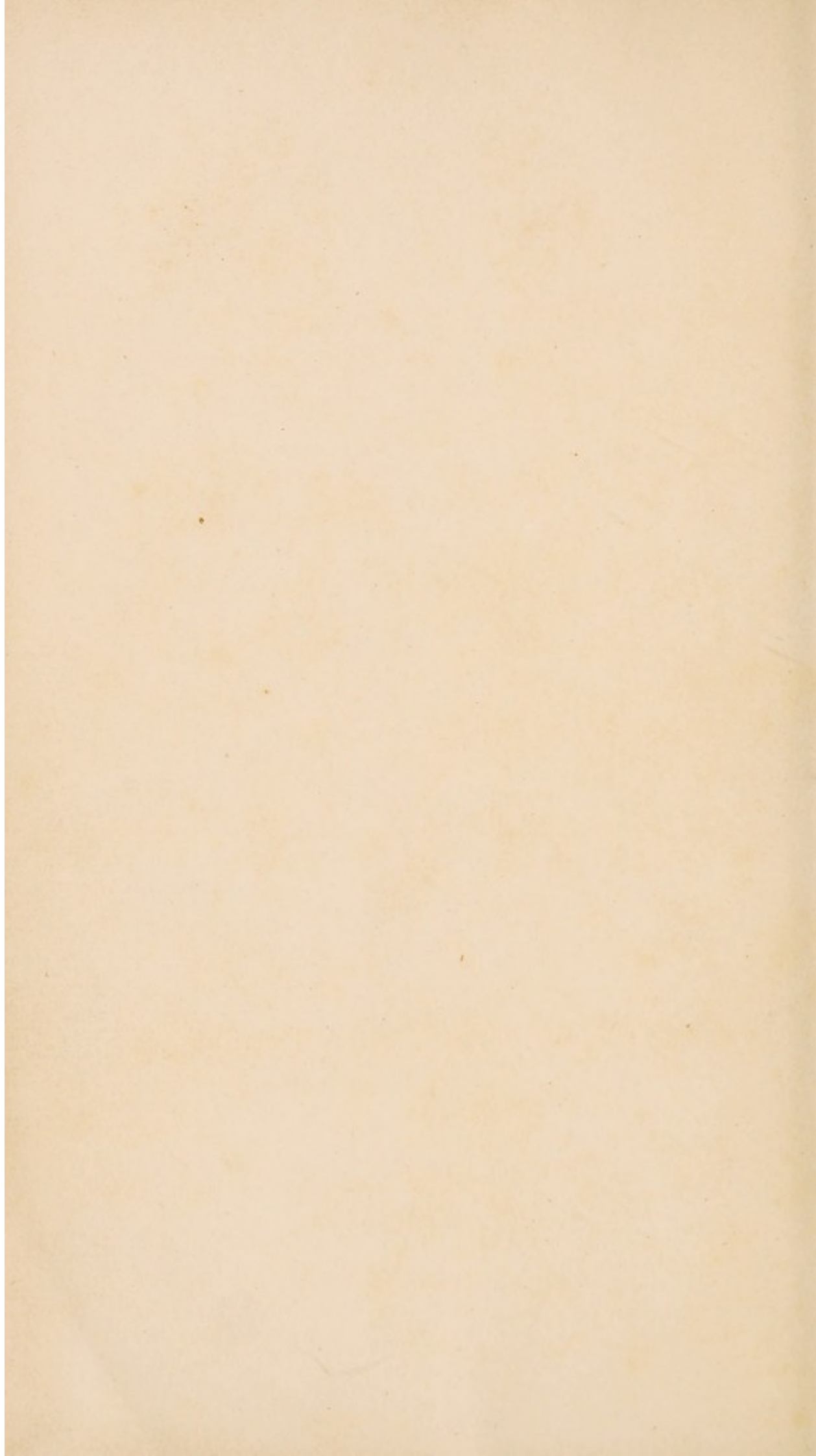
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OF
Studying Physick, &c.

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METHOD

OF

Studying Physics, &c.

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A
METHOD
Index OF *Prop*
Studying **PHYSICK.**
 CONTAINING

What a Physician ought to know in Relation to the Nature of Bodies, the Laws of Motion; *Staticks, Hydrostaticks, Hydraulicks*, and the Properties of Fluids: *Chymistry, Pharmacy and Botany: Osteology, Myology, Splanchnology, Angiology and Dissection*: The Theory and Practice of Physick: *Physiology, Pathology, Surgery, Diet, &c.* And the whole *Praxis Medica Interna*; with the Names and Characters of the most excellent Authors on all these several Subjects in every Age: *Systematicks, Observators, Operators, &c.* their best Editions, and the Method of reading them.

Written in *LATIN*

By the Learned HERMANN BOERHAAVE,
 Now Professor of Physick in the University
 of *LEYDEN*.

Translated into English by Mr. SAMBER.

*Medicum creavit Altissimus. Altissimus creavit de Terra
 Medicinam. Eccles. cap. 38.*

L O N D O N:

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THE
PREFACE.

THOUGH I am not much in Love with Prefaces, I find my self at present under a Sort of a Necessity of doing that for which I have so little Inclination.

This Treatise was written in Latin by the incomparable Boerhaave, Professor of Physick in the University

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versity of Leyden, for the Use of the Students in that Science, who came to his publick Lectures.

I shall not presume to draw the Character of this Great Man; he has sufficiently done it himself in the ensuing Treatise, which discovers him to be a Person of the profoundest Judgment and Penetration, of prodigious Reading; and whose excellent Qualities shine in too bright an Orb to receive any Lustre from me, should I be so vain as to attempt it. There is an Air of Modesty runs through this whole Work, which seems Genuine and Natural; his Criticisms are just, with a great deal of good Humour; and his Impartiality appears in Condemning his own INSTITUTIONS, as I shall take Notice of by and by. When therefore he commends the English Philo-

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Philosophers and Physicians as the best in the World, and has taken Care to make honourable Mention of them in this Treatise, he must undoubtedly meet with a generous Reception from them, for those Honours he believes he has justly paid them, and which they are Persons of too much Gratitude not to acknowledge.

I could say a great deal here if I loved Prolixity; but I shall therefore content my self.

1. With relating the Motives which occasioned the Publishing of this Book in English. And

2. I shall endeavour to obviate some Objections which possibly may be raised against it.

The Motives which occasioned the Publishing of this Book in English, are its Excellencies and general Usefulness, which any Gentle-

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man, who will please to read it with due Attention, will soon discover.

I shall not here launch out into extravagant Encomiums, (a Fault which Authors are too frequently guilty of) upon that divine Science which does not want it, and which does not only make a Man in some Sort Arbiter of Life and Death, but qualified to govern Kingdoms. It is well known that the greatest Princes in the World have had Recourse to their Physicians in Affairs of the highest Importance. Not to mention Alexander the Great, (who held Aristotle in the highest Honour) and several other renowned Princes; we have a famous Example of this Truth of late Years in the incomparable Hermann Coryngius a German, who was called from the Professor's Chair

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Chair at Helmstadt, to be a Minister of State in the Empire.

*The Son of Sirach * tells us, a Physician demands our Honour and Respect for those Benefits we may receive from him, as being created by the most High; that he shall receive Honour from Kings; that his divine Skill shall lift up his Head, and that Great Men shall stand in Admiration of him.*

And indeed it is impossible that it should be otherwise, for, what great Things is not such a Person capable of, I mean, he who is well acquainted with Physick in all its most useful Parts, that knows the secret Workings of Nature, the Dispositions and Inclinations of Men, the Influences † the Sun and

* Eccles. cap. 38.

† Page 96.

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Planets have on human Bodies, and can thence give Judgments and presage Events? Without which it is impossible to be a perfect Physician. But—of this no more, of these Things the World is not worthy, and wise Men keep them to themselves.

There have been several great Men who have written De Consilio Medico; the famous Coryngius, whom I just now mentioned, put out a Treatise at Helmstadt in the Year 1654, called Introductio ad Universalem Medicam. Schellamer afterwards put out this Book with excellent Notes at Spiers in Quarto, in the Year 1688, where you will likewise find Gaspar Bartholin's Treatise De Studio Medico inchoando & continuando; as also the Consilium Medicum of Peter Castelli.

Vander

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Vander Linden's *Manuductio ad Medicinam*, and Rhodius's *Introductio ad Medicinam*. Lypenius likewise put out his *Bibliotheca Medica in Folio*. But they are all inferior to this present *Treatise of Boerhaave*; for surely the best *Method of acquiring any Science*, is that which is the easiest.

A good *Method of Study* is certainly of the highest Consequence; how many a bright Genius at first setting out in his Studies has been ruined by beginning at the wrong End, or the ill Choice, or too great a Multitude of Books, and has dipp'd into a great many without digesting any one: This has crowded Peoples Heads with an Infinity of unshapen confused Ideas, and has plunged them into such endless Labyrinths that they have not been able to extri-

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extricate themselves as long as they lived.

To remedy this Inconvenience, Boerhaave wrote this Method, which he dictated in publick to the Students in Physick in the University of Leyden (and I could have wished our Universities had thought fit to have kept up this good old Custom) and here a Gentleman may not only know where to begin his Studies, what is pre-required thereto, but how to chuse his Books, and in what Order they are to be read; a Work so admirable, that a learned Doctor was pleased to say, it was the Physicians Dictionary. And indeed this Book, not only Beginners, but Doctors themselves may make use of in erecting their Libraries; for which End I have added to it a copious Index, shewing not only the Titles of the several

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ral Books recommended by this great Man in this Treatise, but their best Editions, and I am well satisfied this Book will, by its Directions, make a great Physician, and save a Man at least seven Years time in his Studies.

But this Work is yet farther useful, it is not only worthy the perusal of those who addict themselves to the Study of Physick, but of every Gentleman. For though all Gentlemen do not study Physick, it is however a Qualification for all Gentlemen to understand the Principles of Natural Philosophy, the Proprieties of Bodies and Mechanicks, the Knowledge of which Persons of the highest Rank have not thought beneath their Quality; which is so useful to them in Architecture, Gardening, Agriculture, erecting artificial Fountains, &c.

In

The Preface.

In this Book are mentioned the best and most celebrated Authors on Mechanicks and Experimental Philosophy. It being then a Treatise of universal Knowledge, it certainly cannot but meet with a kind Reception from the Learned and Curious, and may therefore be allowed to display its Excellencies in English.

This is the least we can do, were it only in Gratitude to him for the Honours he justly does the English Nation, especially our Physicians and Philosophers.

*What Encomiums does he give of Harvey, Willis, Glisson, Wharton, Sydenham, &c. Sir Francis Bacon, Boyle, Wallis, and the Glory and Phenix of our Age, Sir Isaac Newton, who (as this Author very justly observes *) is*

* Page 98. line 20.

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the Prince of Philosophers, and knows as much as all Mankind together. And their Characters he gives without the least shew of pompous Expression, or extravagant Eulogy, but with that Air of good Humour and Modesty, as makes his Sincerity unsuspected.

A Specimen of this great Man's Modesty you find in Page 320, where discoursing of Dr. Bennet, he owns he has had often Recourse to his Works, when he was doubtful what to prescribe to his Patients; as also in Page 271, where he condemns his own Institutions as being written in Haste, and no ways pleasing to him.

2. I shall endeavour now to obviate some Objections which may possibly be raised against this Work.

It

The Preface.

It may be said, That this is the way to make Quacks, and render the Profession contemptible and common.

*No Man certainly upon serious Reflection will think this any material Objection. I am sure it is as Ill-natured as Unreasonable. This is exactly what Boerhaave himself in this Book takes Notice of in * Bartholin, who was very much troubled, that the famous Anatomist Michael Lyserus put out his Book of the Order of Dissection for the use of his Scholars, because it too much discovered his own Profession.*

Nor can Books of this Nature encrease the Number of Quacks; on the contrary it will confound their Ignorance, and rather frigh-

The Preface.

ten them from the Practice of what they so little understand, when they shall see how much Time and Reading, and what Share of Learning is absolutely necessary to perfect a Physician.

It cannot be denied that France has produced very learned Men in the last Century: Men who understood Latin perfectly well, and yet they rather chose to write in their own Tongue, though on several Subjects of the greatest Speculation in Divinity and Philosophy.

The celebrated Controversy De la Perpetuité de la Foy, (which made so great a Noise all over the World) between the famous Antagonists, Monsieur Arnaud Doctor of the Sorbonne, and Monsieur Claude Minister of Charenton, was entirely carried on in French.

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Monfieur L'Abbé Marriotte wrote his *Treatife of Hydroftatics* in French (now translated into Englifh by Mr. Defaguliers) Le Clerque, his *Ofteology* : Tournefort his fine *Treatife of Plants* ; and feveral others I could mention, who wrote all in French. Nor did they apprehend in fo doing, they rendred the refpective Subjects they treated on Common or Contemptible.

It is true, they might have publifhed them in Latin, for thofe Subjects could not be well underftood but by Perfons well acquainted with that Language ; but they confidered notwithstanding, that there is no Gentleman whatfoever, that underftands Latin ever fo well, but is rather pleafed with Treatifes (efppecially ufeful ones) in his Mother-Tongue.

I muft

The Preface.

I must confess, this Method of our Author's cuts the Study of Physick very short; but I hope that is no manner of Objection: Men cannot be too soon acquainted with so excellent a Science which teaches them the way to conserve so valuable a Thing as Human Life, a Thing the most frail and brittle in the World. There is no Fear of being too knowing in this Respect; there are every Year new Distempers, nor can it be otherwise while Men indulge themselves in so much Inactivity and Luxury; there will therefore of Consequence be always fresh Subject Matter for the Learned in this Divine Science, who need not want Employment of Thought. And when all is done that can be to render it as Compendious as possible: This is an Axiom of eternal Truth, ARS LONGA VITA BREVIS.



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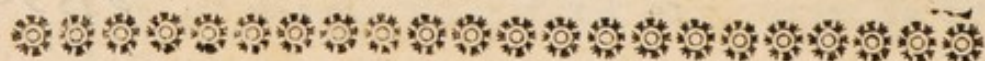
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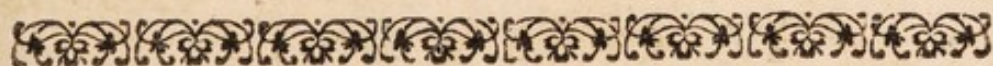
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BOERHAAVE's
METHOD
OF

Studying Physick.
In FOUR BOOKS.

BOOK I. PART I.

CHAP. I.



HAVING at last resolved with myself to examine after what Method, and by reading what Authors this Science of Medicine or Physick may be acquired, and what is its present State and Condition in the World, I shall in the ensuing Treatise shew you,

B

2
m i. What

1. *What Discoveries are look'd upon at this Day, as incontestable and undoubted Truths.*
2. *I shall tell you the Names of the principal Authors, who have been an Ornament to this Science in its respective Branches, and who have made any remarkable and useful Discoveries therein ; and,*
3. *I shall give you my Advice how, and after what Method, these Authors are to be read.*

I. Now *Phyſick* (or *Medicine*) is nothing else but a Science, teaching how to conſerve the *Life* and *Health* of a *Human Body*, and reſtore to it *Health* when abſent.

From this Definition it neceſſarily follows, that he who is willing to attain a competent Knowledge in *Phyſick*, muſt chuſe ſuch a Method as may bring him to his deſired End ; and therefore it as neceſſarily follows, that Authors who have written on this Subject muſt be carefully read by him ; ſo that nothing worthy Obſervation, or what may make for this Science, may eſcape his Notice.

II. This Science then teaches a Man eight Things,

1. *It*

1. It teaches him what is a Body.
2. What is a Human Body.
3. What is the perfect or entire Life of a Human Body.
4. What is imperfect Life.
5. What is entire or perfect Health.
6. What is prejudicial or detrimental to a healthy Body.
7. What Helps and Remedies this Body stands in need of to repair and conserve its Life and Health; and,
8. After what Method they ought to be made use of in order to establish and procure Life and Health; that is, their certain Dose, fit Time, and just Order and Proportion.

While I explain to you this Science, and what is its Object, Drift, and Scope in discovering the Construction and Frame of this Machine, (our Body) it not only shews me what are the *Proprieties* of this our Body, but also what is *common* to it with all other Bodies subject to the Laws of Nature: A Physician therefore ought to have a general Notion or Idea of all this, since in a Human Body some Things are *common* to it with other Bodies, and some Things *proper* only and peculiar to it. A Man in pursuit of this Study must not then imme-

4 Boerhaave's *Method*

diately begin at Anatomy, or any other one Part of Physick: for in so doing he never will arrive to any Perfection, since Anatomy only teaches the Structure of Human Bodies and their Contexture: But a Physician must know the general Dispositions of a Body, and be well acquainted with those Laws and Affections which are *common* to it.

III. He only is said to be a Physician; whose Understanding has gained such Perfection in this Science, that he can practice or exercise it: But to make a Physician these three Things following are required, *viz.*

1. *That he have a good Genius, and well instructed in the Science or Knowledge of Physick.*
2. *A Readiness or Promptitude to exercise his Science. And,*
3. *That he exercise it for the Benefit of the Sick.*

IV. A Physician therefore ought thoroughly to know those eight Theorems before laid down in the second Paragraph, which are there described, as necessary for him to know. For he who desires to be a Physician, ought first of all to know what
is

is a *Body, Life, Health, &c.* before he can be capable of practising that Science.

V. Now of all these eight a *Body* is the Principal, and therefore the perfect Knowledge of a *Body* ought to be our young Students first Care. And by a *Body* I mean a *sensible Substance endued with certain Proprieties*. He therefore ought to be acquainted with all those Proprieties which are in all Bodies whatsoever.

All Bodies have in them some things which are in all Bodies, and these are what are said to be *common* to all Bodies.

They have likewise in them some things which distinguish them from other Bodies, and which are only *proper* and peculiar to those Bodies : Distempers therefore equally arise from what are *common* and *proper* to Bodies. If a Man falls down Stairs he will be bruised, and this Malady is *contusive*, so called from Gravity, which is common to all Bodies ; a Body therefore may be affected with that which is common to another Body. But he who begins his Studies by Anatomy will never know this ; the same is true of all Parts of a Body ; so that the vital, natural, and animal Functions, and the other Proprieties of Bodies, equally depend on what is *common* to all, and what is *proper* to some Bodies.

VI. For all these are to be met with in a human Body, since they are *common* to all Bodies.

Thus a general Knowledge is required, that a Man may know what a Body in general is, and that he may find out all the Proprieties of his own Body.

But perhaps it may be said, this Study is fit for the Schools, and out of the Sphere of Physick; however, it is what a Physician ought to be acquainted with, that he may know all the Proprieties that are in all Bodies.

VII. These Generals, or Things common to all Bodies, are almost infinite, but yet may be reduced under three general Heads. Consider Natural Philosophy and the Mathematicks, and you will find there is almost an Infinity of Things which are common to them with other Sciences.

1. *The first of these Heads explains the common Idea of all Bodies in general; and this is called Corporeal Science.*

2. *The second will shew what Ideas are impressed in the Intellect, when the Mind has any Conception of whatever Changes or Alterations a Body undergoes; and this is the Idea of Motion. And,*

3 *The*

3. *The third explains those Laws or Rules by which the Nature of things (or God) acts in those Changes or Alterations affecting Bodies, (hinted at in the foregoing Heads;) and this is the Object of Physicks, or Natural Philosophy.*

VIII. From whence it follows, that a Physician, if he would arrive to any Perfection in his Science, should begin his Studies by contemplating those things which are most general in that Science. However, if he sticks only at Generals, his Life will slide away before he can attain to any Knowledge in Physick; it will be sufficient therefore for him in this Acquisition only to know the general Attributes, Affections, or Dispositions of a Body.

Our young Student in Physick should therefore lay a firm and regular Foundation of his Study in a strict and diligent Search and Inquiry into these three Heads I just now mentioned.

IX. We will therefore shew, in as compendious a manner as possible,

1. *What are these three Heads.*
2. *How they may be known.*
3. *Who are the best Writers, or Authors, who have treated of them. And,*

4. *In what Order or Method these Authors are to be read.*

X. I shall here inquire after what manner a general Idea or Conception of a Body is formed in the Mind.

A general Idea or Conception of a Body is formed in the Intellect or Mind of any one, when he considers all what he knows and perfectly understands of a Body. For a Body (as I have before observed) has some things which are common to it with all other things, and has some things which those other want. If therefore a Man collects all those several common things together, and reduces them into one Conception or Idea, he will unavoidably form a general Conception or Idea of a Body.

The Mind or Intellect conceives many things in Bodies ; as that some Bodies are soft, hard, heavy, extended, divisible, diaphanous or transparent, sonorous, moveable ; it likewise conceives, that in some Bodies some things are always present, some things at one time present, at another time absent ; but when a Man retains all those things which are always present to a Body, and are common to all Bodies, he has then a general Idea of all Bodies ; for Example, I consider Water and Marble, I find they
both

both have Parts which are measurable and gravitate ; I consider also that Water has moveable Parts, and that they are transparent ; that Marble on the contrary is an opacous, hard Body, and its Parts are close and immoveable : Since therefore these last Proprieties do not agree with both these Bodies, I cannot conclude they are common to both ; but as the former are always present to every Body whatsoever, I therefore conclude they are common to every Body whatsoever.

XI. If our young Student follows the Method set down in the preceding Paragraph, he will find that in the general Idea of a Body are comprehended these four things.

1. *Extension.*
2. *Impenetrability.*
3. *Figurability.*
4. *Mobility or Moveableness.*

If a Philosopher and a Physician examines what Idea is common to all Bodies, he first of all proposes to his Mind all things which he knows of a Body ; and amongst these finds there are some which are always, and some which are not always in other Bodies ; and these he will call *Accidental*

dental Proprieties. But his Drift and Scope being to inquire into those which are common only, there is no necessity in this Inquisition to have recourse to *Accidental Proprieties*: He therefore takes notice only of what are common, and of them forms his Idea; then finds that four things common to all Bodies come into that Idea, of which if one be wanting, the whole Idea of a Body is destroyed.

1. *The first Propriety of a Body is Extension and Measure; but when I say a Body is measurable, I presuppose it extended; now every thing is extended whose constituent Parts adhere one without or beyond each other.*
2. *The second Propriety of a Body is Impenetrability, which excludes the Congress of two Bodies in the same Space, or one Body to enter into another. For Example, consider whether two square Stones of equal Dimensions will occupy no more Space, if laid together, than one of them by it self.*

I say *Extension* is the first Propriety of a Body; for a Body cannot be impenetrable, unless first extended, which is plainly evident; for one Body cannot exclude another from the same place itself is in, unless

unless it be extended; if therefore you take away Extension from a Body, all things which may be affirmed of that Body are likewise destroyed, viz. *Impenetrability*, *Figurability*, &c. It is therefore highly requisite that we have an exact Idea of Extension in every Body.

But if *Extension* is the first, it is as certain *Impenetrability* is the second Propriety. For it cannot be conceived, how one Body perfectly solid, should enter into another Body perfectly solid in the same Space, so that it should be but as one Body; that is, occupy no more space than one Body. Now since there is no difference of this in the Idea of any Body, it will be true in every Body whatsoever.

3. *The third Propriety of a Body is Figurability, which is a describing the Limits of a Body; for where-ever a Body ends, it finds there its Limits, which constitute its Shape or Figure. Limitations, in a Superficies or Surface, &c. are called Limits Mathematical, Fines Mathematici.*

4. *The fourth is Mobility or Moveableness, which is a Power of being where-ever another Body is absent; and whatever Conception or Idea you have of Motion, it is certain you may conceive a*
Body

Body to be now in one Place, and now in another; to be now here and now there.

Hence it evidently follows, that a Physician, after he has thoroughly examined every thing that may be said of a Body, will not with *Descartes*, lay it down for an undoubted Truth, that the Nature of a Body essentially consists in *Extension*; but rather that *a Body is a thing extended, impenetrable, figurable, moveable*; for no Man in the World ever knew what a Body essentially is but only its Proprieties, and therefore the *Aristotelian* Definition of a Body (*viz.* Triple or Trine Dimension) is not perfect; for a perfect Definition requires a perfect Notion or Idea of the thing defined; but if there are more Proprieties than one in any thing, they ought to be mentioned in the Definition of that thing.

And therefore in Physick, the first Subject of all is, that we know what *Extension* in a Body properly is, what *Impenetrability*, *Figurability*, and *Mobility* or *Moveableness*.

XII. Of these four Proprieties, that which is the Foundation of the rest, and consequently what is first in our Conception,

tion, is CORPOREAL NATURE, or the Nature of Bodies; all other things which are contained in that Idea are called Corporeal Proprieties.

We see then that no one can have any Idea of a Body, but must at the same time have an Idea of these four. The Question now is, which of these is in *reality* the first; I do not say, which obtains the first Place as to Order, or in our *Conception*; but which of these four Proprieties, exclusive of the other, is in *reality* the first existing in a Body. Let us then see what may be said of *Mobility* or *Moveableness*; but that will not take up much time to determine, for a Body must first be extended before it can be moved. The same may be said of *Figurability*; for Figure supposes Limits, and therefore somewhat precedes Figure, and consequently Figure cannot be first; or can we conceive *Impenetrability* or *Extension* to be *really* separate from, or exclusive of each other? No, the most simple Idea then which we can have of a Body, is, that it is *a Thing extended and impenetrable*.

A Physician therefore lays down this as a fundamental Truth, that a Body is extended and impenetrable; but all other things that it comprehends, if they are inseparable from it, are called PROPRIETIES;

TIES; if separable, ACCIDENTS: I conceive, for Example, a Sphere, and that to be extended, and impenetrable, but take away these, and the Sphere is destroyed. I likewise conceive it to be Figurable and Moveable, but these may be changed, and therefore are Accidents; for Site does not depend on the Nature of a Sphere, but from other Causes, viz. circumjacent Parts, and therefore may be either present or absent.

XIII. The true Definition then of a Body is, that it is *a Thing extended and impenetrable.*

XIV. And its individual Proprieties are *Figurability and Mobility.*

XV. EXTENSION is *a Position of Parts (compounding or constituting the whole) one without or beyond each other,* and is measured from one Point by three Perpendiculars mutually cutting each other in the same Point. It is a Demonstration in *Euclid*, that from a Point given on a Plain, it is impossible to draw from thence more than two Perpendiculars; and therefore every Plain or Superficies is only measurable by two Perpendiculars, viz. Length and Breadth; and hence every Plain or Superficies is call'd
double

double or two-fold Dimension ; this being allow'd, if a Point be not taken from the Superficies, but from the Space within, then in such Case there can be no more than three Perpendiculars, as is evidently demonstrated in *Euclid*.

All Extension therefore is measurable after a triple or three-fold manner, as *Galileus* very well concludes : For whatever thing I conceive to be corporeal has these three Proprieties. A Cube is a Body terminated by six quadrate Superficies, and by these all corporeal Space is measured ; the Sides are call'd respectively either Length, Breadth, or Depth. If therefore by these we measure all Bodies, when we come to know these, we know all Extension, and consequently all Bodies.

From the Nature of Extension follows *Divisibility*, because to be extended signifies to have Parts standing out of other Parts, and consequently *Divisibility*. If I take a Line, and divide it never so much, I shall never divide so much that I can divide no more ; and if I could, yet the extreme Parts would be extended. Every Line therefore is not composed or made up of Points but Lines, nor every Superficies of Lines but of Superficies, and a Cube of other Cubes *in infinitum*.

XVI. IMPENETRABILITY is the Idea of *Extension* together with an infinite Resistance of one impenetrable against every other impenetrable, which strives to come into the same Space with that impenetrable.

Suppose you clasp both your Hands together, and imagine in the Space between them there is plac'd an impenetrable Body : If then a second Body would come into that Space occupied by the first, and the first Body resist it, it will be impenetrable by any (tho' an infinite) Force. If it gives way, it will be condensable, because of its Rarity and Porousness : But a perfect Solid, if its whole Nature makes use of all its Power, cannot give way, because it is impenetrable ; as long therefore as Impenetrability remains, the same Extension will remain. But if a Body gives way as to one half, one half of it will be impenetrable, and the other condensable. And thus, if a Grain of Gold be supposed to be in the very Centre of the World, if then it be press'd by every *Radius*, and reduced to half as little a Space as it was before, it cannot be said to be impenetrable, but condensable as to one half, and impenetrable as to the other.

XVII.

XVII. Every thing therefore which is impenetrable is extended, but every thing that is extended is not impenetrable ; for what is impenetrable occupies a Place in such manner that it resists with infinite Force : It occupies a Place, therefore it has Parts standing out of each other.

If you seriously reflect on this, you will find the Ideas of Impenetrability and Extension are distinct Ideas. If, for Example, I hold between my Hands a Body most solid, which is thence taken away, and no other Body come in its Room, no Absurdity can follow, if I conceive the same Extension ; but yet it cannot be said I conceive another Body to be in the same Place ; we see then that the Idea of Extension does not involve, or imply Impenetrability.

XVIII. Every *Impenetrable* therefore will be found to be *measurable*, and consequently *divisible*. *Measurable* is that in which may be assigned a certain equal Number to be in measuring : To measure therefore is to assign how often a Measure can be apply'd in measuring ; and consequently every thing that is *impenetrable* is *measurable*. But Measure supposes Extension or Parts, and since one Part of it can be conceived to

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stand

stand out of other Parts, it is certainly *divisible*.

XIX. Every Impenetrable therefore may be divided into infinite lesser (and always divisible) Parts. Now every Impenetrable, as we see in the foregoing Paragraph, has divisible Parts, but these again have (as we suppose) their ultimate or extreme Parts either separate or not; if not, then two Parts, if they are join'd together, will penetrate each other, or all the same Surfaces will meet together, which is absurd: Therefore again, I say, they have Parts; but if they can be united in their Substance, then I conceive it to be one Thing, not to be two Parts, and therefore I call it one Thing. Again, I conceive a Body composed of 100000 Parts, if I consider two of them, and they mutually penetrate each other, they are only one Thing; if four, and they penetrate each other, they are but one Body, and so *in Infinitum*. Therefore every impenetrable Body is compounded of infinite extended impenetrable Parts, that is, no Body whatsoever loses its resisting Force or Power.

XX. Every Body therefore stands in need of some Cause to make one impenetrable Part cohere or join to another: Every Body
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dy which is impenetrable, is impenetrable in one Part or other, and every Part has its own Impenetrable : Hence the Idea of *Impenetrability* and *Extension* implies nothing but a Position of one Part next another.

Cohesion is such a Contact which is repugnant to Separation ; if I have two Bodies, one existing here and another at the same Part, there is a *Cohesion* between these two, and I cannot move one without moving the other, so closely are they united ; therefore they cohere or stick together : The Idea therefore of *Cohesion* is not included in the Idea of *Impenetrability* or *Extension*. As often as in any Idea I conceive another Thing which does not belong to it, I ought to call in to my Assistance a second Idea ; and if that is not enough, a third, &c. For Example, if I conceive a Triangle to have three Angles, and that it is moved, tho' I conceive the Cause, yet that Thing is said to want a Cause.

Hence between Sir *Isaac Newton* and the *Cartesians* has arisen this Question, Whether the Idea of *Cohesion* is any wise imply'd in the Idea of *Extension* and *Impenetrability*?

XXI. This Cause of *Cohesion*, a Thing
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the most unknown in the World, we call *Unity*, *attractick Virtue*, or *Elementary Virtue*, or what else you please : But these are the Effects, not the Cause of *Cohesion* ; for no Body can be said to be really one, since every Body is compounded of two Parts, or *Moieties* : Since therefore the first Body lies immediately next the second, I shall distinguish this Cause by some Name, either by that of *Unity* with *Democritus*, or *attractick Virtue* with Sir *Isaac Newton*.

XXII. The Effect of this we call *Hardness* : A hard Body is that which cannot be separated, tho' several Men forcibly draw it backwards and forwards by different Movements ; but its Parts so cohere, as to resist the Power of Separation. Now if a Body is of such a Hardness as to affect the Senses, it is called *sensibly Hard* : But I challenge *Descartes* and other Philosophers to explain the Nature of Hardness ; for they supposed it to consist in the Rest or Quiescency of the Parts close to each other : But if one Part of a Body is mov'd, it communicates its Motion to the next Part ; therefore its Rest or Quiet is destroy'd, and that Body must be separated. Rest of Parts therefore is an Effect, not the Nature of *Cohesion*. *Bernouille* therefore
and

and others, who have treated of the Nature of Things, suppose Bodies to be hard, without inquiring into the Nature of Hardness.

XXIII. If this Cohesion or Hardness in any Part is such as exceeds all known Power of Separation, it is called an *Atom*, or a Corporeal Element. And for this *Democritus* was falsely accused, as if he did not understand Geometry; though certainly he was the most skilful in that Science of any one whosoever; his Doctrine was, that Nature was so framed, that there were Bodies so closely united as no natural Force could separate and divide them; and this he demonstrated from the Perpetuity of Nature: For there is no Diversity perceiv'd in the Parts of Water, Air, Fire and Earth, and they are never changed in their Essence; they therefore so cohere as they cannot admit of any Change; for if many Things should resolve themselves into the Element of Fire, its Power must necessarily for that Reason be the greater, and Heat in the Earth consequently more intense; but since for almost six thousands Years it has been observ'd, that all Things have been the same, and have had the same Proprieties as now they have; if then the

Seminal Principles were changed, no old Body could ever be renewed like what it now is, but all Things would be quite different : But since almost nothing is destroy'd, you see from all these it follows, that that first Thing in Nature must of necessity immutably cohere, not mathematically, but that there is no Power possibly that can lessen or destroy it ; the true Cause which makes extended and impenetrable Parts thus cohere, is the Order of *Nature*, or God himself its Author.

XXIV. Granting then there be such a Thing as an Atom (described in the preceding Paragraph) or a Body made up of Atoms, if it has its Parts so cohering, that no void Space can come between those united Parts, then that Body or Atom will be perfectly solid. To this the Followers of *Aristotle* and *Descartes* answer, that Extension is the Idea of Solid and Impenetrable. An Atom consists of infinite Parts with intercepted Spaces, and therefore is not perfectly solid. Those little intercepted, or interspersed Spaces between the cohering Parts I call Vacuities or Voids ; if then the Parts so cohere, that there be no intercepted Space, it is perfectly solid, that is, if the Superficies of the Parts are so joyn'd together, that between

tween the Superficies no Space can be admitted, it is even the most simple Body, inasmuch as it is made up of Bodies perfectly solid, without any intercepted Space.

If it be enquir'd by what Measure a Solid is measured? I answer, by that of Space. Suppose, for Example, a cubical Space of one Foot, which a Body wherein there is no *Vacuum* or Void may fill; now Extension alone cannot be measured, for that Body may otherwise be rarified, but an Impenetrable occupies properly that Space.

XXV. If an Atom or Body have impenetrable Parts so conjoyn'd as to admit ~~no~~ little Voids between its united Parts, or if it be filled with other Matter, it is called a porous Body.

Suppose, again, a Cube of one Foot, whose Parts are so united, that one half is solid, the other void, such a Body seems to occupy the whole Space, since it is extended to the whole; but in reality it only occupies one half Part or Moiety: We must not therefore say a Body is so large because it occupies so much Space, but an impenetrable solid Body occupies so much Place, and a porous Body so much: These two being therefore added together it is so large. This is useful in

moving corporeal Powers, because the Quantity of Matter ought to be first known.

Philosophers call an Element a most simple Body, out of which simple Bodies compound Bodies are formed, and into which they are resolved.

XXVI. Sir *Isaac Newton* and *Hugens*, Men that have flourished in our Days, have both discovered, after a different Manner of Reasoning, that corporeal Matter, in whatsoever Space it be, has the same Proportion as a Weight to the Thing it weighs.

Corporeal Mass is all that which we see.

Corporeal Quantity is a Collection of Impenetrables perfectly solid which is in a Mass.

Sir *Isaac* discover'd, that all that which we call interspersed between the Pores is the same as a *Vacuum*. [*Nat. Phil. 3d Part.*] Suppose a Box of a certain Size, either full, or not full of Gold, but perfectly closed, the *Phænomena* or Appearance would be all one: Now as he supposed there was Matter between the Pores in the Experiment, he thought some other Thing ought to effect it, when yet it cannot act; for Example, if between the Cylindrous Pore of Wood, subtile Matter would act, it would put on the Matter

Matter of the Solid ; if therefore such like Bodies can act without it, because only Weight gives Percussion, &c. Hence it appears, that this subtile Matter is not : Wherefore, if I know that one Body of one Foot weighs one Pound Weight, and another Body of one Foot weighs two Pounds Weight, I know there is twice as much Void or *Vacuum* in the former as in the latter. *Hugens* by Experiment saw the same Truth ; but as he was a perfect *Cartesian*, he wrote nothing of this Subject after he had seen Sir *Isaac Newton's* Book ; and therefore he said, that every Thing which weigh'd, or was ponderous, was Mathematically solid.

The Quantity of corporeal, impenetrable Matter in every Space is known by its Weight, so that if we could have only one Body perfectly known to us, we might explain all Bodies, but there is no such Thing in the World : Gold seems to be solid, but it is demonstrated by its Sound, the Microscope, &c. to be porous ; therefore our Science can only be known, inasmuch as it is relative ; and so also the Nature of Hydrostaticks in relation to what Force and Power Bodies have. See the last Line but one in Sir *Isaac Newton's* Natural Philosophy, Part 3d. *Traite de la Pesanteurs* ; pag. 163. by *Hugens*.
Corporeal

Corporeal Quantity therefore is found by finding out its Weight, and the Proportion of the *Vacuum* or Bulk of a Thing shews us what is Proportion.

XXVII. From corporeal Nature therefore may be had the Idea of Diversity.

Hitherto we have seen that an indivisible consists of infinite Parts, which being united by some Power make an Atom, which also has Gravity; and therefore it is evident that extended, impenetrable Matter, formed into certain Parts which cannot be changed by any Power whatever, have a Gravity perfectly proportionate to the gravitating Mass.

Of the Diversity of Atoms.

1. One Atom is not so large as another, if it be divisible.
2. It is not requisite that it be equally solid.
3. The Figure of this Atom may be different from that, and consequently it is not necessary that the Elemental Parts be both alike.
4. One Atom as well as another may be united by a greater or lesser Cohesion.
5. One Atom, or one Body, according to the different Manner of uniting, may under a different Respect be porous,
that

that it may sometimes intercept pores^{es},
and sometimes not.

A three-fold Diversity therefore results from the Elements, which I shall reduce to three chief Heads; *Cohesion* is the only Elementary of which now is the Question; and hence arises *Diversity*, *Density*, and *Porousness* or *Porosity*.

XXVIII. The first Thing therefore that a Physician should know, is the general Idea of a Body; and all those Things which immediately flow from it we have therefore explained:

1. *Extension*,
2. *Divisibility*.
3. *Impenetrability*.
4. *Hardness*.
5. *An Atom*.
6. *Solidity*, or *absolute Density*.
7. *Porousness*, or *Porosity*.
8. *Measure of a perfect and imperfect Solid*.
9. *The triple Diversity of Bodies from the very Nature of Elements*.

XXIX. These nine Articles are the most necessary and useful Fundamentals for Physicians and Natural Philosophers.

A Natural Philosopher is he who knows the Power of Things corporeal, and these depend on Corporiety and Motion, but Corporiety has nine Heads or Generals: Natural Philosophy is therefore contained in these, and of these no one can make any manner of Doubt.

A Physician is he who searches into that Part of Nature which is called a Human Body, and is acquainted with the Powers of a Human Body on other Subjects, and how they again act upon a Human Body. He therefore must understand the Powers of a Body as well internal as external; and therefore,

He who will diligently and in earnest search into these Things must read,

XXX. The Principles of *Democritus* and *Epicurus*, the ancient Philosophy of the *Phœnicians* and *Egyptians*, which he will find excellently well described in *Lucretius Carus*, and which contains what is most remarkable in the Nature of Things.

2dly, He must read *Diogenes Laertius* of the Life of Philosophers, especially the Life of *Democritus* and *Epicurus*: But if he would perfectly know all these, let him read that great Man *Peter Gassendi*, viz. his Commentary upon the tenth Book of *Diogenes Laertius*, put out in a separate Edition

dition in *Quarto*, these three have all what is most considerable in the nine foregoing Articles, but perhaps *Gassendi* alone is sufficient.

But he who has a Desire to penetrate the inmost Recesses of the Mathematicks must read *Sir Isaac Newton*, and *Hugens De la Lumiere*, & *de la Pesanteur*, and these you may find in *Keil's* Introduction to true Physicks or Natural Philosophy.

I have now finished the first Part of the Study of Physick, it remains ~~now~~ that we say somewhat of the Figure of Bodies ; but in this we must have some Recourse to Geometry.





PART II.

CHAP. I.

Of the Figure of Bodies.



WHEN a Physician has known the general and common Nature of Bodies, he will easily know that all Bodies are finite : But this cannot be gathered from the *Cartesian* or *Aristotelian* Philosophy ; for according to *Descartes*, Extension is the same Thing as a Body, and therefore that being infinite, according to him, a Body must consequently be infinite : But by our Philosophy a Body is finite ; and thereupon *Gassendi* had good Reason to ask this Question, *viz.* When shall we come to the Superficies of the World ? If it be finite, what will be beyond it ? Surely Extension ; but according
to

to the *Cartesians* it will be a Body, according to us that Extension is a *Vacuum* or Void : But as a Body is finite it has Bounds or Limits, which are call'd the Superficies, and this extream Part may wear different Forms, or (more properly speaking) *Figures*.

Figure is the extream Shape of corporeal Extension : Or in other Words the Superficies of every Body ; every Superficies therefore, which is simple Figure, has nothing in it corporeal : Superficies is the Extream of a Body, and Figure is only the Superficies of Form. This extream has nothing of Density in it, but encompasses a Body as to Length and Breadth ; simple Superficies therefore is called two-fold Mensurability : You see Geometricians never measure a Body, but the Superficies, and very often its Length only ; a Physician therefore, that he may know what Bodies are, ought to know the Figure of a Body.

II. On the Knowledge of a Superficies depends the Art of measuring corporeal Space ; on the Measure of corporeal Space depends the Measure of Power ; and therefore a Physician who is intent to know corporeal Powers cannot want the Knowledge of the Measure of Superficies.

It

It is most evident from Geometry, that he who knows how to measure a Superficies, from thence knows how to find out what is the Area or Space contained in that Superficies ; he ought also to know the Swiftneſs of a moved Body and its Magnitude : Now as Magnitude depends on a Superficies to be meaſur'd and conſider'd, ſo he who ſtudies corporeal Powers ought to know how to meaſure Superficies ; and thus we ſee the Art of Meaſuring to be uſeful to a Phyſician, which *Hippocrates* alſo well obſerves in his Epistle written to direct his Son in his Studies, wherein he tells him, that he ought to apply himſelf to Geometry before he ſtudied Phyſick.

III. Every Limitation of a Superficies is called Figure by Geometricians : No one can know what is Magnitude, unleſs he knows what is Superficies, which being limited , is Figure : . The Conſideration therefore of Figures is very neceſſary for a Phyſician, and requiſite in every one that ſhall undertake to explain corporeal Powers.

IV. All Superficies are known by knowing firſt the Meaſure of Lines. I ſhall now demonſtrate how every one may eaſily and briefly know all what a Phyſician ought

ought to know in relation of Figures: Now since every Physician ought to know what are corporeal Powers, and consequently Celerity or Swiftneſs and Magnitude; but as he cannot find out what is Magnitude, unleſs he knows what is a Superficies, nor what is a Superficies, unleſs he knows firſt what are Figures, nor Figures without being acquainted with right Lines; the firſt Thing therefore that a Physician ought to know in Geometry, is, what are the Objects of right Lines.

V. But in theſe Lines, as well as in Superficies, and in Bodies themſelves, Geometry conſiders what is,

1. Magnitude.
2. Increase.
3. Decrease.
4. Proportion to other Things of the ſame Kind.
5. Transmutation into other Things of a different Nature, but of the ſame Magnitude; and this is all that Geometry conſiders.

1. If a Geometrician knows what is a right Line, he at the ſame time knows what are a great many; for what *Euclid*, *Archimedes*, and all other Geometricians

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have

have demonstrated, was so done by considering Magnitude or Extension, which comes between given Limits ; a Line is a Point to Lines ; a right Line is a Distance directed between one extream Point and another ; a Superficies is an Extension between four Limits ; I affirm that little Cube to have Magnitude, whose lower and side Superficies I know, which being multiplied by themselves together with Altitude or Depth shew its whole Magnitude, that is, its Extension between six Plains or Superficies.

2. The second Object of Geometry is *Increase* ; for I cannot conceive Extension, but at the same Time must conceive another Extension beyond it, which circumscribes or encompasses my Extension. Now a Geometrician does not make this Extension, but thinks it only augmented, or has a farther Thought beyond the Limits first given. If I conceive a Superficies, I conceive Limits ; if I think farther, I am said to encrease Extension ; but this is not an Addition, but a farther Extension of my Idea.

3. The third Object is *Decrease* ; if any one attentively considers this, he will find that *Increase* is the Multiplication, and *Decrease* is the Division of Lines and Superficies ; for Example, I take one Line,
I assign

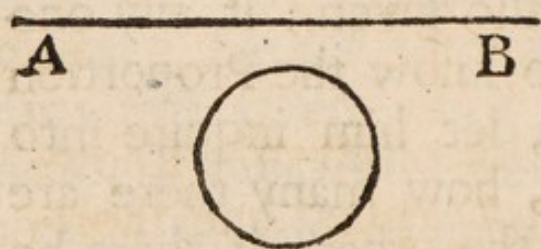
I assign some Parts contiguous to each other, where there are given ultimate Parts, as well from one Extream as from the other; if then a Geometrician divides this Line in three equal Parts, he forms in his Mind an Idea or Conception of three Lines, one of which is a third Part of the whole; but to multiply is when I make this one third Part of a Line three times as much as it self, so that the whole divided Line, consisting of three Parts, be made one whole one; to add and multiply then is to encrease Extension, and to divide it is to diminish or decrease it; for Example, to conceive a lesser Limit.

4. The fourth Object is *Proportion*: Treating of Proportion is the very Marrow of Mathematicks. Suppose a Line given, here is finite Extension; then suppose another Line also given; if any one now would desire to know the Proportion between them, first, let him inquire into their ultimate Parts, how many there are in one as well as in the other; if there be 100 in one, and 50 only in the other, it will be but a half Proportion; which Invention or finding out of common Measure by two Things extended, Geometricians call *Ratio*, that is, Rule or Measure; that is, when two Magnitudes of the same Kind are compared with each other,

what Measure there is respectively between them. Now first Proportion is an Equality of Measure, as when having four several Qualities, I say, as one is to two, so is three to four, and this is called simply by the Name of Proportion. Secondly, Proportion requires that the Quality of Measure be known. Thirdly, how the Thing to be measured contains Measure, and by these Proportion in Things that have Extension is known.

5. The fifth Object of Geometry is *Transmutation*, and this most noble Part is called the Intension or Consideration of Quadratures or Squares. I never heard of right Lines changed into crooked Lines, but on the contrary crooked into right Lines. For if you consider a known right

Line *A B*, and would have me make a crooked Line in the highest Degree, which may be equal to the Magnitude of the



Line *A B*, I then make a Circle, and find the right Line in a Circle; but if you would have me make this right Line equal to the whole Superficies of an *Ellipsis*; it does not appear how these Quadratures or Squarings of right Lines can scarce

scarce possibly be changed into crooked Lines, but it is easily known that crooked Lines are formed of crooked Lines, Surfaces of Surfaces, &c. If any one would change a Quadrate or Square into a Triangle, he may easily see this demonstrated in the Elements of *Euclid*; and therefore the Area of the same Extension will remain, and the whole can only be changed into various Triangles: If a crooked Figure may be changed into a right Figure, its Quadrature is called first of all a Transmutation of a Surface comprehended by crooked Lines into right Lines; but such Quadratures never yet have been found out; and about this Mathematicians busy themselves to this Day; and these five Objects are all that Geometry considers in relation to all Lines whatsoever.

VI. If a Man would come to the Knowledge of these after the easiest and shortest Method, he must first be acquainted with Arithmetick, and the best (tho' not perfectly) of all Authors that I have hitherto been acquainted with, who have treated of this Subject, is *Andrew Taquet*. This Author has put out a Book in *Octavo*, wherein he treats every particular Article after the easiest, and most simple Manner;

but if you would have a larger Work, read a Treatise put out in *French*, in two Volumes in *Quarto*, by C. C. *Prester*, entitled, *Elemens de Mathematique*, where all Things are clearly explain'd, and you may learn it without a Master if you have Patience, and these two Books are sufficient. The Reason why Arithmetick is necessary to be first acquir'd, is, becaule we cannot cast up or compute Measure or Magnitude without Numbers, for measuring is numbering; you ought therefore to learn Arithmetick as far as Multiplication, Division, Fraction, and the Golden Rule, or Rule of Three.

After this read the first six Books of *Euclid*, that is, his *Elements*: The best Edition of these is that of *Furnier*, with *Melder's* Notes; but if you would proceed farther read the fifteen Books of *Euclid* put out by *Barrow*, (but the *London* Edition is by much the most correct;) he was a Philosopher, Physician, Divine, and excellently skill'd in Musick, and corrected and amended all the Faults and Mistakes in *Euclid*: But if you would read these to the greatest Advantage and Profit, you must study at the same time *Clavius* upon the fifteen Books of *Euclid*; that printed at *Rome* is the best Edition, in two Volumes in *Octavo*; but it was a

Misfortune

Misfortune in *Euclid*, that he never observ'd Order ; for Order requires to treat,

1. Of right Lines.
2. Of inflex Lines.
3. Of crooked Lines.
4. Of Superficies : And,
5. Of crooked Figures ; but first of Triangles ; for by Triangles all other Superficies are measured.

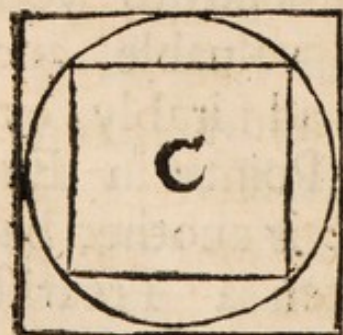
If to these you add whole and broken Numbers, &c. you will know all that is contained in this Book, and may proceed without a Master.

If you make use of this Method in your Studies, I would advise you likewise carefully to read a Book put out at *Paris* by *Bernard Lami* (*Prete de l'Oratoire*) Priest of the Oratory, in *Octavo*, in the Year 1655, entituled, *Elemens de Geometrie ou Traite de la Mesure de Corps*. This Book I particularly recommend to you, for it is most excellent and valuable, and really a *Golden Treatise*, admirably explaining the most material Points in *Euclid*, *Archimedes*, &c. There is another besides *Lami* that has written a *Treatise* in the same Method, but it is very defective and full of Mistakes.

VII. Figures (or corporeal Superficies) curved and irregular are understood by appointed Plains, and are thereto reduced; so that if you know the former, you understand the latter.

Superficies is the Extreame of a Body divisible according to Length and Breadth: Figure is a limited Superficies which gives Shape or Form; a plain Figure is that to which a right Line every way applied has Congruity or Agreement, when the Superficies of a supposed Line does not any wise emerge, but lies close and contiguous; a swoln or gibbous Figure is a Superficies not plain which winds round like a Sphere, for in this a right Line applied does emerge, that is, does not touch in all Parts, but in one Point only.

All curvilineal Figures are measured by right Lines in such manner as the ancient Geometricians made use of. Imagine a Circle, the Centre of which is a plain Figure C. I inscribe a Square, and say this Square is less than the Circle: I then circumscribe a Square, and say this Square is larger than the Circle:



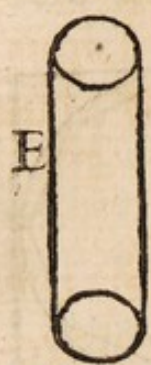
If therefore I find the Magnitude of both Squares, and divide their Difference into two

two Parts, I come nearer to the Magnitude of the Circle. If after this I inscribe an *Octagon* D. and take away the former inscribed Magnitude from the circumscribed, the remaining Difference will be yet less than that of the former,



and I still come nearer to the Circle ; so that at last there will be no Difference at all from the Circle : For I can inscribe and circumscribe so often, that the whole and entire Difference from the Circle will be less than any imaginable Area or Space in the World, as *Archimedes* has evidently proved.

This Part of the Mathematicks begins after that which I have explain'd ; now as I have not only discoursed of right Lines , but have hinted to you somewhat of curvilinear Figures, and that these are either plain or gibbous, you must know that plain Figures cannot be measured, if you do not do it with exactest Nicety : If there could be Inscriptions and Circumscriptions *in infinitum*, the Difference *in infinitum* would be very small, and this is the Quadrature of Curvilineals.



We come now to discourse of *Gibbous* Figures. Conceive then with me a cylindrical Body *E*, which is formed of two Circles directly parallel, and placed directly one over another, if then there be drawn a right Line from the Superficies of one to the other, and that Line be turned about, there will arise a Superficies, which being circumscribed is call'd a Cylinder, that is a corporeal Figure which includes Space; for a plain Circle does not include Space. *Archimedes* consider'd that Figure which is circumscribed and inscribed in a Circle as a quadrate or Square; a Body therefore which is inscribed in a Cylinder has four Square or quadrate Sides: But if in a Circle there is inscribed and circumscribed a Triangle, then we have *Prisms*; in this Case one Superficies is less than the *gibbous* Part, the other greater: If then I proceed in *Infinitum*, they will be equal to the *gibbous* Figure; and thus is this Figure *gibbous*, as being a Superficies composed of infinite right Lines. Every curvilinear Figure therefore is reduced to a Square; and this is to be seen in a Sphere. If I roll about a Semicircle, I describe a Sphere; if I will reduce its Superficies to Measure, I circumscribe a Cube, and inscribe a Cube; if now I circumscribe and inscribe *ad Infinitum*, they will at last be equal;

equal; so that the Art of Measuring consists in reducing plain Figures to right Lines, and in reducing gibbous Figures to plain ones.

VIII. Whoever attentively considers this will see that the Measure of Space is required to measure Bodies, the Measure of Squares to measure Superficies, and the Measure of right Lines must be found out to measure Squares.

Measure is a known Magnitude, to which other unknown Magnitudes are apply'd to know how many times the known Measure is contained. Every Measure ought to be simple and certain; the most simple Superficies therefore must be measured to measure a Body, and to do this is requir'd the known Measure of a Line: It is therefore requisite that Geometricians know,

1. *The Measure of a Line.*
2. *The Measure of a Triangle.*

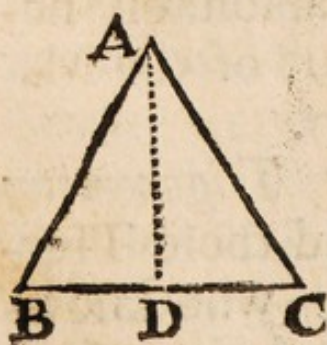
Upon which Account it is absolutely necessary that he learn that Part of the Mathematicks call'd *Trigonometry*.

But you ought to study *Trigonometry* next after you have perus'd those Treatises I mention'd above: He who knows how to measure a Triangle, knows how
to

to measure all Things; let us propose, for Example, a Circle, when I know what Magnitude its Circumference has, I can make a Triangle equal to it. No one can search into the Nature of the Powers of a Body, unless he knows this; for all we know of corporeal Powers must be computed from their Size or Magnitude. All Trigonometry ought from three Things given to find out the rest.

IX. *Trigonometry* consists in this, that from three Things given in a Triangle, all other Things are found out and discover'd.

In a whole Triangle I can consider three different Things, viz. three Lines, three Angles, and the comprehended Space which is call'd the Area; now from three of these seven being given, the rest are found out by Geometry; if you give three Sides, then from *Euclid, lib. 1, Prop. 22*, I know how to find out a Perpendicular on the Basis; if therefore this be known, I



know that if the Basis B. C. be multiplied in Height, or by the Perpendicular A. D. then there results a Parallelogram double to the Triangle: Therefore half of the Product is the

the Area of the Triangle. By the Tables of Sines find out Angles.

If you give me two Sides and one Angle, I know immediately one Angle, and by the Tables of Sines I know the other two.

But from three Angles given I know nothing, because three Angles of a Triangle are only two Rectangles; but if you give me three Angles and one Side, I presently know the rest.

This most noble and excellent Art was found out by the Geometricians, as well as these useful Articles following, viz. that there is a Proportion between the Magnitude of the Side and Angle, and this is demonstrated in *Euclid, lib. 1. Prop. 18*. In every Triangle the greater Angle is that which is apposite to the greater Side, the lesser to the lesser, *Prop. 19*. In like manner the greater Side is apposite to the greater Angle, and the lesser to the lesser, *Prop. 21, &c.* For from the known Proportion of the Angles you gain an excellent Knowledge of Proportion between the Sides, and this by the Treatises of Sines, Tangents, and Secants.

X. If you would be thoroughly acquainted with this, read *Philip Lansberg, De Geometriâ Triangulorum, lib. 4. in Quarto*; the

the *Amsterdam* Edition, 1631, is the best.

But if you would see all this treated more at large, read the practical Geometry of *Andrew Taquet* in Fol. printed at *Antwerp*, 1669, or the Tables of Sines and Tangents put out by *Adrian Vlacq*, revised by *Francis a Schoten*, the best Edition is that printed at *Dort*, 1664.

These Authors will instruct you herein in a plain and easy Method, and without Circumlocutions, but no one more faithfully than *Taquet*; but to understand them you must first of all know *Euclid's* Elements, and the VII and VIII Paragraphs of this Chapter, this is absolutely necessary.

From what has been said, it follows, that a Geometrician is he who considers,

1. *The Magnitude of Figures.*
2. *Their Encrease.*
3. *Their Decrease.*
4. *Their Division.*
5. *Their Multiplication.*
6. *Their Proportion : And,*
7. *Their Transmutation, and has learn'd to measure all these by Geometry and Trigonometry.*

XI. From the foregoing Principles is known the Measure of all Spaces, Plains, Superficies, Rectilineals or Curvilineals, which may be referr'd to right Lines; as also of all *gibbous* or hollow Spaces whatsoever which may be reduced to Plains, and even of all Bodies comprehended in these Superficies.

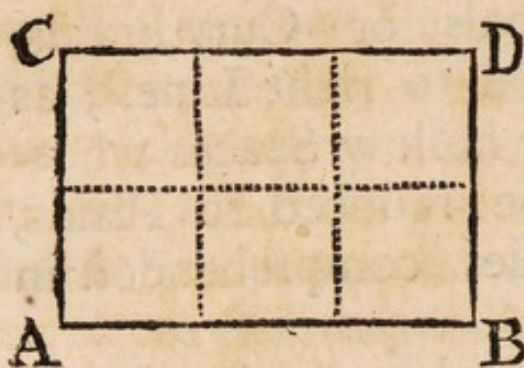
This is most evidently true, for *Euclid* has shewn how right Lines, and *Archimedes* how crooked and gibbous or hollow Lines may be measured. He therefore who studies after this Method may be assur'd he knows the Fundamentals of Natural Philosophy; for all these consist in the Measure of,

1. *A right Line.*
2. *A Square.*
3. *A Triangle : And,*
4. *A Cube.*

1. And first, a right Line is measured when the moving Longitude by which it is to be moved is measured; and therefore Geometricians make use of two Sticks and a measured Iron Chain, lest the Elasticity of the Chain should change the Measure; its Longitude therefore or Distance between the two Sticks being known,

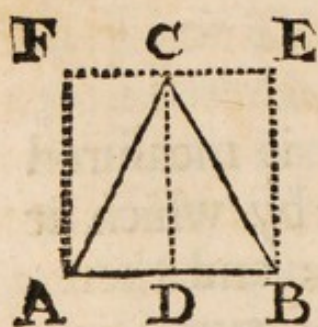
known, the Longitude of the Thing to be measured is likewise known.

2. Is the measuring of a *Square*; for all Measure of a Space is done by a Square; for Example, I have a Space $A. B. C. D.$ and I would know its Magnitude; let the Parts of Longi-



tude $A. B.$ be multiplied by the Latitude $B. D.$ there will result an entire Square equal to so many Squares therein contained; for Example, suppose the Side of the Space of the Rectangle $A. B.$ be three Inches, and $B. D.$ two Inches, the whole Space $A. B. C. D.$ will be six Square Inches; and when we say the Area of such a Thing contains, for Example, a hundred Inches, the Meaning is so many square Inches.

3. All things are measured by Triangles;



for Example, let the Line $A. B.$ be the Basis, and $C. A.$ $C. B.$ the Sides drawn from the Perpendicular $C. D.$ upon the Basis, if then $A. B.$ be multiplied by $C. D.$ it makes a Square or Rectangle $A. B. E. F.$ One half of which is the Area of the Triangle (*Euclid. lib. 1. Prop. 41.*) or if we multiply the Number of Perpendiculars by the Number of

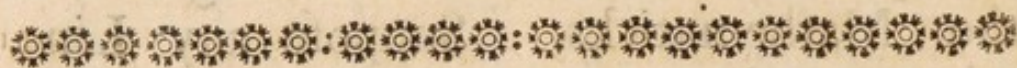
of the Basis, and take away half the Sum or Product.

4. By a *Cube* are measured all real Spaces or Bodies themselves. A *Cube* is a Body terminated by six equal Superficies, and is the most plain and simple of any relating to Bodies that can be thought of in the Mathematicks. Suppose any Line whatever given, upon which let there be describ'd a Square, over which let there be set up other Squares, that Body which these Squares comprehend is a *Cube*. All Measure treated by Geometricians is made by a Body which has six equal Squares, one Side of which Body is the Foot in the measuring Line; if therefore I measure a Body, one Line of which is 20 Feet, and another 20 Feet, by multiplying these I have an Area of 400 square Feet; then let the Height be multiplied by this, and then I have 8000 Feet, and therefore that whole Body has 8000 cubical Feet; for if I could have so many separate Feet in that Body, I could precisely apply them.

Hence you see to understand Measure well how necessary 'tis for you to have a true Definition of what is a right Line, Square, Triangle, and Cube.

Of all these, if any one desires to see a larger and more accurate Account (and which Part of Geometry is call'd *Stereometria*,
E Measure

Measure of Solids or *σωμείρια*) let him consult *Andréw Taquet*, in his practical Geometry in *Folio* printed at *Antwerp* 1669, mentioned above in the foregoing Paragraph. Let us now come to the Mutation of Bodies.



C H A P. II.

Of Motion.

I.  E who knows the general Attributes of a consider'd Body, by Degrees may soon understand all Changes or Mutations possible to a Body.

If at once you think upon a Body, as long as that Idea remains so long the same Body remains which shews that its Nature is immutable.

Hence occur two Things worthy our Observation ;

1. *The Essence of Things which can never be changed.*
2. *Those things which are conceived, as they obtain in any thing when that Thing is conceiv'd with another ; for*
Example,

Example, if I conceive a Sphere, and conceive it in æternum, whatever I deduce from thence, yet the Sphere and its Proprieties will still remain immutable, viz. that it is a round Body, &c.

Hence it follows that a Thing never can be conceived mutable if it be conceived alone ; now a possible Mutation arises from the Conjunction of Things, and when that is really separated it is call'd accidental ; for if I conceive a Sphere presently after its being changed, I do not in such Case conceive only the Nature of a Sphere, and all the aforesaid Proprieties, but also I think on somewhat that was not in it before, namely Mutation, which I did not conceive in it before : Now if I conceive a Sphere in Motion, (since all Ideas are immutable) I conceive it in Motion in *Infinitum*, as long as no other Body changes its Determination ; but if it be conceived that Motion carries it on to affect any other Body, it is conceived to act either with a greater, lesser, or with the same Motion, and therefore Motion depends on other Bodies.

II. That Body we call one whose Parts in such Manner cohere as that Motion given to one Part may move the whole Moles, but not separate the touched Part from the untouched.

We ought to define what a Body is, for in this matter Naturalists run into the greatest Confusion, for every the least and most minute Particle of an Atom consists of others more minute; shall we therefore conclude an Atom one Body, when that can be again divided? This Matter therefore I have thoroughly consider'd, and can find no other Definition but what I have given; for every Body whose Parts so cohere that they may transfer Motion to the whole Moles is one Body, which is comprehended in one Superficies, tho' it consists of various Bodies. Unity therefore consists in this, that is, that the Parts cohere in such manner as I have here laid down.

If it be requir'd then what are many Bodies: I answer, those which mutually embracing each other, do not transfer Motion when given from one Part to another, but separate the touched from the untouched Part.

III. In every Body conceived as one there can be conceived no Mutation, unless the whole Place, or Figure, or Unity be changed. If I conceive that Body to be changed as to place, the same Figure and Quantity may remain notwithstanding; its Unity therefore remains, and it is one Body, tho' existing one while here, and another while there. It is therefore moved and changes Place.

And the Figure of a Body may be changed tho' the Body keep its same Place; for Example, a Piece of Wax may receive new Forms by Impression of our Fingers, the same Quantity still remaining. One Body may be made many, that is, if its Unity be dissolved, and it be divided into various Figures, and this is called *Division*.

IV. Every one therefore ought to study the Knowledge of Motion in that whole Body in which it is consider'd; if a whole Body be transferr'd by a Motion impress'd on one Part, such a Cohesion in the Parts is requir'd as may not be destroyed by a Force affecting one Part.

V. It is requisite too that the whole Strength of Motion be communicated to the whole Body in one Moment; for if this

is not done, one Part will be moved in the first Moment, and another Part not, which is against the Hypothesis. One only whole Body therefore receives Motion in one only Moment.

VI. It is likewise requisite the whole Strength or Power of Motion be equally distributed to the whole Bulk or Moles of such Body.

Suppose a Body divided into 100 Parts, and by the Motion of one Degree I strike one Part, it is absolutely necessary that that quantity of Motion be distributed through all the 100 Parts, and that too at the same Moment; for if this Body in one Moment should receive half as much more, it would be separated; every one of the other Parts therefore would have 99 Degrees of Motion: If this was not so, one Part of the same Body would move faster, and another slower, and then it would not remain the same Body; this therefore is the impenetrable Power of Nature, that Motion proportionably be distributed to the whole Body.

VII. Such a Body continues to be moved by such an inherent Motion.

VIII. Such Motion goes on *in infinitum*,
if

if a Body be conceived as alone and excluding others.

IX. And always by a right Line produced by the first begun Motion. Since every Body is moved in a Moment it makes a right Line, and the same Cause remaining it necessarily produces an imperfect right Line, and that at equal Times.

X. Nor is any thing changed in that Body, but only Site or Existence in several Places and at equal Times it will produce the same Spaces with the same Proportion.

XI. If a Motion be given to one Part of one Body, and that Part by such Motion gives way from the others not affected by it, then the whole or Moles remains quiet, or is moved more slowly, or is retrograde.

It is very pleasant to consider how many Mutations of Motion a Body may undergo, and this chiefly is the Object of Physicks or natural Philosophy. In the foregoing Part I have treated of the Mutations or Changes of Figure, but now I shall discourse of all the Fundamentals of Mechanicks, which are to be understood from Separation of Parts. All Mutation is caused by Motion.

XII. Every untouched Part therefore requires a *sistent* or *retropellent* Cause, or at least greater than absolute Rest or Quiet.

This is the most profound *Theorem* in all Natural Philosophy or Physicks; for if I consider this one Body, and the Parts of this Body to be separated by Motion into two Bodies, then in the very Instant in which the impellent Cause gives its Impulse it must cease to be one; if by a sudden Communication of Motion these Parts are moved all together, then they are only one Body; wherefore at the same Moment that this Unity is destroyed, *this* Part must of necessity separate it self from *that*. Now *Cohesion* is greater than absolute Quiet, and is the Cause that hinders Secession or Separation of Parts.

I say *Cohesion* must be greater than Quiet, for if Bodies conjoined did only rest themselves, there would be no Difficulty to separate them, but hence it follows that they would not be one Body; there can therefore be no Separation of Parts, so as to make the Motion more violent if the Body cohere: Suppose a Body absolutely one, of Wax for Example, and no Medium of Air or any other Body else existing: If then any Power should be forced upon this Wax, the Parts would
not

not be mutually separated from each other, but would be destroyed at once, because absolute Quiet is less than Cohesion, and all Motion separates while it impels on one Part, and is resisted on the other : If it were not so the Body would be destroyed ; for Example, if you conceive a compacted Body, and indifferent either to Motion or Quiet, so soon as Motion shall impel or strike one Part, the Body will be destroyed, but if on the other Part there be a Resistance, it is separated by this Motion. Hence we see that Separation requires two Causes, *viz.*

1. *Resistance.*
2. *Motion.*

XIII. The greater the Force is with which these two Causes oppose each other, so much the more violent is the Separation of Parts, that is, the Destruction of the whole follows : So that to cause Separation, of Necessity there is required an impellent Cause on one Part, and a resisting Cause on the other, and the greater this Impression is, the sooner will the Body be separated ; for the most violent Motion only impels or enforces a Body ; there must therefore be the other Cause likewise present, *viz.* Resistance, or there will be

be no Separation. For Example, you have a Mind to break a Stick, to do this it is not necessary only that the Stick receives some Motion, but the opposite Part must be moved by your other Hand, which may serve as the other moving Cause. Opposition therefore in different Parts may very well be, and then Separation becomes more easy.

I have now told you all the Separations of Motion; for every Separation of Motion is always local in respect of a Body to be moved: Now besides mutation of Place and Unity there is a third Species, and that is, when the same Body remaining, its Figure is changed.

XIV. If the Figure of a Body be changed, and the whole corporeal Moles remain one, then some Parts will be separated from their former Place, and yet they will cohere to the whole.

Suppose I have a Piece of Wax of one Pound Weight, having the Figure of a Parallelogram, tho' I do not so much as touch it with my Finger, yet its Superficies will be changed, the same Weight remaining: That a Body therefore remain one it is required that the whole Moles remain one, and the Parts not recede mutually from each other; but now in this Case that
same

same Body is changed, because the Parts are inwardly transposed tho' they cohere.

XV. Part therefore of the old Cohesion remained, or after Separation a new one obtained. Suppose we conceive a Body weighing one Pound Weight, and of a Parallelogram Figure; suppose this Figure be changed, remaining the whole Moles, this Change or Mutation may be effected two Ways, first, if it now has, or begins to have another Figure, it will still weigh one Pound, but yet the Parts are transposed: Therefore in this Case some Parts remain coherent, and others are changed. The second Way is, if in the very Instant that one Part is separated, it immediately joins it self to another; for if it be very tenacious it will give way by reason of the applied Motion, but by reason of its Viscousness will apply it self to a resisting Part. These are the two ways Mutation can be effected, and never any yet could be imagined more just.

XVI. If the first Cause obtains, such Body is called *flexible*, its Parts being so disposed, that they are changed in Figure by a given Motion, and yet remain in Cohesion.

XVII. If

XVII. If this *Flexibility* be tenacious of the Site of an impressed Figure, it is call'd *Softness*.

XVIII. But if a Figure so changed by *Flexibility* (the Cause of *Flexibility* ceasing) returns to its former Site and Figure, such Body so affected, is called an *Elastick* Body.

This is the Idea of Bodies which change their Figure ; for either a Body is moved by one projective Motion, or its Parts are absolutely separated, or are separated so as to cohere and remain, and is either a soft Body , or if they return back immediately to their former Figure, it is an *Elastick* Body. If you take Wax and impress on it any Figure whatsoever, that Impression remains, because Wax is a soft Body ; but if you bend a thin Piece of Steel, it will fly back again into its former state, and this resilient Power is called *Elasticity*.

XIX. All Motion therefore in every thing in Nature is caused by these three Things, *viz.*

1. *Gravity.*
2. *By another impellent Body.*
3. *By attractick Power.*

A Body

A Body which is once one, remains one *in æternum* if conceived alone ; but if you conceive this Body to be destroyed, and there was a Passage hence to the Centre of the Earth, it would move thither of its own accord. This is called,

1. Gravity from the Power of Motion, or the *vis Centripeta* ; but take away Gravity of Bodies, and conceive, if you can, how one Body can impel or inforce another.

2. This is called *local Motion impress'd*.

3. There are also *corporeal Powers*, by means of which one Body comes to another ; for Example, put a Loadstone to Iron, it will draw the Iron to it, and this Power is called *Attraction* or *Motion from Powers pushing on each other*.

I have now shewn you all what may be consider'd in relation to the Fundamentals of Change or Mutation.





C H A P. III.

Containing all the Parts of Mechanicks.

S E C T. I.

The First Part of Mechanicks.



MECHANICKS is the Supputation of the Quantity of Motion which is given or taken away by Causes [See last Paragraph of the preceding Chapter] proposed by one to another Body ; or it is the Calculation or Description of Motion of Quantity which arrives from one Body to another by *Gravity*, or *local Motion*, or *attractick Powers* : For every Mutation is only Transposition of a Figure, or Acception of Motion, or its Admission or Direction , and this is the Object of Mechanicks ; if, for Example, such a Body meets such a Body, we learn from Mechanicks how they are moved after this Accession

Accession or meeting together : And since this happens in all Bodies, you will easily see the Necessity of Mechanicks.

II. That Faculty present or inherent to a Body, in order to give or take away Motion from another, is call'd the Force or Power of that Body.

III. And therefore most certainly every Power is either resisting or impelling the resisting Power. Sir Isaac Newton calls the unacting Power *vis Inertiæ*, and the other Power he calls Motion communicating Force. *Motus communicans Impetum*.

After knowing the Nature of Powers, either resistent or impellent, take a Piece of Marble of ten cubical Feet, let it hang quietly by a Cord in a perfect *Equilibrium* ; let another Piece of one cubical Foot strike against it, the one will rest, and the other will move, or rather they will both move ; in their very Contact therefore they make a Mass of eleven Feet, and then it is moved with so much the less Velocity the greater the Mass is in which Motion is distributed : Therefore precisely it changes, as well as it is changed by another ; the recipient Cause therefore of Force, as much Motion as it receives from the moving Body, so much precisely it takes

takes from it. Hence you see that this Axiom is very true, *viz. Action and Reaction always act equally upon each other.* If I break an Egg by whatever Force or Power, and all that Force is taken from me, and not destroyed by me, but by the resistance of the Egg, it takes therefore from me so great a Quantity of Power; and thus a Body changes and is changed. And this is the Foundation of all Calculation in Mechanics, *viz. active and passive Mutations.* Mechanics do not make a new Motion, but apply a new Motion; for otherwise Motion of the entire whole would be encreased *in Infinitum*, which is impossible.

IV. That therefore the Relation between the impellent and resisting Powers may be found out, it is only necessary that these six Things following be demonstrated in Order :

1. The Action of a moved Body perfectly hard, directly impelling a quiescent Body perfectly hard. Suppose two Bodies both perfectly hard, and one merely rests or resists, and the other moves, then I ought, having given the Magnitude and Power of the moved Body, to calculate the Velocity, and Power by which the moved Body ~~sticks~~ against the quiescent Body.

2. Ought

2. Ought to be known the Action of a moved Body perfectly hard on a Body perfectly hard moved directly against it, that is, when two Bodies perfectly hard are moved towards the same Point, and meet one another, with what Power they mutually act against each other.

3. I ought to know the Action of a Body perfectly hard moved on another moved Body perfectly hard preceding in the same right Line.

4. Must be known the Action of a Body perfectly hard, striking obliquely on another Body perfectly hard, but quiescent. Bodies are said to strike each other in a strait Line, when the Line which joins the Centre of Gravity of two Bodies passes through them by their Contact, and are said to strike each other obliquely, when the Line, by Contact communicated to them both, does not pass through their Centre, but thro' one Side or Plain.

5. Ought to be understood the Action of a moved Body perfectly hard on another moved Body perfectly hard, moving obliquely on the same Plain: And,

6. Ought to be known the Action of a moved Body perfectly hard on a moved Body perfectly hard moving obliquely towards its opposite.

Whoever from the Mathematicks has learn'd Calculation, may easily suppute or reckon the Mutations of Motion that possibly can be in any of these Bodies, and consequently all the Laws of Motion.

V. If any one would see these six very exactly and compendiously demonstrated, let him read *Wallis's Treatise of Percussion*, [*Traëtatus de Percussione*,] pag. 668, printed at *London*, 1670, in *Quarto*; this Treatise explains these six Proprieties: Or let him read *Philosophical Transactions*, [*Acta Philosophorum*,] printed at *London*, No. 403, which have only Conclusions, not Demonstrations: Or *Keil's Introduction to true Physicks*. [*Introductio ad veram Physicam*:] But *Wallis* treats these much better than any one. We must confess the *English* were the first that distinctly fixed these Matters; tho' *Galileus* merits also our Praise for his Discoveries, but he wrote very confusedly.

You have now a Method how to learn the first Part of Mechanicks, which is Calculation or Supputation of the Quantity of Motion given or lost in a Body perfectly hard, not endued with any Elastick Power.

S E C T. II.

The Second Part of Mechanicks.

I. **T**H E S E foregoing six Proprieties are likewise to be found and demonstrated in Bodies perfectly Elastick.

1. The first Part of Mechanicks treats of Bodies perfectly hard.

2. The second considers the Laws of Nature in Bodies perfectly Elastick, wherein these six Proprieties occur.

In this many a very learned Man has err'd, and particularly *Descartes*, who, after he had a Mind to set up new Physicks in relation to the Laws of Motion, consider'd Bodies perfectly hard, and seeing what were the Sequels of terrestrial Bodies, concluded Motion did not destroy Motion: Now, I say, Bodies perfectly hard impelling each other of a perfectly equal Motion, will rest in the Point of Contact; and then the Motion of both is destroy'd; [But *Descartes* said they would fly back; for seeing this true in Physical Bodies, not Elastick, he would likewise apply it to Mechanicks,] because they are equally press'd upon the opposite or contrary Parts, neither of them therefore will prevail but rest; but, in Physicks, while Bodies meet one another, and mutually press

each other, they are mutually repelled ; the Cause then of this Repulse is in Motion, by which Bodies return to their former Site or Position.

Descartes said Motion did not oppose Motion, but Direction Direction ; and therefore Bodies perfectly hard meeting each other in the same Degree of Swiftneſs, would return whence they came : For if (ſays he) Bodies perfectly hard meeting one another with an equal Quantity of Motion ſhould reſt in the Moment of Contact, then if the Quantity of both their Motions was two Degrees, in this Caſe there would be entirely deſtroyed four Degrees of Motion ; and then ſince the whole conſiſts of an Infinity of ſmall (and therefore perfectly ſolid) Atoms, it follows, that from their Concourse a perfect reſt of them all muſt obtain ; and tho' the Motion in them at firſt was impreſſed, they would ſoon loſe it, at leaſt the greateſt Part, 'till moſt of the Atoms come together, by whoſe Cohesion or Elaſticity the other Part of Motion remaining in the whole ſhould at length be perceived.

But this has ſince been diſcover'd and demonſtrated by ſeveral great Men, and what is wonderful, three ſeveral Perſons by different Arguments have agreed in the ſame Concluſion. The Royal Society of *England* in the Year 1662, would have all Ma-
thema-

thematicians study to find out and discover the Laws of Mutation arising from the Collision of Bodies, which three Fellows of the Society, viz. Sir Christopher Wren, Hugen, and Wallis, after they had apart reflected well on this Matter, discovered by pendulous Bodies: The Method was this, they hung up Bodies of an equal Magnitude by a Line, and then took down the Longitude of their Ascent and Descent, by applying for this End another pendulous Body; then they folded up their Conclusions in Paper, and seal'd them severally; afterwards when the Society open'd these three Packets, they found they all contained the same Conclusion. *Vide Acta Philosophorum*, No. 43, but the Discovery and Demonstration of this Matter is set down by Wallis, pag. 686 in the Treatise above, wherein is shewn the Reason of these Effects: You may see the same in *Tractatu Hugenii de Percussione*, in his *Posthumous Works* which are sold at Leyden by Bondestein. If you would see how Sir Christopher Wren demonstrated it, peruse Keil, pag. 169, but above all Wallis, you may read him thro' in a few Days.

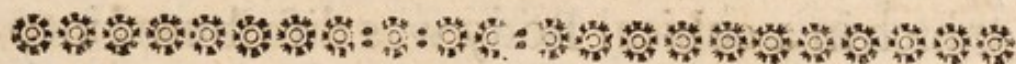
What has been said will suffice for the second Part of *Mechanicks*, viz. The Calculation of the Powers of Bodies perfectly Elastick.

S E C T. III.

The third Part of Mechanicks.

*per-
cussive* **H**A V I N G been well instructed in the foregoing Matters, let our Student learn the Laws or Powers of heavy Bodies, in those that are perfectly ^{heavy} and ~~im-~~ perfectly Elastick. If you would study these after the clearest manner, consult *Galileus de Motu locali ex gravitate Corporum*. This is a Treatise of the finest and most profound Speculation; this Book is printed at *Lyons* and *Pisa*. This Author first found out the Method of considering Swiftness and one right Line, and Gravity and another, and of these two made a Triangle. On the same Subject you may read *Alphonsus Borellus de vi Percussionis*. He was Scholar to *Torricellius*, who had *Galileus* for his Master. This Author unlock'd all the *Arcana* of *Galileus*, who having put some Weights into one Scale of a Balance, and observing that a very little Body falling suddenly, and with a great Velocity into the other Scale that was empty, moved a great Weight in the opposite Scale, said he could not understand it; but *Borellus* very ingeniously discover'd that a quiescent Body does not act, but at the very Moment it begins to be mov'd there is in the other Body a much

much greater Action than the Action of that which was quiescent, and thus solved the Difficulty of *Galileus*. This also may be seen in the *Mechanicks* of *Wallis* in *Quarto*, pag. 33, and in *Keil*, pag. 232.

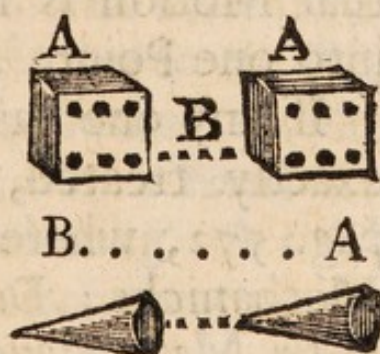


S E C T. IV.

The fourth Part of Mechanicks.

AFTER the foregoing Studies must be learn'd how useful may be the Figure of an Instrument or Body communicating Motion to another Body to which such Motions is communicated.

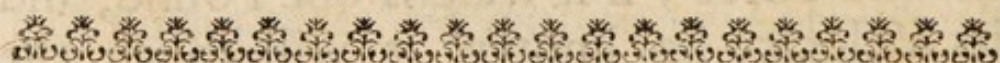
What Figure does, is thus explained : Take a cubical Body *A*. let it be moved along upon the Line *B*. and strike directly on the resisting *Obex* or Bar, and have a determinate Force ; if it weighs one Pound, and its Velocity be known, it will touch the *Obex* with its whole Side, and therefore will apply Motion to as many different Parts of the *Obex* as it touches : If now it be of the same Magnitude, and have the same Velocity, it will have the same Motion. If you suppose the Figure of this



Instrument or Body to be conical as in the Figures mark'd *B A*, it will then in its striking on the *Obex* inhere, and the whole quantity of Motion will be impressed on one Point of the *Obex*; and therefore one Point of the *Obex* receives that Motion which in a cubical Body was distributed into several Points: This latter Instrument is therefore fitter and more apt to destroy the *Obex* than the former which communicates Motion to many Parts, because so much greater is the slowness of Motion in every one of those Parts.

These Observations are most useful in solid as well as fluid Bodies; and hence it follows that Motion is not encreased, but that Motion is from several Parts receiv'd into one Point.

If any one has a Mind to see this more exactly treated, let him consult *Wallis*, pag. 572, where he treats of Wedges in *Mechanicks*: *Descartes* in his *Treatise De la loy Mechanique*, and all Writers who have written of Wedges, but chiefly *Borellus*.



S E C T. V.

The fifth Part of Mechanicks.

Hydrostaticks.

IN the next Place must be learned that Part of the *Mathematicks* which considers

siders the general Proprieties of all *Fluids*; and this is call'd from the *Greek Word* [*υδροστατική.*] *Hydrostaticks*.

A *Fluid* is that Congeries or Collection of Bodies whose insensible Parts cohere with no Connection, or what is very easy to be changed. By this you see that in a Fluid the ultimate constituent Bodies which cohere by a small Connection become one again; and so all that I have demonstrated in general in relation to the Proprieties of one Body is evident here; but inasmuch as these Parts are joined together, their respective Magnitudes, Figure, and various Degrees of Connection are therefore to be consider'd, upon which depends the very Nature of a Fluid. The other Part which I now consider has relation to the Proprieties which are in a particular manner proper to a Fluid as such, for a Fluid has Parts either less or more cohering. A thick Fluid is that which has one Part greater than another. A viscuous Fluid is that which has Parts that cohere with a closer and stricter Connection than in another Fluid.

Mathematicians consider Bodies under these three Respects, viz.

1. As Things most minute.
2. As having no Connection with each other : And,
3. As

3. *As they are heavy.*

Hydrostatics is absolutely necessary for a Physician ; (for all things that happen in a Fluid are found in our Bodies) that he may thence know what is Life, Increase, Decrease ; and how the spiritous and weaker Parts act by Vegetables and the Air.

II. That this Part may be the easier learn'd, these ancient Authors following are to be carefully read, viz. *Archimedes de his quæ humidis insunt*. This Treatise is revised and amended by *Barrow*, and printed at *London*, 1675. This Subject is likewise excellently handled by *Stevin*, heretofore Mathematical Professor, and chief Architect at *Lyons*, in his Treatise of *Hydrostatics*; his Works are in two Volumes in *Fol.* entituled, *Hypomnemata Mathematica vel Hydrostatica*. Read also *Wallis de Hydrostat. Mechanicorum*, pag. 708, printed at *London* in *Quarto*, in the Year 1670. Jo. *Alphonsus Borellus de vi Percussionis*, the best Edition is that of *Bologna*, but it is very scarce. *Vander Aa* likewise printed it. Mr. *Boyle* has given us many curious Experiments, as may be seen in his Book of *Hydrostatick Paradoxes*. By perusing of these you will very well understand this in a few Days
time

time. *Borellus*, *Boyle*, and *Wallis* will merit your highest Praise ; tho' by reading only *Wallis*, you may be sufficiently instructed without a Master.



S E C T. VI.

*The sixth Part of Mechanicks is,
Hydraulicks.*

I. **I**T remains now that we search into those different Rules or Methods of Motion by which fluid Bodies act or suffer as they are enclosed, or moved thro' Pipes, or Conduits and Elastick Vessels, and this Part is from the *Greek Word* [*υδραυλικη*] called *Hydraulicks*, which signifies nothing else. A Physician therefore is to study this Part with all the serious Application of a Mathematician : For if any Part of the Mathematicks comes near the Nature of Medicine or Physick it is this, whether you consider *Mastication*, or *Digestion*, or *Circulation*, *Secretion*, or *Excretion*. He that would learn this Part must first be well acquainted with *Hydrostaticks*, and likewise ought to know from *Mechanicks*, how a Body acts when impelled against the resisting *Obex* or Bar : For *Hydraulicks* supposes *Liquors* to be moved against the
Sides

Sides of resisting Vessels as against their *Obex*. He likewise ought to know their several Figures and Rules of Inclination ; for if such a Fluid runs in such Channels so inclined, we thence find out what Reactions and Changes it will undergo.

II. That the Knowledge of this Part may the more easily be acquired must be read that great Hero of Antiquity, who wrote *de Spiritualibus Pneumaticorum*. This Book is written in *Greek*, in which is explain'd the Structure of artificial Fountains, and on that Occasion the several Ways of Water passing thro' Pipes.

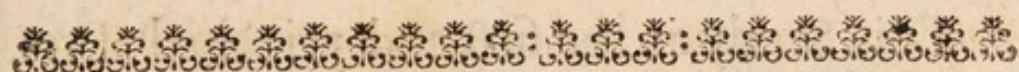
Then the great and famous *Torricellius* ~~de~~ *Tubo Torrecelliano*, he was the Disciple and Successor of *Galileus*.

Benedictus Castelli, Disciple of *Torricellius* ; this Treatise is extremely scarce, but admirable on this Subject, viz. of the Motion of Water ; it is written in *Italian* in *Quarto* : It demonstrates what the Parts of Rivers suffer from Cascades or Falls of Water, and what effect Water produces in running in Length, Breadth and Depth, and against any resisting Power or *Obex* ; all which may be transferr'd to the Circulation of our Humours.

To this Part also Monsieur *l'Abbe Mariotte* is a noble Ornament : He wrote
a Trea-

a Treatise in French, call'd *Experimens Hydrostatiques* in Octavo, wherein he sets down many wonderful Experiments which he made by throwing Water through several sorts of Pipes; as also the Force of the Impression of Water through Tubes by Pestles, &c. but he is not easily comprehended unless by the experienced.

But you must not forget *Borellus de vi Percussionis*.



SECT. VII.

The seventh and last Part of Mechanicks.

LASTLY, That Part of Mathematical Science which considers the Action and Retardation of a known Solid, moved by a known Fluid, is very useful for a Physician.

This is the most noble and secret Science that can be studied by Human Wit, and which is almost neglected by all, tho' the most useful and necessary. The best and almost the only one that has treated of this Subject is Sir *Isaac Newton* in his most excellent Book of Philosophical Principles, *Part 3d.* wherein he considers what a Body may suffer in one known Degree of Motion by a Fluid, and then discover'd four Degrees

Degrees of Resistance : If then a Body should be moved by two known Degrees, it does not in such Case find only eight times a greater Resistance, but almost an infinite ; and thence he explained the Actions of all known Bodies. I could wish this Book had been so published as every one might understand it.

Hugens in his Treatise of Gravity, Refraction and Light, has some *Theorems* on this Subject.

This Study is the first and principal Preliminary to that of Physick, and whoever is herein well instructed, will understand all philosophical Books relating to Physick or Medicine that have been hitherto published, and whatsoever is known in the Theory, and what is deduced by Reasoning and Argument.

In this Part we owe a great deal to *Borellus*, *Bellinus*, *Pitcairne*, *Malphigius*. Every Physician then ought to be well instructed in these Principles, before he proceed to that of Medicine or Physick ; and these Sentiments of mine are agreeable to those of *Hippocrates*, who in a Letter to his Son recommends Arithmetick and Geometry.

Hugens



PART III.

CHAP. I.

Physicks or Natural Philosophy.

I. HYSICKS, or Natural Philosophy, is the *Knowledge* of corporeal Things existing in the *visible World*. This Science the Ancients universally called φυσικὴν, tho' not very properly, since Metaphysicks and Pneumatics treat likewise of Things natural.

It is the *Knowledge* of all Modes by which the Ideas of all Things can be represented so as the Mind may perceive them: I also say in the *visible World*; for we will not with *Anaxagoras* dispute of the Existence of many other Worlds, since that belongs to the Philosopher, not the Physician.

II. This Science is acquired partly by Observation of the Senses, and partly by reasoning, deducing from such Observations Things not yet known by the Senses.

III. The observing Part of Physicks orderly collected is called Natural History, which is an orderly digested Collection of all Things which may be observ'd by the Senses in corporeal Substances, viz. Astronomical, Animal, Vegetable, Mineral, &c. and he who describes these thus observed is an Historian.

IV. This describes all Actions exercised between Bodies, inasmuch as they may accurately be observed in all Circumstances by Help of the external Senses.

V. The other Part of Physicks (for there are two Observations, and Conclusions thence deduced by Argument) which a Physician ought to learn from the Observations of Things first known, by those Things which we have seen, (as mentioned in the several Paragraphs of the two foregoing Parts of this Book) conveys that to our Knowledge which our Senses can no way discover, and yet obtain in natural Things. It is a known Truth that our
Senses

Senses are only apt to discover some certain *Phænomena* in corporeal Substances, and that nevertheless there are infinite Things in Nature they can by no means search out: For which Reason,

1. *Things that have been observed we take pro datis.*
2. *We take for Principles those that are mathematically so: And,*
3. *By applying these Mathematical Rules to observed Phænomena, we draw our Conclusions.*

These conduce to the Knowledge of those Things which are not obvious to the Senses, though they exist in Nature; and therefore let

1. *All Phænomena be observed.*
2. *One Observation be compared with another, whether they agree or disagree.*
3. *By applying to them these Mathematical Rules are drawn Conclusions, which are most certain like Mathematical Truths, though they cannot be comprehended by the Senses.*

You see here the Plan which a Philosopher ought to follow, that he may acquire the accurate Knowledge of Things natu-

ral ; and now I will lead you through all Physicks, and tell you both the best and most approved Authors as well as Experiments.

VI. That the first Part [mentioned in the fourth Paragraph of this *Chapter*] may most exactly be learn'd, *Aristotle* deserves chiefly to be read in all his Works, which is call'd the History of Physicks ; that great Philosopher the most eminent of the Ancients, who knew much more than the Moderns would have him to know : He, I say, who was the Great Preceptor of *Alexander* the Great, in his several Journeys through various Countries collected a vast Treasure of Experiments in relation to Animals, Minerals, Meteors, Plants, and a great many other Things worthy to be known, viz. of the Generation of Animals and their Nature, &c.

Then read *Pliny's* Natural History ; this Author, after *Aristotle*, is the only one left us of Antiquity capable of instructing us in what the Ancients knew in relation to Physicks. He made Collections from a thousand Authors ; and tho' they are intermixed with many Fables, there is nevertheless an *Index* of those Things the Ancients knew in Medicine, Meteors, Astronomy, Botany, Chymistry, &c. for
he

he has most elegantly extracted the very Marrow out of all Authors, not by Argument, or deducing Conclusions, but barely by Collection: He therefore must be read with great Caution, for he has a great many Trifles, and what is even repugnant to himself. He treats of Herbs better than any Botanist since; and therefore you may much better learn their Virtues from him than any other whomsoever.

The Text or Stile of *Aristotle* and *Pliny* is better than that of their Commentators. I know only these two amongst the Ancients that are valuable; those who have commented upon them, as well *Greeks* as *Arabians*, are scarce worthy a Place in your Study, so wretchedly have they explain'd them. *Pliny's* Edition put out with so much Industry and Care by *Delecampius*, Professor of Physick, is by far the best.

VII. By Antiquity I mean 'till the sixteenth Century, and this Age excell'd all the preceding, which is chiefly owing to the most Illustrious *Francis Bacon*, Lord of *Verulam*: For in Reality before his Time the Learned World was wholly taken up with the Trifles of the Peripatetick Philosophy, and Commentators of the Schools who had by their Quiddities render'd Physicks merely Logical.

At that Time came up the Chymists, who were the first Authors of Experimental History, whose Knowledge in relation to the Causes of Things the Lord of *Verulam* suspecting, before the End of that Century rose up in the Reign of Queen *Elizabeth*; and this great Man only certainly deserved this Honour, that he alone made greater Progress in Physicks than all that ever went before him, or succeeded him. The best Edition of his Works is in *Folio*, printed at *Frankfort*, 1665, tho' his *English* Epistles are not there.

His Character was this: He had so sprightly a Genius that he could not be deceived or imposed upon; for never Man was endued with a Genius so penetrating into Physicks; he was of an unparallel'd Diligence and Industry; for while he was Lord-Keeper of the Seals and Chancellor of *England* (which Offices he admirably well discharged,) he wrote all his Works, which are deservedly divided into two Parts; the first considers *Morals* or *Ethics*, and the second is purely Philosophical: Without presupposing any thing he lays down in a plain and simple Style what occurs in Things corporeal; and from these Premises concluded that all *Phænomena* and Experiments agreed in such or such a Thing; and therefore

fore that in which they agreed must be the *Ratio Causæ*, or Matter of this or that Thing, or what ought to be therein chiefly consider'd ; and thus he reduced to one Head all what was so to be reduced, as you may see by reading his Treatise *De Ventis & Calore*. I can assure you that in no Author you will find greater Science, Prudence, and Candor than in him, who far excell'd all *Europeans*, and even the *English* themselves, and has all that is good of *Descartes*.

VIII. Next to the Lord of *Verulam* (and who trod close in his Steps) succeeded the Illustrious *Boyle* likewise an *Englishman*, and as great a Glory to *England* ; what that Lord began, this Nobleman endeavoured to perfect. Consider the Times, and read whatever Authors you please before *Bacon*, and compare their Writings with his, and you will find him to have carried away the Prize from them all. And as *Boyle* was most diligent in his Searches, so there is scarce any Part of Physicks that he has not taken Notice of ; for if you have a Mind to know what is done at the very Bottom of the Sea, you have nothing else to do but to read his *Opera sub-aquatica* ; and you will find as you read other Authors, that this has out-done them all in

his Way; for he searched with the utmost Diligence into the Nature of Fire, Air, Water, Earth, Salt, Oil, Fossils, &c. by making Experiments of them all. His Works are put out separately, as the Time would permit: Some are to be seen in the *Philosophical Transactions* of England, but not all; his whole Works are printed at Geneva in Latin, but the Translation is in some Places extremely obscure, whereas the *English* is admirably clear and plain; the best *English* Editions are those of London and Oxford.

In acquiring the Knowledge of corporeal natural Things, these two excellent Persons must be consulted Night and Day: But as Boyle kept no Order, you must make an *Index* your selves: But Bacon strictly observ'd Order.

The other Authors who have written since, I shall tell you as briefly as I can.

IX. At the Time Boyle began to publish his Book of *Natural Philosophy*, (excited by the Death of Bacon) was instituted the Royal Society of London composed of Members from all Parts of England; and this Society was erected on Purpose to search into the Secrets of Nature. Much about the same Time the same Work was instituted and carried on in Germany, France
and

and *Italy*; that is, there was to be taken into this Society Men of the greatest Ingenuity and Candor, who should treat of the Affections and Dispositions of Things natural with the highest Circumspection and Caution, not speculatively by Reasonings or Argument, but by Experiments. The first who began this were the *French* in their Book *Journal des Sçavans* printed at *Paris* in the Year 1665, which they continue on to this very Day, by adding to every Month what has been written or discover'd thro' all *Europe*. In these Books are contained all Experiments as well private as publick, and all new Discoveries. From which, if there was carefully collected all what relates to Physicks, Chymistry, Mathematicks and Medicine, it would make a Work most excellent and noble. But as they now lie, a Student by reason of their being crowded with variety of Matter and many a useless Subject, would be frightened from reading them. But however, it would be of Advantage to you, if you had an *Index* after every Treatise, which you might turn over and mark down the useful Places without troubling your selves about the other. When I recommend this Work, I recommend at the same time those Authors that they cite, for to give you every one here would be a Work of infinite Labour.

X. At the same time the *English* by publishing several Books, began to communicate to the World in a regular Method all what they had discoursed of in their private Conferences. Which being Experiments made according to the Lord of *Verulam's* Plan, you may easily guess what a prodigious Work that was: For they were *Wallis*, *Newton*, and the greatest Mathematicians, Naturalists, Physicians, and Chymists, who collected these Experiments which are contained in the *Philosophical Transactions*, a Work begun in the Year 1665, and continued to the Year 1708; and (what is much to be lamented) are now left off. They were printed in *English* in a great many Volumes in *Quarto*. *Oldenburg* a *German* translated the first Years into *Latin* in *Quarto*, but those Writers who follow'd him, through want of Diligence translated nothing. The *French* have cull'd out several of these Experiments and put them into their Journals. These *Philosophical Transactions* are vast Vol. but in the Year 1705, three Vol. in *Quarto* were put out in *English* by way of *Compendium* or Abridgment by *Lewthorp*, a very eminent and experienced Physician, who reduced with the greatest Exactness those vast Discoveries under several Heads or Chapters, omitting none that
are

are useful, and that so clearly, as evidently gave the World a sufficient Specimen of his excellent Genius: But we must despair of ever seeing them appear in *Latin*, unless that Author himself would so far oblige the World. This is truly the second Basis or Foundation of Experimental Physicks.

XI. Then in the Year 1667, there was published at *Florence* in *Tuscany* an *Italian* Book in *Folio*, entituled, *The History of all the Experiments made in the University of Cementina*.

It is a Book printed at the Royal Press, and treats of the Rules and Methods of the Society which the Grand Duke founded and so much encouraged by his Example, that he was generally present at their Experiments and Conferences. It is a Work not translated, but you have many Things contained in it (by way of Abridgment) in the *French* Journals of the Year 1668. There is likewise a Book put out in *Italian*, called *Giornale di Litterati*, by *Signor Abbate Rosati*, in which you have some curious Things not elsewhere to be met with, I mean many Experiments made in *Italy*.

XII. Afterwards in the Year 1670, there
was

was set up a Society in *Germany*, composed of learned Persons from all Parts of *Europe* under certain Rules and Statutes, by the Name of the *Leopold Society*, or of the curious Inquirers into Nature, [*Leopoldina Societatis, vel Naturæ Curiosorum*] who then began to publish Treatises of all Things relating to Physicks and Medicine; and it was order'd by the Rules of the Society, that whatever Curiosity or Rarity should be discovered should be described in Writing, and sent to one certain Place. This Book appears under the Title of *Curious Miscellanies* [*Miscellanea Curiosa*,] printed at *Leypsick*, and is continued on to the Year 1707 or 1708; there you have every thing that was done in *London* and *France*, &c. but as there are display'd in those Tracts a great many Beauties, so are there likewise of Trifles not a few.

XIII. After this Work came out the History of the Academy of *Paris*, written and published by *John Baptist Du Hamel* in *Quarto*, which begins from the Year 1665, and ends in the first Edition (which is the best) at the Year 1699. Nothing can be finer than this Work; for it contains all the Discoveries which the King of *France* made choice of, and which he himself call'd by the Name of *The Academy of Sciences*,

ences, [*Academie des Sciences*,] and there you have all what is new relating to Natural Philosophy.

XIV. Then follows the *Acta Leypsiensia*, and these began in the Year 1682; every Year there came out a thick Volume in *Quarto*, and by continuing it on for a whole Year, the Authors in every Volume took in what was most useful and advantageous, and the principal and newest Experiments which the most learned Men all over the World communicated to them as they found out and discover'd in Medicine, Mathematicks, &c. Hence we have wherewith to congratulate our Studies on account of new Discoveries, leading us by an easy Way into the inmost Recesses of Nature, and which we owe to all the Authors of these Books.

XV. But last of all is published a Book which far exceeds them all, and that is the History of the Royal Academy of Sciences [*Histoire de l'Accademie des Sciences*.] They who know how to frame any Judgment of Study, know very well that there is no Society so famous and so useful as what *Lewis* the Fourteenth instituted, after having invited thereto the greatest Men of the World; as *Hugens*,
Cassini,

Cassini, De la Hire, Moralde, Newton with honourable Titles, giving them Pensions, and allowing them Time and Place to make their Collections, and communicate them to the Publick. There was an Edict put out, that at the End of every Year should be published a Work which was to be well consider'd and examin'd by the whole Society. From hence we have the best and noblest Treasure of Physicks; for the Volumes beginning in the Year 1699, contain every thing relating to the Mathematicks, Astronomy, Physicks, and Medicine, and consequently all Things a Physician ought to know; which Books, if you can once obtain, you will have the best and noblest Library in the World.

XVI. Here you have a List of the Authors I recommend to you to buy, and who will inform you of all true Experiments, and these only will be useful for you to read. For he that is resolved to read Authors will learn what is false as well as what is true, and will find not only the Opinions, but chimerical Notions of several Authors which can only be distinguished by those who have made a considerable Progress in Learning.

XVII. Besides those I have named, there
are

are some Authors who do not write in a Philosophical Style, but deliver down Histories of natural Things as *Ulysses Aldrovandus* in thirteen Volumes in *Folio*. This learned *Italian* who expended all his Substance in Travelling, making Experiments, in correcting Authors, and collecting rare Curiosities, set up a *Museum* which is now kept at *Bologna*, and is called after his Name, *Museum Adrovandi*, to whom also the Prince used to send his Curiosities; but (what is much to be lamented) he was reduced at last to extream Poverty. He wrote the History of all those Animals, four-footed Beasts, Fishes, Fossils, Herbs, &c. which he had collected in his own *Museum*; but because he gave Credit to some Authors, he has some Things very fabulous.

XVIII. After him follows *Conradus Gesnerus*, a Man that was a very Prodigy in Learning, and whose Writings I cannot read but with Wonder! He was a Pillar in Medicinal Science, he wrote of Animals, Fishes, Plants not before described; as also a great many Experiments of his own: In whatever Works of his you buy you may depend upon it you will have a glorious Treasure, written with the sublimest Judgment, intermixed with nothing fabulous;

lous ; his Works, as many as they are, are all single and separate.

XIX. Another famous Author is *Andreas Cæsalpinus* : His Works are admirable, whatsoever of them you can buy ; he was a consummate Botanist, and was the first that reduced the various Species of Plants to their *Genus*, through a curious Observation of their respective Productions. *Morison* borrowed from him, tho' he suppressed his Name. He wrote also admirably well of Metals, and was the first that found out the Circulation of the Blood.

XX. Add to these *Morinus*, otherwise call'd Father *Mersenne*, who wrote a Book in *Quarto* of Mechanical, Hydrostatick, and aerial Experiments, which Volume is almost inestimable ; for it contains whatever *Galileus* wrote, or *Torricellius* in his Epistles ; this Father held Correspondence with all the Learned of his Time, he praised every body and was devoted to no Party ; but this made him at last be suspected on both sides, and made him want many Friends at the latter End of his Life, his Book is entituled, *Experimenta Physic. Mechan.* printed at *Paris*.

I have now given you a List of the principal Authors who excel in Natural History, and in them you will find laid down whatsoever

soever you may draw any useful Conclusion from; and as you read these and compare them with others, you will find that no Authors in the World have written better, or with more Learning and Exactness than these.

XXI. From these Authors (for it must be confessed they have written every thing diffusedly and without Order, as the Subjects offered themselves to them in their Journals,) you must collect Experiments, reduce them to their Classes, and place them under their proper Titles, and keep them as a Natural History. This Method I my self made use of by simply reading and noting down in the Books whatever was written respectively relating to Anatomy, Physick, Chymistry, &c. Then I had a Book mark'd *A* for Example, in which I wrote down every thing that related to Physicks; in another mark'd *B*, what belong'd to Anatomy; and in another *C*, what related to Chymistry, and so on; and then I reduced all to different Heads or Chapters; to one Head I reduc'd what ought to be reduced to that one Head; and by this Means I had compiled a *Thesaurus* in three Vol. (and so may any one in Time) which is of inestimable Value: And this will be in the highest Degree

gree advantageous to you in your Studies ; for when you have taken your Doctor's Degree, you will not have always Time to turn over Books, but to have recourse to your *Index*, in which you may find what you want by a slight Perusal.

XXII. Physicks or Natural Philosophy is divided into four Parts.

1. *Astronomical.*
2. *Elemental.*
3. *Chymical : And,*
4. *Physical Qualities of all Kinds.*

Whatever Physical Changes I find out, inasmuch as they depend upon the Sun, Moon, &c. I reduce to *Astronomy*. But what, say you, has a Physician to do with Astronomy ? Read those Authors, not ancient but modern, who have treated of Influences, and you will be satisfied.

To the the *Elemental* Part I reduce every thing that relates to Fire, Air, Water and Earth.

To *Chymistry* all that I shall presently speak of in the ensuing Chapter : And,

To *Physical Qualities*, I shall reduce every thing relating to Heat, Smells, Tastes, and all sensible Quality.

XXIII. The other Part of Physicks which results from Reasoning has likewise its Authors ; for entire Physicks, as I have before observed, consists of two Parts. The Object of the first is in making Experiments, and the other consists in drawing Conclusions by Argument and Reasoning from those Experiments. It requires indeed the greatest Prudence and utmost Skill to recommend those Authors who have written and reasoned not only faithfully but in a good Method and Order ; for Men very seldom err in Experiments, but very often are quite wide of the Mark in their Arguments and Speculations ; and in Reality I ought to look over my Authors a much longer Time than I have done before I recommend them to you ; but these I have reduced to a few, viz.

1. Whatever *Galileus* wrote on this Part of Physicks is very good, for what the Ancients wrote is worth nothing. But this Author was the first that began to draw Conclusions by Mechanicks from Experiments, and his Arguments have stood Examination.

2. *Torricellius*, whose Works are extremely scarce, followed the Steps of his Master.

3. *Benedictus Castelli* has reasoned with
H the

the utmost Exactness in his Treatise of Motion.

4. *Bellini*, who has set us an Example how we might argue from Physical Principles.

5. *Alphonsus Borellus*, and you may place him before all the former; but (what is to be lamented) he too much indulged himself in Arguments purely Chymical.

6. *L'Abbè Mariotte* in all his Treatises, especially his *Essays de Physiques*.

7. *Perault* in all his Works, and in his *Essays de Physique*.

8. *D'Amontons*, Fellow of the Royal Society at Paris.

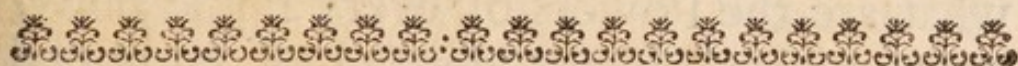
9. *De la Hire in Naturæ Phenomenis*.

10. *Hugens* in all the Treatises he published *De Pendulorum Motu*.

11. The Prince and Captain of all is *Sir Isaac Newton*, who knows as much as all the rest of Mankind together, as all his Works will inform us, and which only have set Bounds and Limits to the Wit of Man. An Example of this we have in his first Volume in the Chapter of Opticks and Colours. I never saw a Book where were stronger Arguments drawn from Experiments: It is the best Pattern in the World, and deserves the highest Honour.

I have now given you the Advice a young Physician

Physician stands most in need of purely as he considers a Body in general. For you have seen here in Abridgment what Things are necessary to be known before a Man undertakes the Study of Physick or Medicine ; *Viz.* The Mathematicks and Experimental Natural Philosophy ; and therefore what follows belongs to it, *viz.* Chymistry, which is in the highest Degree necessary in making Experiments.



CHAP. II.

Chymistry.

I.  AFTER you have gone thro' all the foregoing Studies, the next Science you ought to apply your self to is Chymistry ; for this Science shews you the Method of searching into the Nature of Corporeal Things, as well in Physicks as in Medicine.

II. For Chymistry is the joining together, or separating certain Bodies by violent Motions, directed at first by Fire, which Element gives us thereby an Opportunity of thoroughly considering and observing what are joined and what separated

parated from each other, and confining those that are changed to Vessels : Now as Physicks totally consist in a plain and simple Observation of Experiments, no one can doubt but that it is absolutely necessary for a Physician perfectly to know what Bodies are, and their singular Effects, and of what they are compounded.

III. This Science in the first Place shews what are the Powers of every single Body, upon which chiefly depend all corporeal Actions, which can never be known but by Experiments.

Chymistry therefore does those Things which Mathematicks and Physicks could not do ; for the former only gives us a general Idea of Bodies, and a Method of finding out those Affections or Attributes which are common to all Bodies. Physicks makes what Observations it can by the Senses ; but Chymistry teaches us the particular Dispositions and Inclinations of Bodies which operate by that which is not common, but peculiar to them ; hence it plainly appears how much greater an Advantage it is to a Physician to know Particulars than Generals ; for tho' I may know the Mathematicks, yet that Knowledge does not any ways assist me in knowing the Powers of Arsenick , for Example ; but if
I make

I make any Experiments upon it by Chymistry, I can then be able to tell you its Powers, viz. that if it be taken inwardly it will inflame, corrode, &c. the Parts; upon which I endeavour to apply Remedies to this Distemper. That Art therefore that displays the Dispositions of single Bodies is certainly the best and most useful: For how can any one know there is any such Body in Nature which has such coherent Parts that they can scarce be separated? By Speculation this can never be done, but by Experiments. For Example, put Oil of Vitriol to an *Acid*, or Oil of Tartar *per Deliquium* to a fixed *Alkali*; when these two Bodies are mixed together it will be impossible for you to know what they are compounded of or of what Nature by Argument or Reasoning, but by Experience I know that these two Bodies mutually change in order to form a third Body which cannot be separated by a great Fire, and this Inclination or Disposition a Man can never find out but by Chymistry. Sir *Isaac Newton* gives us many chymical Experiments of the Attraction of Bodies.

I know very well that if I inject it into any Body by a Syringe, it will destroy every Part it touches; but if I inject *vitriolized Tartar*, it will scarce do any Hurt at

all. All this shews that there is somewhat in Bodies which a Mathematician or Naturalist as such cannot observe; the Chymist only fore-sees that such Motions will follow, and new Actions be produced. And thus we see that the Nature of Waters, Oils, Spirits, Salts, Earths, can only be discovered by Chymistry; and you see what Use these Things are of, since they belong to the Action and Permanency of our Body.

IV. In the next place Chymistry teaches us how to excite those corporeal Actions which a Philosopher or Physician would exercise; for Example, suppose a Physician would excite in the Stomach a Motion as would mutually separate from each other such Liquids as it has received; or by which the Parts may be stimulated mutually to give way to each other and the circumjacent Parts: Unless he is a Chymist 'tis impossible for him to know this Action; for Example, $\mathcal{R}$ †^{ti} *distillati* $\mathfrak{z}$ ij *Sp.* $\ast^{\text{ci}}$ $\mathfrak{z}$ ij. Let the Patient drink first one half, and then the Remainder some time after, and by this means the Parts will be moved up and down and ferment. Or $\mathcal{R}$ † *Communis* $\mathfrak{z}$ i. and it will have the same Effect with Chalk.

Again,

Again, suppose a Physician would kindle a Fire, or make a Noise like Thunder in a Moment &c. *Ol. Carioph. 3i. & Duplum. Sp. Eni rectificati*, and 'tis done in an Instant. But without the Knowledge of Chymistry it is impossible: And besides,

V. Chymistry by Experiments makes us penetrate into Nature it self, makes us know the Powers of what we eat and drink, our Humours, Medicines, and Poysons, by ways unknown to other Arts.

VI. The Nature of Bodies is said to be known when their Figure, Weight, Hardness, Porousness and Solidity are explained, and all this Chymistry does while it tries to change Bodies; as also the Motions that follow, if some Bodies are applied to others, and how that is done. Thus, if it be asked what is Bread? No one but a Chymist knows that Meal by being resolved into an Oil and by Fermentation, can be reduced into a Spirit; by this all its Powers are shewn, and by Putrefaction it becomes human Dung. Nor can any one know what are Humours but a Chymist, *viz.* that they have such and such Qualities or Inclinations, and have such Parts when they are resolved to cause these Operations on the Blood, and at last be-

come Blood themselves. And the same is true in relation to Medicaments and Poysons. Let a Man take of sublimate Mercury 3i. nothing in this Case but Chymistry can help you; but a Chymist will tell you that sublimate Mercury is an Acid which corrodes the Bowels; he therefore prescribes you to take $\ominus$ is $\boxplus$ ri 3v. in a Pint of Water, and in an Instant there will be a Powder of a dusty Colour, &c. and only the Mercury will precipitate; for these Alcalis contain in them a corrosive Acid. If Arsenick was given, you will know by the same Method and way of reasoning to take away also its pernicious Effects.

VII. That therefore a Man may easily, and in a short Time learn this most noble and necessary Part, let him make himself acquainted with what is most general in Chymistry, that is, those Things which are performed by the Use of Instruments, and their Object, and by the Operation of this and that Production.

VIII. Those Authors who have treated of the Use of Chymical Instruments with the greatest Clearness and Perspicuity are these that follow, viz.

1. *Nicolas Le Fevre* in his Treatise printed at
Paris

Paris in two Vol. 12^{mo} and now reprinted at *Leyden* in 12^{mo} in two Vol.

2. Father *Lemery* in his *Course of Chymistry* [*Cour de Chemie.*] The best Edition is that of *Leyden* in the Year 1697, sold by *Bontestein*, and I believe it has been reprinted twenty Times, and has had every time Notes made upon it at *Paris* and new Additions.

3. *Christopher Morley* in his excellent Treatise printed in *Quarto* at *Leyden*.

4. You have printed at *Amsterdam* in *Octavo* *Leydensia Collectanea Chemica*, and several other curious Tracts : And,

5. *Conradus Barchausen* will give you extreme Satisfaction in this Matter, it is a Book printed in *Quarto* at *Leyden*, and may be had at *Bontestein's*.

IX. When a Chymist has master'd all these Authors, then he must read those who by Experiments have illustrated this Art by adding always to it new Works and Discoveries : And,

1. The most eminent and Prince of all is Mr. *Boyle* in all his Works. There is not one Part of Chymistry that he did not excel in ; it is great pity there is not made a general *Index* to his four Volumes printed in *Quarto*, in which might be contained every thing relating to Chymistry, Physicks,
 &c.

&c. there is such a one printed in *English* in *Octavo*, call'd *Boyle's Works abridg'd*.

2. To him may be added *Kungelius* a *German*, a most laborious and renowned Chymist, who spent many a Tun of Gold in making Experiments, and to find out the Philosopher's Stone; he was maintained by the King of *Prussia*: His Works, which soever they are, are most excellent, and had he not been so intent upon the Philosopher's Stone, he would have exceeded *Boyle*; he found out many a curious Experiment in Chymistry, but he neglected them on account of the Stone.

3. *Nehemiah Grew* of the *Royal Society* in *England* in all his Works as well Botanical as Chymical, he is an excellent Author.

4. Next to these is *Homburg*, he was maintained at the King's Expence, he relates his Experiments (which are many) in a clear Style, as may be seen in the Acts of the Academy of *Paris*: As also,

5. *Godfrey*, whose Experiments are most admirable, and these are chiefly those who have been famous in Experiments; to whom may be added,

6. *Otho Tackenius*, whose Theory is not worth much, but his other Works most excellent; as also *Antony Nerius*, in his Art of Glass-making. [*De Arte Vitriaria.*]

8. *George*

8. *George Stachley.*

9. To all these must be added what you find in the Philosophical Transactions of *London* and *Paris*; all these are very famous Authors.

X. After having gone through the two Classes of these principal Authors, Order obliges you to consult those who have so written of Chymistry as to amend some Part of Physick as much as Chymistry would permit; such a one, for Example, was *Boyle*, who writ universally of Experiments, and consequently belongs to the second Class; he writ also of the Blood, which makes him belong to this third Class.

XI. For first in the Theory of Physick those are most useful who have written of the Nature of the Blood, viz. its constituent Parts, Effects, &c. as they were discoverable by Chymical Experiments, and among these the principal are,

1. The famous *Boyle* in his Book call'd; *Apparatus ad Sanguinem humanum cum Appendice*, printed at *London* in *Octavo*, wherein the Author examines the Nature of the Blood according to *Mechanicks*, *Physicks*, and *Hydrostaticks*; after that he examines Chymically into what Parts it may be resolved, how these Parts act separately, how conjunctly;

conjunctly ; for a Chymist's Examination of the Blood differs very much from that of a Physician's. To this Class likewise belongs,

2. *Hierom Barbatus*, who has written a Treatise of the Blood and its *Serum* ; this Book is printed at *Frankfort* in *Duodecimo*, in the Year 1687 : As also,

3. *John Baptist Helmont*, who was the first that I know of who discover'd a great many Proprieties of the Blood, viz. That the fixed Salts of Vegetables in a human Body become volatile, so as to exhale thro' the Skin, and common Kitchen Salt in the Blood becomes likewise so volatile as to be express'd by Sweat, and evacuated volatile by Urine. *Boyle* confirms the same Experiments.

4. *Otho Tachenius*, who writ three Treatises, the first is called *Hypocrates Chemicus* : The second has almost the same Title, but is a Defence of the former Part against *Zwelfer* : The third *Morborum Princeps, sive Tractatus de Podagra*. This last is much scarcer than the other two, and much better, as treating of the volatile Salts of Animals. You will scarce find any one that has explained better the Nature of Human Blood, Urine, &c. And to these may be added,

5. *John Laurence Bauschius*, *De lapide Hematite & Aetite* ; to which he prefixed his

his *Traētatus Hematologicus* full of Chymical Experiments. It was printed at *Leipsick* in *Octavo* in the Year 1665 ; this Author was a *German*.

6. *Vieussens* writ a great Book on the same Subject, wherein he endeavours to demonstrate that the Blood is acid in it self, in which how much he was deceived all the World knows ; but while he was defending with all his Might these Experiments, the World saw in that Defence many a noble Observation of the Analysis of Human Blood on this Account. Also,

7. *Isaac Holland* richly deserves your Attention ; I have this Author in *Folio* written in *Dutch* ; he has a great many Experiments which later Authors arrogate to themselves ; this Treatise is call'd, *Of the Quintessence of Human Blood*.

XII. Of Urine and its Chymical Analysis, the best whoever writ are ,

1. *Boyle* in all his Works.

2. *Laurence Bellini* in his Treatise *de Urinis & Pulsibus*. Every one before him examined this Subject Chymically only ; but this Author does it by the Disposition of the aqueous Humour ; by the various Degrees of Colour, Taste, Thicknes, as it contains more or less of Water : For which Reason before *Boyle* you ought to read,

3. *Willis*

3. *Willis* who treated all his Subjects Chymically; but the best Author of all is,

4. *John Baptist Helmont* in his Treatise, *De Lithiasi*, or the Cause of the Stone, in which he Chymically resolves fresh and putrified Urine both of Man and Brutes into their Principles, and reduces them to Medicinal Uses; this is the best Treatise ever was published by *Helmont*.

5. *Isaac Holland* knew all the Proprieties of Urine, even to the *Phosphorus*.

XIII. The only Author upon Sweat is *Tachenius*, who tells us that he took some Lye in which Shirts had been washed, and distilled it by a gentle Fire, from whence rose a Salt exactly like that of Urine (for the fixed Salts of Mens Bodies stick upon their Shirts:) But Lye gives no volatile Salt, and therefore such Salt is produced from Sweat.

XIV. On the Bile are these three Authors following; viz.

1. *Silvius*.

2. *Bohnius* writ with greater Diligence and Fidelity. But the best Author on the Bile is

3. *Verheyen* in his second Part of Anatomy, printed at *Brussels* in *Quarto* in the Year 1710.

XV. Of the other Humours I can recommend

mend to you no Chymist that has treated of the Constitution of solid Parts.



C H A P. III.

Pharmacy.



THE best Authors that have written of *Pharmacy* are the Chymists.

Pharmacy is the Art of knowing how in due Time to gather, preserve and prepare Medicines according to true Rule. *Chymistry* conduces very much to this Knowledge, as teaching those Things which can be kept and which cannot, and at what Time they must be gather'd; that this Plant, for Example, has such Qualities, or has not, and that from it such or such a Thing may be made or extracted: But how these Authors must be read in Order to your acquiring Knowledge in this Art, I shall distinctly shew you; but it must be observ'd that *Pharmacy* is divided into five Parts: Of all which in their Order.

P A R T I.

THE first Part considers the compounding Parts of Vegetables, and the

the Principles into which they are resolved.
Of Authors read these following, viz.

1. *Tournefort*, in that laborious and excellent Treatise *Des Plantes naissantes aux environs de Paris* printed at *Paris* in *Octavo*. I do not know any one has Chymically examined Plants more exactly than this Author; for he added their fresh Juices to several Salts, and thence saw their Effects, and what Redundancy of Salt there was in such or such an Herb; for Example, he tells us that the Juice of *Roses* is astringent, is compounded of such Salts and *Menstrua*, gives such a Colour, and then being mixed with the *Serum* and Blood has such Effects. It is a Work of incredible Labour, and the best that ever was written on the Subject. Other Authors are not so valuable: The next to him are,

2. *Nehemiah Grew*.

3. *Boyle*.

4. *Robert de Du*, who also reduced Plants to their Principles.

5. *Dodart* writ upon this Subject; this Author was a glorious Member of the *Royal Society* at *Paris*; his Book is called *Histoire des Plantes* in *Folio* and *Duodecimo*.

6. *Du Hamel* here and there in his *History* of the *Royal Academy*; this Work was continued by *Bilsious* by the King's Command.

7. *Godfrey a Bolduc*, likewise a Member
of

of this Academy. If you would read Authors that are free from Trifling, read only these ; for they have admirably well resolved Vegetables into their Principles, and this is the Foundation of true Pharmacy : Other Authors are not worth your Care.

P A R T II.

TH E second Part of Pharmacy teaches how to gather Plants, and what Time is proper for that Purpose.

Helmont says that in Winter time they abound with Salts and want Oils ; that in Summer they emit Salts, and the Oils and the more fixed Salts concenter. If then you would have a Salt-Matter, let them be gathered when they begin to shoot from the Roots ; but if you would have a Balsamick Matter, Oil, and Rosin, then gather them in *Autumn* or the beginning of Winter. And for this our *Chymical Institutions* are very useful. I know of no Chymist that ever writ on this Subject ; only the Galenists tell us that odoriferous Plants are oily, and that the Oils are excited by the Sun ; these therefore are to be gathered in the Morning, and then may be kept ; but unless they are rubbed they give no Oil.

P A R T III.

TH E third Part of Pharmacy teaches us what Part of a Plant is to be gather'd, and at what Time ; that Seeds contain much Oil, and less of Earth or Salt if they are gather'd when at their Maturity ; that Rinds or Buds abound with Balsam in Winter time, which defends the Plant from nipping Colds, and they must be gathered in the Heat of Summer, [In this Part likewise there are no Authors.] that all Vegetables being often wet and dry'd lose all the Principles they have ; and therefore such Plants are to be kept cold.

P A R T IV.

TH E fourth Part contains the Method of preserving and keeping Plants duly gather'd, or teaches us the best Manner of preserving them ; but this only can be learn'd from Chymistry, that is, what Plants are to be kept (as has been said) in a cold Place.

P A R T V.

TH E fifth Part teaches the Preparations of Medicines from a known Matter.

Matter. You must read these Authors following, who have written of preparing Simples Chymically; for no one ever div'd deeper into this than the Chymist. For in all Countries, now-a-days, Medicines are well known which a Physician may safely prescribe and with good Success: For Example, it is well known that Cinnamon has such Powers as excel every thing thought of by Antiquity: What Man could have a nobler Medicine against Pains in the Nerves than that aerial Spirit of Turpentine? One or two Drops of Oil of Fenel cures a Body labouring with Phlegm which could never be found out but by Chymistry; but if you would see how nobly perfect Chymistry is in these Things, you must read along with this our Method,

1. *Angelus Sala* (the most successful Chymist in Practice that ever was) in his Treatise call'd *Opera Augusta Chemica*, printed at *Franckfort* in *Quarto* in the Year 1647, who in describing all his Secrets teaches us how to prepare Vegetables, Minerals, Animals, &c. He was an *Italian*, but liv'd there a long Time and there published his Works.

2. *John Schroder* in his *Pharmacopœia Chymica Medica*, printed at *Franckfort* in *Quarto* 1685; but this Book is printed at

Leyden in *Octavo* with a very copious *Index*. There never yet was a *Pharmacopæia* that teaches with greater Clearness, Exactness and Sincerity what are the Effects of prepared Medicines than this, his only Fault is, that he is too short in his Description of Simples, and writes not Systematically, but according to Pharmacy, and with the severity of a Chymist.

3. *John Zwelfer* in his *Pharmacopæia Regia* printed in *Folio* at *Nuremberg* in the Year 1675, but he is not to be compar'd with *Schroder*, having collected and blended all Things together in a very indigested Manner; it is the best *Galenical Pharmacopæia*, but not what we make use of. These two Authors are compleat in this Matter, and all others are obliged to them for what they have.

4. *Joseph Quercetanus* in his *Pharmacopæia Dogmatica restituta & hermetica*, printed at *Paris* in *Quarto*, and afterwards in *Germany*. He has some Things in him which are not to be found elsewhere. This Author had a Mind to dive into the Secrets of *Paracelsus*; but the best of all by far and who can never sufficiently be commended is,

5. *Daniel Ludovici* in his *Pharmacopæia Moderno seculo applicata* published in *Gothick-Saxon* in the Year 1685, in *Octavo*.
It

It is an Abridgment or Compendium of all Pharmacy; he consider'd what various, costly, and laborious Forms of Prescriptions our Age labour'd under, and therefore he had a Mind to collect only what was good and necessary. Perhaps you may think it was too bold an Undertaking ever to be perfected, but I don't think ten others could do what he has done; but it must be owned (and that is his only Fault) he writes in so obscure and compacted a Style, that none but the Experienced can extricate themselves out of such various Opinions: But he that has Patience and understands Pharmacy and Chymistry will understand him. He examined all the Secrets of *Helmont*, &c. and really deserves the Character of a just, severe, and most ingenuous Man.

By this time our Student is prepared to apply himself to his Study, being now instructed in the general Principles of the Mathematicks, Physicks, Natural History, Chymistry and Pharmacy; and all these most certainly must be learn'd before he begins his Study of Physick; for our Method is not instituted only to make a Man prescribe [*Recipe*] like common Physicians, but that he may know what is now known, and be instructed by Experiments, rational Deductions and Consequences, &c.

C H A P. IV.

Materia Medica, and Botany.

I.  H E first thing which a Man must learn is in Reality what is most remote from the Practice of Physick. The *Materia Medica* (especially Botany) may be learn'd of any one that is not a Physician, as a Part of Natural History. But how shall a Physician know how to prescribe Medicines, if he does not know whence to collect them? This Study is most easy to those that are willing, as requiring no great Judgment or severe Application.

II. After our young Student is sufficiently instructed in the Knowledge of what has been hitherto said, Order obliges him to apply himself to the learning those Things which belong to the Knowledge of Simples, and whence the *Materia Medica* is deduced, and out of which are made all what we call by the Name of Medicines or Medicaments.

III. A Medicine is that which being apply'd to a sick or healthy Body is capable or apt to prevent a future Distemper,
or

or cure a present one : And Medicines are divided into Bodies which are apply'd or given inwardly to Bodies , and into those that are spirituous which comfort the Mind through the external Senses. But the former only are properly called Medicines. To cure is so to take away the Distemper, that what was either destroyed or corrupted by it may be entirely restored to its former Condition.

IV. The *Materia Medica* is therefore that which *Dioscorides* call'd [*ὑλὴ ἰατρικὴ*] *Sylva Medica*, and this is taken either *Physically* or *Medically* ; if in the former Sense, it is a Collection of all those Things which can be reduced into Medicines ; if in the latter, it teaches the Art of knowing the several Parts, the Gathering, Preservation, Preparation, and the whole Medical History of all Simples.

If there be any thing, not prepared, but purely as Nature produces it, it is called a Simple. The *Materia Medica* is then divided into two Parts :

1. *The first consists in the Description and treating of Simples.*
2. *The second in resolving and compounding these by Art.*

1. The first teaches us, for Example, what sort of a Body Antimony is, *viz.* that it is a Metallick Fossil, by what Notes or Marks it may be known, to wit, by its leadish Colour, and that its Parts are furrowed or channelled like a Perspective Glass, then from what Places it may be digged up, what Powers it has, and what Distemper it cures.

2. The second tells us into what Parts it may be resolved, *viz.* into Sulphur and Metal, and these again into other Things, and what may be made by compounding all these; it is called a simple natural Body, tho' by its Nature it is compounded of various Parts.

V. On this Subject of Simples have written several Authors necessary to be studied, not only by young Beginners, but those that are more advanced in their Studies. Some Authors have abridg'd all what is contained in voluminous Treatises into a narrow Compass, while others again have written so much at large as they seem not to have omitted the most minute Circumstance of those Subjects they have undertook to treat of; for Example the Bezoar Stone, which is its native Place, in what Part of the Animal, how it grows, &c. and have consequently made an entire History

History of this very Particular. But as a Beginner would undoubtedly desire first to read all this in Abridgment, I shall recommend to him these Authors following, viz.

1. Margrave's *Materia Medica contracta* in *Quarto*, printed at *Leyden*. It is a Treatise so digested, that there are in it all Simples that are used to be prescribed in *Europe*, with their respective Figures, Names, Uses, Powers, and their whole History; in short, every thing which this Author used always to explain in his College.

2. *Schroder* in his *Pharmacopœia*. As to the Chymical Part of it, his Method is much to be commended. If you would read any Author who has extracted from other Authors the native Place of Simples, at what Time they are to be gather'd, what Marks to be known by, and what Virtues they have, and how to be kept, read *Schroder* along with *Margrave* for Simples; for whatever these Authors have of Common is very good. To these may be added,

3. The *Pharmacologia*, or *Manuductio ad Materiam Medicam* by *Samuel Dale*, printed at *London* in *Octavo*, in the Year 1693. It is likewise printed in other Places. In this Author you will find, in a very short Style, what ought to be treated of, or what you can expect in relation to Simples, their Marks;

Marks, and Powers admirably reduced into their proper Classes; he has interspersed some Things from the Ancients, but has very faithfully inserted his History of Simples under one Title, and in such manner, that as soon as you see them at the Apothecary's, you will exactly know them. These three Authors are sufficient for a young Student.

VI. For those who are more advanced, or if you would arrive to the greatest Perfection in this Knowledge, you must read other Authors: As,

1. *Gabriel Fallopius* in three Volumes in Folio, (or by it self in one Volume) it is call'd *Tractatus de Medicamentis & Medicinalibus in Dioscoridis Librum*. The first Volume is full of Erudition; the second is a Treatise of Bath Waters, [*De Aquis Thermalibus*,] in which you have whatever Simples are produced by Waters impregnated with the Embryos of Metals; and in the third he has written admirably well of Metals and Fossils.

2. But if you would have a Work the most compleat of all in this kind, you must buy *Dioscorides* with *Mathioli*'s Notes of the Edition of *Gaspar Bauhinus*; this Author was a Man very famous, and had a Pension from the *Romans* for his extraordinary

nary Merits : He travell'd over all *Africa*, where he searched into all the Monuments of Physick, especially the *Materia Medica*; after that he travelled over all *Asia* and *Europe*, and collected what was in use among the Ancients in their Medicines made out of Simples, and not only reduced Simples to their proper Classes, but gave them their respective Characteristical Marks, their Smell and Taste, and collected all the Learning of Antiquity in such a Manner as you may easily distinguish the true from the false, and the good from the bad. This Author has Commentaries or Notes written upon him by *Mathiolus*, who was not so much a Botanist as that he could judge of the Figures of *Dioscorides*; for which Reason a great many Errors and synonymous Words have crept into that Work, and as he was a Person of a morose Temper, and had been often corrected by several Persons on this Subject; at last *Gaspar Bauhinus*, a most learned Botanist undertook that Task, corrected the Figures, and added a hundred new ones, and brought the Work to such Perfection that it may very well pass for the most perfect Treatise as well of Animals as Fossils and Vegetables as ever came out. Add to these,

3. *Salmasii Exercitationes Pliniane in Solinum & C. Plinium*, printed at *Paris* in
three

three Vol. in *Folio*, in the Year 1629 : In this Work are contained all the Experiments and History of Antiquity, but there are likewise some Errors : For tho' *Salmasius* was a very learned Man, yet he was no Botanist ; and he wrote of Plants which perhaps he had never seen in all his Life. And,

4. *De re Fodinaria & Metallica* in *Folio* by *Agricola* ; this Author is most excellent.

VII. To these Authors I must confess I am indebted for all what I know on this Subject, and they alone are sufficient, if read in the Order as I have now placed them, and from these Fountains a Physician may draw what may be of greatest Use to him in his Studies, and abridge it. For Example, suppose the Ancients have said many things in relation to the Nature and Qualities of Wormwood ; to know this, read *Markgrave* and *Schroder*, and there you will find that it is a shrubby Berry-bearing Plant of a greyish Colour, and of a most bitter Taste, &c. But if you would see whether it be what *Plierius* prescribed, then peruse *Mathiolus* on *Dioscorides* of *Baubinus*'s Edition ; and as he was very famous in the History of the Ancients, he tells you how you may know the true *Ponticum* to which *Dioscorides* attributed

tributed such Virtues. After him read *Dale*, in which in a short Method you will see what both the Ancients and Moderns have said on this Subject, and as you are collecting one Part reduce under it all what belongs thereto. And this will be sufficient.

VIII. But if besides this general Knowledge of the *Materia Medica*, a Physician would perfectly be acquainted with Botany, let him at first chuse a Master who may shew him *viva Voce*, and with his Finger the Names proper to every Plant; for he must not begin by mere Reading.

IX. A curious Study of this Matter is not required for the *Materia Medica*: For Botany is the Knowledge of all Plants in the World hitherto known: And it is no Matter of Moment whether a Physician, for Example, knows what an Oak is, provided he knows all those Plants which are useful in his Study, which is limited to about two hundred Plants, and is the most easy of any, and may be consider'd in these two Respects, *viz.*

1. As enlarging Natural History.
2. As it belongs to the Use of Physick, and the full Knowledge of that Science.

X. For

X. For the Reason why Physicians now-a-days are so intent in this Study with such unwearied Application (though such an exact universal Knowledge does not any ways seem useful in order to attain their End) is because *Hippocrates* (or some other of the Ancients) has described simple Plants with such Virtues which Plants are unknown to us by those Names. Thus if we would make a Collection of the Herbs of *Hippocrates*, we must not obtrude any for what ~~it is~~ not; for Example, we must not say this Wormwood is the *Absinthium* of *Hippocrates*: For as there are a great many Species of Wormwood, we ought to be acquainted with them all before we can give a Judgment whether it be so or no, to remedy this Inconveniency the Reformers of the *Materia Medica* have diligently apply'd themselves; amongst whom the chief is *Fabius Colonna*.

XI. As soon as you have resolved to learn the Nature and Qualities of Plants, you will find several Words which give you no manner of Notion of the Plants they are intended to signify; for Example, I hear the Name of *Asclepios*, *Helenium*, *Parthenium*, &c. pronounced: Which Names form in the Memory no Idea of the Plants so called. But if the Plant with its Name be pointed out to me by the Finger, I have

have then a Foundation to remember its Name with such Descriptions, and so retain it: But if you would have recourse to Figures, and imagine they will give you any Light by comparing them with the Plants, you will be mistaken; for we have no Figures of the Ancients, except those of *Dioscorides* in a very old Manuscript kept in the Emperor's Library, all the Figures we have are made by the Moderns; and therefore you must learn this from a Master; and when you perfectly know the Names of Plants, then you may frequent the Garden and compare their Texture with their Description given by *Dioscorides*: And then you may discover the Truth.

XII. The best Method of attaining a perfect Knowledge in Botany is most certainly thus to be directed by a Master, who will shew you every Particular, and by this means you will perfectly know all the Principles of Botany, and every thing that belongs to them; but if you do not take this Method, as it is too seldom done, then you must learn the shortest Way you can what are the Elements of Botany.

XIII. The first Method of Learning the Nature of Plants is call'd an Instruction, by which known Plants are best kept in Memory, and new Plants discover'd most easily

easily referr'd to the old known ones. The End then of this Method is not to explain the Virtues or Powers of Herbs, for these may be vastly different in Plants of the same Class; for Example, in that sort of *Solanum*, call'd *Belladonna*, which differs in its Virtues extremely from the *Solanum* commonly sold in Shops: For after taking the first there ensues a melancholy Madness; whereas after taking the latter the Body is entirely affected with a pleasant and very agreeable Cold.

XIV. But as there are above ten thousand several Plants, the *Latin* Tongue is not sufficient to give a particular Name to every one of them; we must therefore first give them a general Name, and then some other Name particular, which may distinguish them from others; for Example, there are many Species of *Solanum* which are all comprehended under this one Word: Some Adjective therefore must be joyned with it that may distinguish one of their Species from other; for Example, *Solanum Officinale*, *Scandens*, *Soporiferum*, which may explicate its Virtues.

XV. *Tournefort* has very excellently defined Botany to be a System adapted for giving Names to Plants which are reduced
under

under *Genus*'s and into Classes by general and special Characters ; for Example, *Solanum* bears a single leav'd jagged, roundish Flower, its Cup or ~~Shell~~ thin and membranous, but bulging and swelling out, whose inward Stalk or Pestle runs into a soft Berry full of a great many flat Seeds ; as often as you meet with this Description or Character given to any Plant, you may be assured it will be call'd the Plant *Solanum*, not that its Virtue is proper and familiar ; but by thus adding other Words you immediately understand its Species, and if I have but a good *Index*, I shall plainly see in it the whole *Genus* of *Solanum*, and some particular Name added thereto for Distinction ; for Example, *Spinosum*, *Scandens*, *Officinale*, &c.

XVI. The second Method is, by which Plants newly discover'd may be referr'd to their respective *Genus*. Amongst so many thousand Plants there are only seven hundred describ'd by *Tournefort*, under which seven hundred general Heads eleven thousand Plants are comprehended, so that the Difficulty of retaining their Names is not so great ; and it is very easy to give a new Name to a late discover'd Plant. Thus, for Example, if I have found out a Plant with ten Leaves, bearing a rosy coloured

five leav'd Flower, the Fruit arising out of the Stalk having a soft fleshy Pulp, I shall undoubtedly place this as a Strawberry Species, having the Idea of the new Plant and knowing the Character of the old.

XVII. The End and Design of this Method is to help the Memory, and to range every thing distinctly in its proper Place. That System therefore is ever the best which is most easy; I do not say which is most natural, for we do not know what that is: But if you examine all Systems whatsoever, you will very easily find that of *Tournefort* to be preferable to all the rest, as having reduced every thing to a very few general Heads, and yet without Confusion. He took his Character and Mark from Fruit and Flower: Indeed it is not perfect, for no one Man could ever perfect such a Work, but yet it is most easy.

XVIII. If therefore you would learn the Elements of Botany, and the Method by which new Plants may be reduced to their proper Classes, and how to make new Classes, read *Tournefort's* Preface, and if that does not satisfy you, read his *Appendix* after his *Elemens de Botanique*, in which he has explain'd all the various Acceptations of every Term, and every Name and Ge-
m.

mus. The rest of that Work is nothing else but settled Rules.

The Method which Mr. Ray took (an Author ever to be mention'd with Reverence and Honour) must likewise be consider'd; there was some Disagreement between these two principal Botanists of the last Century. Ray would have the Figures, Resemblances, or Characters of Plants to be taken from all those Marks in which there was any Agreement or Likeness in respect of the Flower, Fruit Colour, Virtues, and reduced all such as had many Things common to each other, to the same *Genus* tho' they were not alike in Fruit and Flower: Not that he deny'd you should have any Regard to these Notes or Marks, but he would add others. In this System you must attend to a great many Things at once, but it is not so in *Tournefort*, who has fewer general Heads. But if the *Genus* of Plants is to be taken from what they are alike (or agree) in, then Ray's Method must prevail; for, as I said before, *Tournefort's* Method has much the fewer general Heads, as being better accommodated to help the Memory; it is therefore the best of any for Beginners. But if a Physician would be more perfect in this Knowledge, he must have recourse also to Mr. Ray's Method, and so in two

K 2

Years

Years time, he may learn all the Elements of Botany.

XIX. The *Methodus Riviniana* has respect only to the Flower; the *Methodus Hermanniana* only to the Fruit or Seeds they are both very plain and short, but the Plants cannot be sufficiently distinguished from thence. *Morison* had read *Adrianus Casalpini* the Pope's Physician, and all he has he borrowed from him; *Hermannus* took his Method from *Morison*; for he makes use of *Morison's* Names in his *Horto Lug. Bat. & in Paradiso Batavo*.

XX. Whoever after reading these Authors would desire to know the Method of ancient History must read the Works of 1. *Fabius Colonna*^{umina}, who is the best that ever wrote on this Subject; and there he will see whether any Herb be what is mentioned by *Hippocrates*, *Dioscorides*, *Pliny*, &c. for this Author with his own Hand made exact Draughts of the Figures of Plants, and engraved them in Brass; his Works are only two, viz. *Phytobasanus*, and *Ecphrasis Plantarum minus cognitarum*, printed at Rome in Quarto. He had read *Dioscorides*, who says that such an Herb would cure the Epilepsy; and when he labour'd under that Distemper, he found that

that Herb out, and apply'd it, but without any Success; he began then to doubt whether Physicians really knew this Herb of *Dioscorides*, which made him apply himself to the *Greek* Tongue, and by that means found out the true Herb, and so cured himself; and after that he gave himself up entirely to this Study of Botany. These Books can scarce ever be printed again, because no one now in the World can engrave them so well. The Ancients for the Space of two thousand forty Years have written of the *Materia Medica*. This Study of Antiquity requires Botany, that you may know for certain whether this or that Plant be truly the same that has been described by Antiquity, and to which such Virtues have been attributed by others.

2. *Joh. Bauhinus*, a very learned Author, who wrote the Ancients History of Plants in three Vol. in *Folio*. In him you have all the Ancients have deliver'd down in Relation to the Virtues of Plants. This Author may be reckon'd as a Writer of the Pandects of Botany; his Collections are an indefatigable Labour, and are taken from ^{Linna} ~~Colonna~~ and others; Add to these,

3. *Morison* and *Ray*. If you compare *Morison* with *Bauhinus*, you will find he has many new Plants, all digested after the

Method of *Cæsalpinus*, which *Bauhinus* has not. But take what Plant you will, and you will find all its Virtues in *Bauhinus*, if you compare him with *Morison*. But *Ray* was perfect in all, if perhaps some more Modern have not excell'd him in using another Method. *Bauhinus* has every thing to be met with in *Morison* and *Ray*, except some later discover'd Plants.

XXI. What Authors are to be read that you may in a short Time acquire a true and useful Knowledge of the Virtues of Plants? They who will most faithfully inform you, are,

1. *Schroder* in his *Pharmacopœia*, most faithfully extracted from *Ray*, *Dodonæus*, and *Lobelius*; this Book tells you the Virtues of Plants, as they relate to the Shop, and is an admirable Treatise.

2. *Markgrave*, who also excell'd in this Subject: But if you desire to know the Virtues and Powers of all Plants, read,

3. *Dodonæus* in *Folio*, printed at *Antwerp* in the Year 1644. This Work contains whatever is taken Notice of by *Chigi*, *Æginett*, and *Orbasius*.

4. *Dioscorides*, with *Mathiolus*'s Notes, which is by far the best Edition.

5. *Tournefort* in his Treatise, *Des Plantes qui naissent aux environs des Paris*. He was

an admirable Searcher into Chymistry.
And

6. *Lobelius* in his *Opera Botanica in Folio*, as to the Virtues of Plants is most admirably exact.

We have been hitherto examining what does not *properly* relate to our Body, and which any one may perfectly learn. We come now to discourse of those Things which *properly* do so.

The End of the first Book, containing what is most material in relation to the Introductory Study of Physick.





BOERHAAVE's
M E T H O D
O F
Studying Physick.

BOOK II.

Of the Study of Anatomy.

Introduction.

- I.  **PHYSICIAN**, or he that is to be so, having all Qualities requisite for his Science, must now stop here, and seriously contemplate what is contained in this Second Book, that he may enter into the more secret Recesses of Physick with the greatest Profit and Advantage to himself in such Study.

I have

I have told you that a Student in Physick ought to know from the Mathematicks, Physicks, Natural History, and the *Materia Medica*, whatever belongs to the general Study of this Science, and in what Order he ought to instruct himself; but all this may as well be learn'd by a Philosopher as Physician. He must therefore likewise know what a Human Body is, how it acts, by what Virtues or Remedies it is affected when it proceeds to act, decay, or recover its Health: It is absolutely necessary therefore, that he know,

1. *What he must learn.*
2. *What Order is most proper for him to make use of, that is, how he may with the least Expence, after the easiest Manner, and in the shortest Time, learn it by the Help of his Memory. And then he must be shewn how all these may be reduced to Practice: And this is all which belongs to this Study.*

II. And whoever considers well all these Conditions, and all Things which offer themselves to be known in the learning of this Science of Physick, will soon see that *Anatomy* is the chiefest of all what he ought to be thoroughly acquainted with, and this *Riolanus* more properly call'd

[Anatomia]

[Ἀνθρωπογραφία] *Anthropography*; for it is rather a Description than Dissection of a Human Body. For which Reason *Vesalius* did very well in calling it [Ἀνθρωπομιχανή] the Fabrick or Structure of a Human Body, which if a Physician does not perfectly learn, all his future Studies will be in vain. For a Human Body only is the Object of Physick, and the more any one knows of this, the more he knows of Physick. For as every Distemper in Man is a Defect of the Body from its natural State, so will he be ignorant what this is, unless he know what a Human Body is; for Example, suppose the *Os Humeri* be dislocated from the *Scapula*, it is impossible I should know what the *Os Humeri* or *Scapula* mean; or what is a Rupture or Dislocation of the Tendons and Ligaments. Again, suppose any one tells me that a Fever is nothing but a violent Agitation of the Pulses, yet will he never be able to explain what a Pulse is unless he know what are the Arteries and the efficient Cause of the Pulse in the Arteries; nor can he know this without he knows what is the Heart and its strict Connection with the Arteries and Blood. The Matter of all Distempers, even the most intricate, may be found out and discover'd by Anatomy. This Science we likewise call Ἀνθρωποτομία, by which we mean

mean the Description of the Matter, Figure, Structure, and Connection of those Parts which constitute a living Human Body as capable of being shewn to us by an artful Hand. It is agreed that Anatomy is very useful in Surgery, that a Surgeon may know how to reduce a dislocated Bone into its former State; thus in any Inflammation, either external or internal, the dislocated Blood must be reduced into its proper Vessels.

III. I shall now give you the best Counsel and Advice I am able in relation to this so useful and necessary a Study, and in such a Method as cost me much Labour and Reading.

IV. This artful Exposition discovers in the whole Body of Man either the coherent or firm Parts which are usually called solid Parts, by *Hippocrates* the containing Parts [τὰ ἐχόντα] or the fluid Parts, which the *Latins* called Humours [Humores;] but now less properly Liquors or Liquids. *Hippocrates* call'd them, the Parts contained [τὰ ἐνεχόμενα:] But *Foesius* has much mended the Expression by adding the Term, causing Violence [τὰ ἐνορμίζοντα,] which is the third between the two former Principles: For it must be observed that

that *Hippocrates* did not call them Animal Spirits, but *Impetum facientia*. One Member is very improperly said to be divided into solid Parts, for the ultimate Fluids are equally solid, they are therefore more properly called firm Parts.

V. Anatomy therefore is wholly distributed thro' these various discover'd Parts; so that Anatomists ought likewise to have explained the Nature of a Fluid, which also is a Part, tho' they have only treated of Muscles, Arteries, Vessels, &c. I shall therefore discourse of these two Parts, viz. Fluids and Solids in their Order.

VI. The first Part therefore of Anatomy by Dissection discovers to you and describes the Matter, Figure, Structure, and Connection of the firm Parts which concur to the constituting this Body: Wherefore,

- i. Is to be learn'd the Matter of the firm Parts, that is, what contributes or concurs to constitute these firm Parts; and this no Anatomist hitherto has done; for Example, I ask what is a Muscle? He will tell me that it is a Body made up of Arteries, Veins, Lymphaticks, and other Things; I ask then what is an Artery?
I shall

I shall be answer'd, it is Membranous. If I ask what a Membrane is, he cannot tell. Upon which Account it is most certain that Anatomists make prodigious Mistakes in describing the simple Parts of a Body: For Example, a Bone when thoroughly examined by Chymistry yields Water, a volatile Spirit, different Oils, and much Earth, and they tell you this is the Matter of Bones, but they are grossly mistaken; for every Peasant knows that if Bones are exposed to the open Air, or laid in a Grave, they have nothing of these in them but Earth, and yet they are Bones. In describing an Artery, you come to that of a Membrane, and a Membrane is the Texture of all Kinds of Vessels; but if you would know the Matter of a Membrane, you must take away all that is fluid: And this is what we shall first instruct you in.

2. Their Figure offers it self to your Consideration, and Bellinus alone has performed more on this Subject, than all Anatomists together in their numerous Volumes.
3. Their Structure which is the entire Description of their Form and Fabrick, and this has been the Work of Malpighius and Ruyschius.
4. Their Connection: And when you have known

known all these, you will know the first Part of Anatomy.

VII. That a Physician may most perfectly know the whole Nature of these firm Parts, it is absolutely necessary that he be first acquainted with those Parts out of which the smaller Parts are composed, and into which they are again resolved. It has been a matter of eager Contention which were the ultimate Elements of a human Body. Of this see all Anatomists that have disputed about the first Bodies out of which our Body is composed, and what was the Original of its Form.

VIII. But these ultimate Elements and ultimate *Stamina* of the least as well as greatest Parts are *Corpuscula*, or little Bodies, very *minute*, *similar*, *simple*, and *terrestrial*, secreted from the fluid Humours at their proper Places, and apposite to all the Parts of a Body.

1. They are very *minute*. For every one of the largest Species is made out of a Vessel which is a Membrane, and which Membrane is composed of other Vessels, and those Vessels of other Membranes; which Membranes again are composed of solid Particles, purely and simply the most minute of all, and which are extended, partly

ly as to Length, and partly as to Breadth, firmly cohering and admitting no Cavity.

2. They are *similar*, for I my self have examined by Fire (Chymical) and have separated the ultimate Solid, or firm Parts of all Animals, whether Bones, Arteries, Veins, or Membranes free from all Humour or Liquid; for if these are continued in boyling Water 'till the Water that shall from time to time be added, can receive no farther Tincture, but becomes insipid, then the remaining Bodies are *Similar*. A Muscle soak'd in lukewarm Water continues pale and free from Blood; but let that be boyled over and over several Times, and then there will remain a Mass of dry Fibres; if it be then burnt, the Fibres still continue, but in a long Figure as in their former Condition. If you make this Experiment on a Bone, Artery, or Nerve, you will always find such Matter equally alike in all. Every Part has its Firmness. In an Embryo the great Artery is so very small, as you may blow it away with your Breath, but the same *Stamina* are made firm by adding the same or the like Matter. And thus out of the most minute the greatest are framed, and so the ultimate Matter of a Lymphatick is the same as the ultimate Matter of the Bones, only that in these the Particles are more compacted

compacted together : So that all Parts differ from each other by a greater or lesser Composition or Addition of the most minute Solids ; all firm Parts then are composed only by Apposition of others, and therefore the *Corpuscula* of all firm Parts are *Similar*s the most minute.

3. They are *Simple*, for that is a simple Body in which every Part is the same, and of like Nature with the whole ; for Example, I take an Artery and Bone, and examine both chymically, and find the same undistinguishable *Genus* of Parts, the ultimate Parts therefore causing Firmness in the whole are always *Simple*.

4. They are *Terrestrial*. By Chymical Experiments Bodies are divided into these Species, viz.

1. Salt Bodies which may be dissolved in Water, or separated by Fire. may
2. Into Oily Bodies [Oleosa] which ~~can~~ ~~not~~ be burnt by Fire, but ~~may~~ be mingled with Water. ^
3. Into Spirituous Bodies which evaporate of their own accord, and may be set on Fire or not, and may be mingled with Water.
4. Into watry Bodies which melt before the Fire and evaporate without any Smell or Taste : And,

V. Into

5. Into terrestrial or earthly Bodies which can neither be destroyed by Fire or Water, but keep their Firmness in both these Elements.

For which Reason the Moderns call all the Parts of a Body, Salt, Oil, Spirit, Water, and Earth, and you will see in *Du Verney*, where he discourses of the ultimate Parts, that he asserts Animals to consist of these Five, and that the ultimate of all is mere Earth: So that this last, properly speaking, is what can give Firmness to our Body, and into which all the rest are resolved.

VIII. That is a Body composed of fluid Humours which now is a Body of such a *Moles*, and was before indeed a Body, but Millions of times less: That weighs now 160 Pounds, and only one Grain before, and the whole, which occurred of so little a *Moles*, is formed by the Apposition of the most minute *Corpuscula*. And as it must of Necessity increase equally, this must of Consequence be effected by Fluids, which can spread themselves into all fluent Places thro' Vessels. All of them therefore are composed of Fluids.

IX. I know of none who have written of the Nature of these ultimate Parts;
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and therefore can recommend nothing to you, unless it be what is briefly contained in my *Institutiones Theoreticae*; and especially in my *Aphorisms* in the Chapter *de Morbo Solidarum Partium*, and (if it consists with Modesty for me to speak it) what I have now for these six Years past taught at home in the Elements of Chymistry, and the Experiments there made in the third, fourth, and fifth Operations: This I take to be the beginning of Anatomy, viz. that you have a distinct Conception of the minutest Parts of which the rest are compounded.

X. After a young Beginner in Anatomy is perfectly acquainted with this, then must be demonstrated and explained to him the smallest Fibre of the firm or solid Parts which can no farther be resolved than into the above named Elements, out of which compounded Fibres the most minute and most simple Membranes are formed.

XI. Such a Fibre therefore is a very minute slender Body, consisting of conjoined Fibres merely Terrestrial. Now that Part has these Proprieties, for it can never be resolved into other Parts, for then it would not it self be ultimate; and if a great many
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ny of such like Parts be joined or knit together, they compose a Membrane the most simple, consisting not of Vessels but mere Fibres; for Example, Flax grows up to a tolerable Height from Seed and Earth, when it is ripe, it is mowed down and is a Kind of Hay, it putrifies: All the Moisture it contains is then so small as it evaporates. After this, it is exposed to the Sun, all its Vessels are cut into Fibres, (and our Flax-Dressers beat it into very small ones) then these Fibres are made into Threads, which afterwards being spun is what they make Linen of, which is nothing else but a mere Congeries of Fibres like Membranes in a Body the most simple; which Membranes are Coverings composed of Fibres put long ways together. These Vessels are composed of Membranes, which again are likewise composed of other Vessels and Membranes; but the ultimate most simple Vessel is made of a Membrane the most simple making a Cavity, and this Membrane (as hath been said) of Fibres.

XII. It is a Question what this ultimate Membrane and ultimate Vessel are composed of. A Vessel boiled a considerable Time in Water, and after a continued Repetition of pouring on it fresh Water loses

all its Juices, and dry as it is it keeps its ancient Form; then view it through a Microscope, it tells you what an ultimate Vessel is. An ultimate Membrane has nothing but earthy Parts, and if it be so turned about as to form a Cavity or Hollow, it is a Vessel the most simple that can contain a Liquid. In a Vessel therefore are two Things, viz. a Cavity or Hollow, and somewhat else forming that Cavity or Hollow, and its constituent Parts are not little Vessels but Fibres not hollow. There is scarce any Body more separate than Hair, if I put it into a proper Vessel and burn it (but hold it as steadily as possible) all its Juices will fly away in a clear unsmoaky Flame, but its Figure continue; if then it be shaken, it is nothing but mere Ashes; (this must be done in a very clear Fire, where there is no manner of Smoak) a Membrane therefore is not destroyed in Water or Fire. This Boiling, Drying, and Burning plainly shew us, that a Hair is a Vessel; the most minute Vessel therefore is what I have just now describ'd to you.

XIII. I know of no Authors who have written on this Subject, I cannot therefore recommend to you any ancient or modern; I would have you however consult my *Chymical Elements and Aphorisms* I mentioned to you above.

XIV.

XIV. After this our future Anatomist will learn what the Fibres of the most minute Canals composed of the most minute Membranes are, and their various Texture according to the various Modes by which the Fibres or little Canals are mutually joyned together, viz. by a Parallel, interwoven or spiral Concourse.

I will now present you with a very agreeable Subject Matter, and worthy your serious Consideration and Reflection. The ultimate Vessels are so very minute that one hundred Millions may be contained in one Grain of Salt or Sand; for if they could be gather'd all up together in one Heap, they would not equal one Hair of a Man's Head; but yet as the Hairs of our Head have Cavity, so also have these most minute Vessels, and are composed of Fibres disposed after that manner as I have told you. I have now shewn you what those things are, by a close Connection of which, what are most minute in our Bodies are composed of: And what must be carried to every individual Place to nourish them; nor is there any other Method of knowing this than what I have here told you.

1. I have given you Demonstrations *a Priore*: And,

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2. By

2. By Chymical Resolution we shall find a *Posteriore*, that such and such Parts are thus composed; for Example,

1. The most simple Elements are brought together.
2. A Fibre is made out of these thus brought together and united to each other according to Length, or it may be according to some Kind of Breadth; and is nourished by a mere Apposition which has no Cavity, but is like a Thread of united Elementary Parts.
3. A Membrane is composed of these most minute Fibres mutually uniting themselves to each other after a triple manner, viz. according to Length it is composed either of right Lines placed close to each other, or by an interwoven Concourse of long Fibres, and then it is a thicker Membrane than the former, and more composed and compacted; or lastly, by Contorsion, and then a Membrane is composed or compacted and strong in the highest Degree, tho' it be like the other two simply composed of Fibres.
4. Is made a more simple Vessel which forms a Hollow to be contained in another fluid Body, and whose closed Hollow is a most simple Membrane turned round in Shape of a Vessel. And here we must stop;
for

for it would be an infinite Nutrition, if there were no End of Vessels, that is, if we were to proceed in Infinitum. But other Membranes which are not simple are composed of small Vessels; the Membranes therefore of those which are the next to the last or ultimate are composed of minutest Vessels. Bellini [at the End of his Works] is the only one that has said any thing of this Subject.

XV. The Trifles of the *Aristotelians* in relation to compounding Elements, &c. are very difficult; those Vessels which an Anatomist demonstrates are by no means the most minute; but a Congeries of Vessels the most minute. Suppose (which seems to be a Paradox) the great Artery consisted of a Million of Vessels differing from each other in one Degree only, for a great Vessel has a Membrane, whose compounding Parts are Fibres or Canals, and these are the most minute, or not; they are therefore again composed of smaller, which also are a Congeries of Vessels; and therefore it is a Question, whether a Body as soon as it begins to be formed has these Canals? Undoubtedly it has, but by the Help of the Blood's Circulation, the largest Vessels are extended, and the least are compressed and grow together, which makes them e-

very Day less in Number ; and thus from the Concretion of these most minute Vessels is made a Fibre which is now much stronger than when it was a Vessel ; and thus all the thicker Fibres were once little Vessels, but now the Liquid being expressed the most minute Canals grow up together into one Fibre, which also is composed of a great many other Fibres ; and when this is done in the minuteest Vessels, there grows Strength, but in the greatest a *Callus*.

XVI. The minuteest Vessels of a Body cannot be perceived by the bare Eye, or even through a Microscope ; for which Reason we can only form an Idea of them by Arguments taken from the greater Vessels known to us. For all what I have said concerning Fibres and Membranes I cannot (properly speaking) demonstrate to you ; but I ought to shew you that they are so very small that they cannot be seen through a Microscope, and I think in this I shall act by you with the utmost Fidelity ; for I must recommend to you the use of the Microscope, for nothing more confirms an Anatomist than that useful Instrument.

XVII. That you may the better understand

derstand that there are Canals in a Body much less than can be discovered by the Microscope, I shall in a few Words give you its History in relation to Anatomy.

The most curious Searchers have thus proceeded: Suppose, for Example a Magnitude *A.* to be one Inch, and———*A* which may be divided into an *B* hundred conspicuous Parts; suppose *B.* to be such one hundredth Part, as the Diameter of a Grain of Sand may be; but all those who have made use of the Microscope have discovered that the Diameter of a red Globule in the Blood is one hundredth Part of the Diameter of a Grain of Sand, that is, if one hundred red Globules of Blood were placed close to each other, they would occupy the Space of the Diameter of one Grain of Sand. Since therefore the Diameter of a red Globule of Blood is the hundredth Part of the Diameter of a Grain of Sand, and the Diameter of a Grain of Sand the hundredth Part of an Inch, the Diameter of a red Globule of Blood must be of Consequence the ten thousandth Part of the Length of an Inch. But Microscopes plainly shew us that there are Vessels that carry Blood thro' which only one red Globule of Blood can pass; but as there are Spaces between them like Squares of Diameters, a Square Inch will

will be capable of containing one hundred Millions of such Vessels. These Vessels may be perceived by the Eye. Besides these there are others which are transparent but not perceptible, and through a Microscope I plainly see that this Globule runs through transparent Globules.

XVIII. There are in our Body Vessels which carry Water from one narrow Space to another more narrow, but the greatest of these that I can perceive does not equal that Vessel which transmits a Globule of Blood. This Water as *Lewenhoeck* has evidently demonstrated is in its Parts six times less than a red Globule of Blood, there will therefore be 3600,000,000 of these Lymphatick or watry Vessels in a square Inch: But if you take in *Sanctorius's* Vessels of Perspiration which are much less, as pouring out Liquids which being placed near the Fire do not thicken but evaporate, and consequently are of such extraordinary Tenuity as to leave no Faces behind them; how small then must these Vessels be? And yet tho' a Man was to live a hundred Years, they would remain whole and entire.

XIX. *Lewenhoeck* in his first Volume of his Letters to the *Royal Society of England*, wherein he describes the Brain by the Microscope,

croscope, tells us that the ultimate Thread or Filament in the Brain visible thro' a Microscope is only the sixty fourth Part of the Diameter of one red Globule of Blood, the Diameter therefore of one of these Filaments or Vessels in the Brain is the 640, 000th Part of an Inch, and therefore taking in their Squares 40, 960, 000, 000 of such Vessels are contained in one square Inch: But the Eye can no ways discover Vessels so very minute and slender, but by the Help of a Microscope.

But the Question is, whether these Vessels are the smallest of all? I shall demonstrate that these only differ from the most minute, as the Globe of the Earth does from a Grain of Sand. It is evident from Experiments that the *Animalcule* in Human Seed is the Basis or Foundation out of which afterwards is formed a Human Body, there must therefore be in it all these Vessels; but the Magnitude or Diameter of one *Animalcule* in the Seed is by the Microscope found to be 100, 000th Part of an Inch; in relation therefore to a Cube, a cubical Inch will contain 1, 000, 000, 000, 000, 000 of these *Animalcules*; for as many of these Vessels there are in us, so many Vessels must there be in these; the only Difference between us and them

is,

is, that they have a much greater Number of Vessels than an adult Body: For in an adult Body they are always growing more compact, cartilaginous, &c. and consequently fewer in Number, and this Decrease still continues 'till thro' Diminution of Vessels we die of old Age.

XX. Whenever you hear an ultimate Vessel described, do not believe it to be the ultimate Solid, for 100,000 of them may be contained in the Compass of a Grain of Sand; compare what has been said with relation of the Number of the Sands of the whole Earth, which *Archimedes* computed. Well therefore did the divine Prophet say, that God had created our Bodies with a divine and infinite Workmanship.

XXI. After a Physician has his Understanding well imbued with this Idea, then let him endeavour to digest his Study of Anatomy: In which he will learn nothing but the Parts visible to the naked Eye or Vessels *per se* or filled with a thick injected Liquor: Do not hence conclude with some great Men that the minutest Vessel can be demonstrated; for *Galen* heretofore, and in our Days *Swammerdam*, *Nuckius*, *Ruychius* and *Ravius* have forcibly injected some Liquor to that Degree, that the Vessels have

have been dilated beyond their natural Extension; they injected opacous or thick Bodies, as Wax or Oil of Turpentine, they notwithstanding confess they only attained to the Knowledge of the largest of the minuteſt Veſſels: nor muſt it be ſaid that there are no other Blood-veſſels than theſe, tho' they ſeldom come to the Veins. The ſame may be ſaid of Quickſilver.

XXII. The whole Study of Anatomy is divided into four Parts,

1. *The firſt treats of the Bones and their proper Parts.*
2. *The ſecond of the Muſcles and their Parts.*
3. *The third of the Viſcera or Bowels, and the Parts belonging to them: And,*
4. *The fourth of Veſſels without the Bones, Muſcles, and Viſcera, or which are contained within them. Of all which in their Order.*



*The first Part of Anatomy, or
Osteology.*

THIS Part treats of the Bones, and of their proper Parts ; for other Parts depend on these firm Parts, and therefore I cannot assign their Situation, unless it be in relation to the Bones ; for Example, the Heart is placed in the Cavity of the Breast, and depends upon the firm Parts, but there are no firm Parts in the Body besides Bones and Cartilages : So the Brain has its *Cranium* or Scull which is firm, whereby its Dimensions may be taken. If you have never so learned an Anatomist to instruct you, if he does not begin from the Bones, he will never give you a true Idea of any thing ; for the Knowledge of the Bones is the very Basis and Foundation of the Practice of Physick, because Distempers and Affections of Parts are known by the Description of the Bones. This first Part is therefore aptly call'd *Osteology*, or a Treatise of the Bones, which I will dispatch in three Positions or Conclusions : I will not only give you a Description of the Bones, but of all Things else which belong to the Bones as Bones.

1. The first is Osteology^{geny}, which teaches you what is the Matter and Origin of Bones, and what is their Condition in the first Part of Substance.
2. The second is Osteography which teaches the Knowledge of their Structure in adult Bodies, the Description of their Make, what Cellules, right and transverse Fibres, and Marrow is in them.
3. The third is Synosteology, which explains those Parts in the Bones which make one Bone to be connected and knit together either with or without Motion.

The second Part, or Myology.

THIS Part is so called because the Part making Motion has the Resemblance of a Mouse, viz. it has one shorter Tendon, then a Kind of Belly and a longer Tendon like a Mouse's Tail, so that it does not very improperly look like the Figure of a Mouse, which in Greek is μῆς, in Latin *Mus*, and in Dutch *Muis*, and this Part is divided into two others, viz.

1. Sarcology, or the Description of muscular Flesh.
2. Aponeurosiology, or a Description of the

the Tendons which collect or gather together the Muscles in fixed Points, for Ἀπονεύρωσις signifies going out of the muscular Flesh into tendinous or nervous Substance.

The third Part or Splanchnology.

THIS Part treats of the *Viscera* or Bowels ; under this Name I comprehend a remarkable Body contained in one common Superficies, consisting of a great many Vessels, and (as it is for the most Part) of several Glands collected into one Body whose Effects chiefly are to change Liquids , or to make some great and singular Secretions. The Brain therefore, and all its Parts , the Lungs, Liver, Spleen, the *Pancreas*, Stomach, Intestines and Womb in Women are properly *Viscera* : But the Heart is not, for it is a Muscle. This Part is called *Splanchnology*, and teaches us the Connection and Situation of the *Viscera*, and their Leading, Secreting, and other Vessels.

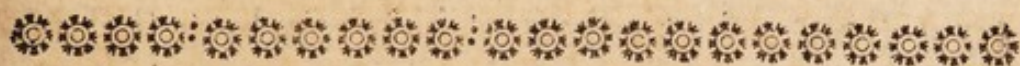
The fourth Part, or Angiology.

THIS Part treats of the Vessels : But what is a Vessel ? For all the *Viscera* are Vessels. By Vessels I understand all those Canals which are without

without the Bones, Muscles, and *Viscera*, and this Part is called *Angiology* from *Αγγέλιον*, a Vessel.

Now here seems to arise a Doubt, *viz.* to what Part we ought to refer the Nerves either under that of the *Viscera* or Vessels: Most certainly to *Splanchnology* in as much as they are Productions of the Brain, and to *Angiology* in as much as they carry a distinct Liquid.

All these Parts, for Order sake, shall be distributed into the four general Heads or Chapters following.



CHAP. I.

The first Part of Anatomy.

SECT. I.

Osteology.

I.  HE first Part of *Osteology* is *Osteogeny*, which is a Description of all the Changes which are observed to happen to a Bone from the first Conception in the *Ovum*
M to

to the full Growth and Maturity of Manhood, and it describes,

1. *The Matter and Origin of the Bones.*
2. *The successive Series of all Changes which they may undergo from their first Formation to their being entirely completed.*

A *Bone* is the hardest, whitest, and smoothest Part of a Body, and it must be observed that there can be no Body, but its immediate preceding Condition was that of a *Cartilage* or *Gristle*.

A *Cartilage* is a Body next in Hardness to a Bone, but more pliable and most Elastick of any Part of the Body. (For there are some Bones a little soft, that are not in the least elastick,) it is (I say) next to a Bone the hardest of any Body; for all the others are either Flesh, Vessels, or Membranes. And it is distinguished from a Bone by its Elasticity; for a cartilaginous Globe is the most elastick of any, and this makes it to have in our Body such Uses as are inimitable by the other Parts; so that wherever there is a Necessity of a resisting Power in us Nature has made it cartilaginous. Thus the *Apophyses* and Cavities in the Articulations are covered with a *Cartilage*, that they may, of their own accord, result or fly back when they are turned about. The Extremity

ty of every Rib has its Cartilage, for these elevatory and depressory Muscles are very strong though not large. For which Reason Nature has fixed to them a pointed (Sword-like) Cartilage, and the Cartilages of the Sides placed close to it, that by their Force and Power the Breast may be compressed inwardly, and this is the only Cause of Respiration in our Sleep, tho' we do not attend to it.

II. *Cartila* in Greek $\chi\acute{o}\nu\delta\rho\omicron$ or $\chi\acute{o}\nu\delta\rho\omicron\nu$ immediately before its changing into a Cartilage was a Membrane; and there is no Cartilage in a Body, but what was so: For in every *Fætus* within the Month there is no Bone, but only cartilaginous Points which grow every day greater, but the Part immediately next them is always a Membrane.

A Membrane in the Greek $\mu\acute{\epsilon}\mu\beta\rho\alpha$ or $\mu\acute{\epsilon}\mu\beta\rho\alpha\varsigma$ (which Name is not only given to the Membrane of the Brain, but to all the others) is a very pliable Body, and nearest to a Cartilage. I do not here give you the Description of a Bone, Cartilage, or Membrane, but only number their *Phænomena*. Every Membrane is a Texture of Vessels and Fibres, it is a kind of Sheet where the Filaments or Threads are closely interwoven (as in Linen) so as to make a Plain, and this is made either of little Vessels or

Fibres. Every Bone therefore is made of Fibres, but every Membrane consists of Vessels, which are so many lesser similar Membranes, so that every one makes a Cavity, but the last is fibrous, and the last but one vasculous. Hence every the smallest Canal has its Membrane, which I do not take for a Texture of Fibres but Vessels, and you may learn the minuteness of Vessels from the Writings of *Hoeck*, *Lewenhoeck*, &c. for in Reality no one yet ever saw the last or ultimate Vessels of *Sanctorius*, the ultimate Membrane therefore is fibrous.

III. A *Fibre* is a right corpuscular Line which consists of Parts conjoyned to each other, and so small and slender that it admits of no Cavity; its Parts are merely earthy, in which there is neither Salt, nor Oil, nor Water; a Bone therefore is composed of Cartilages, a Cartilage of Membranes, and the ultimate Membranes of Fibres, and a Fibre of mere Earth, which is brought and applied to the Part by the Form of the nutritious Juice.

IV. Every Vessel is made a Fibre if its Liquid be expressed, if its Sides be compressed and are consolidated and grow together; and thus a great many Fibres
more

may become one, which will be much the more elastick the thicker it is than it was at first. Hence, if a great many Vessels of any Membrane consisting of the Texture of such Vessels become Fibres, then of necessity it must be more solid, white, hard, and elastick, that is a Cartilage. Look upon the various Heads of *Embryos* [*in Medio Bpéυματῶ*] at first there rises a kind of a Cartilaginous Star, you will see by the Help of a Microscope in that Cartilaginous Point thick Strewings or *Strata*, not only of compressed and non-compressed, but also of compressing Vessels, by which it appears that a Cartilage consists of these *Strata*, whose intermediate Vessels remain loose and unrestrained, and thus there are in it a continued Series of dried and intermediate *Lamellæ*, which yet have their proper Fluids.

V. If these Cartilaginous Strewings or *Strata* are more and more compressed, then such Cartilage becomes most compact, white and dry, and is a Bone.

A Bone then is a Compages of many Membranes which mutually lie on each other like thin Plates [*Lamellatim*] between whose Spaces are Vessels which carry their own Liquid. But in what Part does a Cartilage begin to form it self into a Bone

in the *Fœtus* ? I answer in the very Centre.

- *Havers* has demonstrated that there lies the greatest Artery, and consequently the greatest Pulse; and hence it follows that there the Vessels are first of all compressed and become Cartilages, but by a continued Pulse the Artery goes on in its Compression, and then the Bone begins to be formed, which hardens every day 'till its Middle is so solid as no longer to recede or give way. In the Middle therefore a Bone is most hard and compact, but very small and slender, the *Lamellæ* being there more repelled by the Blood, and in that Place are formed several *Cellulæ*.

VI. Having now explained after what manner all Cartilages and Bones [from these] are made, and that they consist of various *Strata* or *Lamellæ* mutually lying on each other; we must look farther and see that there are in some Places between these *Strata* or *Lamellæ* greater intercurring Vessels, and such as carry more Liquid than the rest, and that at the same time the greater Arteries, being there distributed, distend the *Lamellæ* of the Bones mutually from each other, and so form in the Bone some Cavities or *Sinus* (by its Velocity and Rapidity) which were not at first in the Bone, but afterwards are. The *Os Sphenoides*,

noides, for Example, in the intermediate Part in Infants is solid : but when an Infant is grown up it is made hollow into two distinct Cavities or *Sinus* with a *Sep-tum* or Partition in the Middle, and these Hollows or Cavities have a Membrane and Glands to secrete the *Mucus*. Thus in the Forehead-Bone in an Infant of six Years of Age (contrary to other Bones) when it begins first to grow bony, there is no subciliar *Sinus*, but in a Person of twenty Years of Age and upwards, you will see a Cavity big enough to lay your Finger in the *Lamellæ* receding from each other and forming those *Sinus*. Neither is there any Cavity in the upper Jaw-Bone in Infants; but there is a very large one in adult Persons capable of containing 3ij of Liquor. What Wonder then is it if the *Lamellæ*, which before were so close to each other, being now removed from each other, should form these Spaces which are of so great Use? For where the great Vessels are the Arterial Pulse (tho' very soft) beats 15000 times in an Hour, thereby making the *Lamellæ* recede in order to form these Cavities. After this manner likewise are formed the *Sinus Medullares*; for the *Caverna Medullosa* is not proportionably great (as in adult People) which is caused by the *Arteria Medullosæ*.

VII. I have told you that the Nutri-
ment of all the solid Parts is Earth, which
is so very small that there is no Vessel in
the Body through which it cannot pass.
By the Apposition of this Earth are form-
ed Fibres, and out of Fibres the smallest
Membranes, out of Membranes Vessels,
out of Vessels and Fibres other Mem-
branes, and out of the *Lamellæ* of Membranes
Cartilages, and out of these closely com-
pacted to each other are lastly formed
Bones, &c.

VIII. *Malphigius* in his Posthumous
Works *De Genesi Ossium*, says, that Bones
consist of *Lamellæ*, between which is con-
tained a Bony Juice or Glue, which
makes them stick close to each other. The
Reason of this Opinion of his proceeded
from his observing that the *Callus* in bro-
ken Bones, by means of the extravasated
and harden'd specifick Juice, grew into a
Bone : But the bony Juice is nothing else
but what *Havers* has described. A Bone
consists of 10000 visible *Lamellæ*, between
which Vessels naturally luxuriant, and
endeavouring to extend themselves beyond
the Extremity of the *Lamellæ* heave them
up, and stretch them on every Side, and
when these meet together and are united,
they

they always cause a Swelling or Tumor ; for by the Force of the Arteries they are compelled to make a greater Ascent than before.

A Bone is thus formed in the Middle. For the most Part there appears a white Spot with a cartilaginous Margin, and after three or four Months then it looks like a Star, and sends forth on every Side bony Rays, but every Ray ends in a Cartilage, the rest is a Membrane, and after this manner it proceeds even as far as the *Epiphyses*.

IX. It is not an easy Matter to learn *Osteogeny* from Books after the Method I have here laid down, by reason of the scarcity and want of Authors ; and those who have written on this Subject have indeed some tolerable Observations, but they keep no Order. But the best are these that follow, viz.

1. The best that ever wrote hereon was *Kerckringius*, a Native of *Amsterdam*, he was a Man of a very quick and sprightly Genius, and learned in all Studies, especially *Anatomy* and *Chymistry*. He put out a Book in *Quarto* at *Amsterdam* in the Year 1670, which was reprinted in the Year 1673 ; and as to the Descriptions much preferable to the former Edition, but not
as

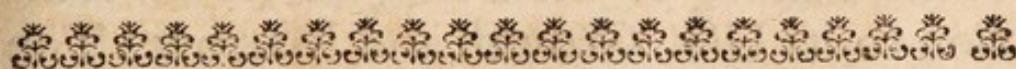
as to the Figures. It bears this Title, *Specilegium Anatomicum & Osteogenia Fætuum*, in which he describes (tho' not very perfectly) what changes the *Fætus* undergoes every Month, especially in relation to the Bones from the *Ovum* to their full Structure and Maturity. He published in *Quarto* in the Year 1670 another Treatise called *Anthropogeniæ Ichnographia, seu Delineatio, describens Hominis Genesin ab Ovo fecundato usq; ad novem Mensem*. These were most elegant Treatises in those Days; for as he was very rich he expended vast Sums, and had the Assistance of the best Anatomists of *Amsterdam*. But as these Books are prodigiously scarce, you may find them in the *Bibliotheca Anatomica*, put out by *Manget* and *Le Clerque*; this Author is the first who ever undertook to write of these Matters.

2. *Malpighius* in his Posthumous Work, *De Cornu Bovini Generatione & Concretionem*, where he describes how the *Papillæ* of the *Epidermis* may be compressed and consolidated into a Bone. He found out this by observing that in the Neck of an Ox that had been used to the Yoke, there grew up a little Horn from the Nerves that lay under the Yoke, being first made cartilaginous and bony on the outside. See his Epistle *ad Sponium*, and his Epistle *de Ovo incubato*,

incubato, wherein he gives some Touches of the Variation of the Bones in Chicken.

3. You must read the *Conceptus de Conceptu Humano* of *Char. Drelincourt*, this is an admirable Book, and printed at *Leyden* in *Duodecimo* in the Year 1685 : But,

4. The chief and most excellent of all is *Jos. Du Verney*, a Man incomparable in Anatomy. But it is great pity he would not present the World with his Discoveries ; but his publick Dictates were curiously but not perfectly taken by his Scholars in the King's Garden at *Paris*, first by *Le Clerque* in *Osteology* in his second Tome, *de la Chirurgie complete* ; but he observed that the *Os Scapulæ* was one while Cartilaginous, and then absolutely bony and so on : Thus his Scholars carried always with them his Dictates, which indeed deserve the highest Praise and Commendation.



S E C T. II.

Osteography.

I.  F T E R therefore a Physician has learn'd how Bones are formed, he ought to know how they are framed and put together in adult Persons. But that this may
the

the better be done, he must take special Notice of the Diversity between the Body of a Bone and what grows upon it. The Body of a Bone is a Series of Fibres which are extended into Rays (like those of a Star) in its Formation, that which grows over it [or its *Adnata*] are the *Epiphyses* or *Tubercula* which remain a long while Cartilaginous.

The Body of a Bone must be consider'd two Ways,

1. *In respect of its solid Part.*
2. *In respect of its Cavity.*

In the former the *Periosteum* about the Bone must be consider'd, which is either *equal* or *inequal*.

An *equal Periosteum* is when by the Texture of all the Vessels falling or rising within the *Meatus* of the Bone, either in relation to its Use, Growth and Marrow : The Arteries , Lymphatick Vessels, Ducts of Fat, the Congeries and Texture of the Nerves go in and out: (For even in the Marrow there is Sense) when it proceeds by one equal Series of Fibres, where there cannot be any Muscle whatsoever.

A *Periosteum* is said to be *unequal*, when a Tendon or *Aponeurosis* of a Muscle lying near a *Periosteum* penetrates that *Periosteum*

riosteum (where there is a two-fold *Perio-*
steum) and inserts it self into the Bone :
There have been some Disputes in rela-
tion to the *Pericranium* and *Periosteum* ;
for the *Pericranium* is the *Periosteum* of the
Scull, and the other is nothing but an In-
sertion or *Aponeurosis* of the Muscles.

II. *J. Riolanus* in his *Anthropography* was
the first who took Notice of this ; but no
one has done it with greater Exactness
than *Havers* in his Lectures *De Ossium Ge-*
nesi in the Royal Society of *England*, and
this has been of great Advantage to Man-
kind. He says the same thing in the twen-
ty fourth Paragraph of the Substance of the
Bones. In the Body of a Bone must be
consider'd its Substance properly so called,
viz. that hard, dry, brittle, light Matter,
void of all Vessels which we call by the
Name of a Bone.

A Bone in the Middle is first most so-
lid , secondly most compact, and thirdly
most united ; but in the extream Parts,
where the Joints are, and where it is knit
to another Bone, the very Substance of the
Bone is less solid, very porous, and con-
sisting of many Spaces not so united : This
is the Description of a Bone in general as
a Bone. I say nothing here of Vessels.
But how comes it to pass that the *Os Fe-*
moris,

moris, for Example, is most solid, compact, and heavy in the Middle? This Question no one can answer but *Havers*, who shews that all the Bones were heretofore membranous *Strata*, mutually laid on each other, and compacted by the Pulse of the Arteries, which at first is effected where the Arteries plentifully enter instead of the Marrow. These are the Arteries of the *Periosteum*, but about the Joints they are divided into lesser Branches, and thence it comes to pass that the Middle of the Bone is compacted in the highest Degree, because there is the highest Pulse; but in the Joints, where there is a lower Pulse, the Bones are looser.

The same Author observed, that if the whole *Os Femoris* was cleft through the Middle, where the Bone is thinnest, the *Lamellæ* would be found there to be in as great a Number as in the extream Parts; but as the extream Part is thicker, the *Lamellæ* therein are more remote and expanded from each other, for the aforesaid Causes. Hence it follows,

1. *That in the Middle of a Bone where the Lamellæ are most compact, the intercurrent Vessels are the smallest; but in the extream Parts every thing is full of Vessels (in the beginning of the Formation*

tion of a Bone it was quite contrary) as may be seen in Kerckringius ; for in the extream Parts the Vessels are not obliterated, and the Lamellæ are more remote. Hence follows,

2. The Whiteness of the Middle, and the Redness of the extream Parts. There is the greatest Hardness in the Middle, and Softness in the extream Parts. But for what Use? It is evident from Mechanics, that if you give any one a Stick to break, when the extream Parts are broken, it is easily broken in the Middle, because in that Place there is a greater Violence of Motion.
3. There is scarce any Liquid between the Lamellæ and the innumerable fibrous Vessels ; burn them in the Fire, and you will see a great Quantity of Marrow fry out ; and after that you will find several void Spaces between the Lamellæ.
4. When the Bones have no more Substance in the Middle than in the extream Parts, there must of necessity be left a Cavity in the Middle ; about the Ends there are a great many very small Cavities ; but in the Middle there is one large common Cavity, where the Marrow shews itself in greater Quantity, tho' it be also in the extream Parts between the little Receptacles

ceptacles of the Fat. There is more Oil in the Middle but fewer Vessels : On the contrary in the extream Parts there are more Vessels and less Oil. By this you see the Reason why a Bone is easily broken in the Middle, and easily put together again ; but it is not so easily broken about the Joints, but ground as it were, and much more difficult to be restored to its former Situation ; for which reason Rottenness and Putrefaction is easily cured in the Middle by Rasure, but it is not so easy in the extream Parts.

III. Compare with this what I have said in *Osteogeny*, and you will have a clear and distinct Idea of a Bone ; but in the solid Substance of a Bone, there are besides intermediate bony kinds of Nails uniting the *Lamellæ* (after the same manner as Builders joyn two Walls together by Beams) that the Bones may not be cleft asunder ; so that in all Bones which are moved and sustain the Body, there are those Nails or little Beams, but not in them which only exercise Motion as those in the Thighs and Shoulders. *Havers* says, that these kinds of Nails are in the whole Series of the Membranes, and the *Lamellæ* of the Sides which are inflected and depressed without keeping any Order at all.

IV.

IV. In the next place the Marrow must be consider'd. All Bones which are designed for Motion have one Hollow or Cavity in the Middle, another about the Ends. The intermediate Cavity contains in every healthy, strong, youthful, undisturbed, well-fed Animal a very sweet, pleasant, thin kind of Oil, extreamly fresh, without the least Mixture of Salt or Water.

V. From the *Periosteum* through the Thickness of the *Lamellæ* are made oblique Holes, by which the great Arteries insinuating themselves from the *Periosteum* soon discharge themselves into the Cavity of the Bones, which, as soon as they have penetrated, they immediately apply their sanguineous Branches on very Side to the Superficies of the Cavity, and make out of all the interwoven Branches a thick Membrane, which is the internal *Periosteum* of the Bone, only covering the Cavity of the Bone. Take the *Os Femoris* of a Sheep, and cleave it long-ways in the Middle, there will stick to it in the inside a sanguineous Membrane, from which infinite Branches are dispersed within the Cavity of the Bone, and by the intercurrent *Anostomoses* make spherical Cavities which are made out of a certain Membrane interwoven

terwoven with these Blood-Vessels; these Membranes are hollow in the Middle, and receive the Oil of the Blood within their Cavities; there is a strict Communication between these little Bags, and they gradually throw out again their Oil into the arterial Membrane, which is a Membrane very thin, covering the Marrow; hence it is call'd *Arachnoidea*, that is a Collection of the excretory Ducts of the Oil of the Marrow. The Veins rise out of these little Bags where the Arteries end, and receive the Blood without any of its Oil. These Veins at the internal *Periosteum* are interwoven with the Arteries, and go out thro' several Holes from the Arteries out of the Bone to the external *Periosteum*, and thence to the *Vena Cava*.

But where is this Marrow? If you take a fat Horse that has been well fed and died of a sudden, his Bones will be full of Marrow; but if he had been used to hard Labour and then died, there will be no Marrow at all in his Bones, but *Serum* only in its room; by which it is evident that I may exhaust all the Marrow out of the Bones by Motion. But if this Horse had rested some time in the Stable, he would have had his Bones again replete with Marrow.

VI. From hence this Oil is distributed into several Places,

1. It goes away by Sweating through the *Lamellæ* of the Bones. Take a Blade-Bone of a Shoulder of Mutton, cut off the Flesh very clean, and hold it to the Fire, and you will see the melted Marrow sweat through an infinity of little Holes or *Meatus*; cleave it then down in the Middle, take away all the Marrow with the Membrane, and hold it to the Fire, and even then you will find that the Marrow will distil. In boil'd Bones (as Shin-bones or Trotters) after the Flesh has been some time taken off, you will see the Fat again sweat out, and the Bones grow yellow; this Fat hinders the Bones from growing brittle, for the thickest Bone may be broken if burnt and its Oil consumed by the Fire; but then if it be put into Water, it will grow firm again, but much more if into Oil after it has suck'd up some Quantity of Oil.

2. The second Way it takes is towards the *Periosteum*, thence to the larger Arteries, and then again at last to the Heart.

3. The third is greatest of all, as being towards the Cavities of the Joints, to lubricate them, and to make their Motions without Crackling or Pain. If an Animal

undergoes much Motion this Oil is consum'd, and there ensues a Difficulty of Motion, the Parts then grow hard thro' Defect of this Oil, as in the Wheels of a Mill, which unless they are well tallow'd begin, as it were, to groan and at length by much Attrition are set on Fire. The Cause that brings this Marrow is the arterial Blood, the Places whence it is propelled are these *Sacculi* or little Bags, the propellent excretory Cause is every more forcible Motion of the Arteries. Therefore when an Animal is at Rest, the *Oleum Medullosum* encreases, if it undergoes much Motion the Blood is secreted through those Parts I just now mentioned; thence it softens by going thro' that Part which returns it into the Veins, and the Joints are moisten'd for their respective Motions, &c.

VII. Authors who have excelled on this Subject are these, viz.

1. *Clopton Havers* in his new *Osteology*, printed at *London* in *Octavo* in the Year 1695: After him,

2. *Du Verney*, of whom we know nothing but in his private Writings, some of which are to be seen in the *Journal des Sçavans*, and some published by his Pupils *Palsin* and *Le Clerque* in *Osteologie*.

3. *Malphi-*

3. *Malphigius* has somewhat worthy your Notice in his *Posthumous Works*, but he is not so excellent in this as in his other Treatises.

VIII. In almost all Bones towards the Extremities, and thence to their Sides grow other little Bones which are called by Anatomists *Epiphyses*.

The Meaning of this Word [*Epiphysis*] is as if one Bone grew over another: And all these are connected with the Body of the Bones by a kind of Joint. If you look carefully on a Shoulder of Mutton-Bone, you will find a Bunch or *Tuberculum* which may be easily separated, which is called an *Epiphysis*; and in that Part by which it is joined to the Bone, you will see Things like Teeth which receive and are mutually received by others. In the second *Os Femoris* or Thigh-bone there are *Tubercula*, the greater and lesser *Trochanter* at its Neck which are easily separated and joined by the Cartilages or *Synchondrosis*, but in adult Persons the Vessels are so much compressed that you can only see one of them, and then it is called *Apophysis*, or an innate *Appendix* to the Body of a Bone: All *Epiphyses* in all Animals of Years change into *Apophyses*.

IX. But for what End or Use are these *Epiphyses* so closely connected with the Bone? There are several Opinions concerning this. Consult *Realdus Columbus* in his Chapter *de Epiphysibus*, and his Anatomy, wherein he says, that a Bone which is moved to a Bone is joined by Ligaments which knit one Bone to another, and that these are not made out of the *Periosteum*, but between the *Epiphyses* and the Body of the Bone there rise out Fibres which embrace the *Epiphyses* of the other Bone, and insinuate themselves between that and the Bone; but when the Animal is grown up, the continual Compressions make them *Apcphyses*. Another Use is to knit the Tendons to the Bone: For where the strong Tendons of a Muscle are to be affixed, there grows up a *Tuberculum* or Bunch, that the Point of Direction of Motion may rise out of such Bone, and so the Muscles from this *Appendix* have a much greater Power than if they were only in *plano Ossis*.

X. Almost every *Epiphysis* is covered with a Cartilage, for (as a Cartilage is a Thing most smooth and elastick) it sooner results from Compression, and the Bones are more easily moved about. These Cartilages never become Bones or grow dry (as *Havers* observes)

serves) because they have always with them a liquid, oily, marrowy Spirit, which makes them never come to be Bones, unless in a very old Age, because then the interspersed Liquid decays. In this Matter consult *Columbus de Epiphysibus.*

XI. All these Descriptions of the *Periosteum* of the double Substance of the Bones, of the Marrow, *Apophyses*, and *Epiphyses* are true of all Bones; for Example, it is commonly said that the Marrow of the Scull is the Brain, than which nothing is more false, and that the *Pericranium* is the outward *Periosteum*, and the *Dura Mater* the inward. These Bones are joined by pointed *Epiphyses* which reciprocally indent each other; at first they were Cartilages after having been Membranes; and lastly, in adult Persons grow to be Bones; the *Sutures* are designed to give Issue to the Vessels towards the *Periosteum*; between the two *Lamellæ* of the *Cranium* is lodged its Marrow, called *Diploe*, which differs very much from the Marrow of all other Bones.

S E C T. III.

Synosteology.

I. **A** F T E R this, let us consider what is *Synosteology* *Synosteosis* [Συνοστεοσις] is a joyning of the Bones to each other in order to effect Motion. You must here then consider the Nature of *Epiphyses*, *Apophyses* the *Tubercular* Heads of the Bones, the *Cotula* or Cups, then the cartilaginous *Crustings* or *Coverings* of the Heads and *Cavities* of the Bones, their *Ligaments* and ways of joining, and this Order I take is the true Order of explicating all these.

II. Every joining of a Bone is at its extreme Parts, which were first *Epiphyses*, then *Apophyses*, from whence arise *Ligaments*. These therefore we ought first to learn; then their *Tubercula* and *Cotula*. These *Cotula* Cups, or *Acetabula*, the Ancients said were Hollows, in which one Bone was moved above another. The Structure of the Bones is certainly wonderful; for Example, the *Scapula* is plain, the *Caput Humeri* most round and smooth, and lest it should slip out there is placed over it a cartilaginous *Cotula*, shaped like a Bowl-Dish, and by that means the *Tuber* cannot be moved above the Bone,

Bone, but is pressed in by an elastick Substance.

III. The Ligaments have a great many little Glands which throw out a Juice in their Motion, as *Havers* observes.

IV. While one Bone is joined to another, if it has any Motion, it is called Articulation, which is various, *viz.*

1. By *Syffarcosis*, when one Bone is joined to another by Flesh growing between them, as the *Scapula Costis*, but here is not properly an Articulation, for this Bone is only affixed to the Muscles.

2. By *Syndesmosis*, or by Ligaments, neither is here a true Articulation; for Example, in the *Os Femoris* with the *Acetabulum* of the *Ischium* or Hip-Bone.

3. By *Synchondrosis*, or by intermediate Cartilages, as the *Epiphyses* of the Bones, *Os Pubis*, &c. But these three are not for moving the Bones, but joining them together.

V. But in this Place we must only consider these Bones which are articulated for these several Motions following, *viz.*

1. *Flexion.*
2. *Extension* : And,
3. *Rotation.*

Every

Every Bone designed for *Rotation* or turning about hath a protuberant Head, and is received into another Bone; thus I can turn about my Arm at the *Scapula*, and this Motion is call'd *Exarthrosis* or Inarticulation; those which have Motion backwards and forwards, as for Example the Knees and Fingers, &c. have always two *Tubera* or Bunches, and this *Coarticulation* is call'd *Ginglymus*; the other ways of joining are all Spurious, as when a Bone is joined to another *Synarthrosis*; as for Example, the *Sutures*, that is, when a great many Teeth are received into as many Cavities. *Symphysis* is when a Bone is simply as it were laid under another Bone, as the *Os Temporis*, and the *Os Bregmatis* (for here are also Teeth;) *Harmony* is when Bones are joined together by a right Line (but there is no such thing in Nature) *Gomphysis*, is when one Bone is fastened (like Nails) into another, as the Teeth in the Jaw-bones.

The best Authors to be consulted in this are,

1. *Vessalius* in his first Book in *Folio*, this Author is absolutely the best of any.

2. *Columbus* and *Fallopilus*.

3. *Le Clerque* is most excellent in his *Osteology*.

4. *Riolanus*.

4. *Riolanus*.
5. *Philippus Ingrassius* : And,
6. *Havers*, who treats of the most minute Particulars in this Part of Anatomy.

VI. Since now I have shewn you every thing that relates to a Bone, and given you a List of the best Authors thereupon, I shall now present you with some Thing very new.

It has been observed that from the extreme Parts of every Bone, between the outermost or ultimate Joints and the slippery cartilaginous Parts, there flows a Liquid which is neither watry, oily, spiritous, nor merely glutinous, but is most clear and transparent as you stretch it out between your Fingers. This is always at the Joints in all Animals whatsoever, and when this Liquid fails, then the Bones have been observed to crackle, and can scarce be moved, as it happens, for Example, in the *Lues Gallica*, and the Scurvy; the first who discover'd this Liquid was *Havers*.

VII. The Joinings of the Bones together are of two Species.

1. For Example, the *Os Femoris* is joined to other Bones, not herein mentioned, by the Cup, *Cotula* or *Acetabulum* : In the middle

Middle of whose Cavity is another Cavity, whence rises a fine smooth Ligament, which fastens the Bone to the Middle of the Cavity; within this there are a great many little Glands, which being compressed, emit a Liquid somewhat unctuous, but not directly oily; this Liquid thus expressed mingles with the Oil of the Marrow of the Bones, which when the Part is moved sweats out and meets with it; and these two being thus mingled, make that slippery Matter which preserves the Bones from being worn away by growing dry.

2. The Bones are so joined together that the Cup and the Head therein received may touch one another on every Side, and in these there is no such *Sinus*; but then the Ligaments have these little Glands, which being press'd emit that Liquid: These are called the *Mucous Glands*, whose Effects are these four following;

1. *To separate this Mucus, or transparent Viscid and insipid Liquor, which, when the Bones are moved, falls into their Cavities.*

2. *To mingle it with the distilling Liquid of the Marrow.*

3. *With the Marrow to form a third Body, which is neither oily, nor merely marrowy.*

4. By

4. By this Means and by the Motion of the Bones, this Liquid is made by Degrees most thin and subtile. For it must of necessity be so, that it may be thrown back again by the absorbent Vessels and mingled with the Blood. For if it should grow thick there would be a Dropsy in the Joint.

We owe a great deal to the Genius of this excellent Person [Havers] for having made his Observations on a Matter 'till then unknown to every Body. You may see his Writings in the *Philosophical Transactions* of London, or in his new *Osteology*.

VIII. The principal Authors in *Osteology* are,

1. *Andrew Vesalius*, a Native of *Brussels*, and an Anatomist, whose Books, *De Corporis Humani Fabrica* can never be sufficiently commended. His Works were printed in *Folio* at *Basil* in the Year 1543, 3 but soon after spread over all *Europe*; and then again printed at *Basil* in 1555. The Figures of the first Edition are the most beautiful; the Figures of the second Edition are more obscure and blotted, but the Text makes Amends for all; for he out-lived the first Edition, and corrected its Faults, and made new Additions, examined

mined all Objections that might be made thereto : If you would have him compleat, you must take the two Editions together.

In his first Book he deserves our highest Esteem in Relation to what he wrote of Bones.

2. *John Riolanus* the Son, this Author was a *Parisian*; the best Edition of his Anatomical Works is that of *Paris*, printed in *Folio* in the Year 1650. None of you if you are wise will be without this Book; for by his Method you will best of all perform your Studies. He was a perfect *Galenist*; but at last yielded to *Harvey*. He wrote against *Harvey*, but being convinced, he published this Book. You may read his Treatises of Bones. He however would explain every thing according to *Galen's* Way, and always consulted his way of Writing; he has no Figures. If you would have more than *Vesalius* wrote, you must compare this Author with *Vesalius's* Figures; for whatever has been newly discover'd since *Vesalius* you find here.

3. *Realdus Columbus*. He was *Vesalius's* Scholar (for *Vesalius* was a Professor.) This Author was a *Cremonian*, he has no Figures. This Work is printed in ~~Five~~ ^{four} Books in *Folio* at *Venice* in the Year 1559; or you may have them in *Octavo* printed by *Weckel*.

4. *John*

4. *John Philipp de Garcias*, who wrote a Commentary on *Galen of Bones*. This was printed in *Folio* in *Sicily* in the Year 1603, and afterwards at *Venice* in 1604. There never was any one more curious in collecting what he could than this Author; but he is very scarce, and there is no great Hopes of finding him, but buy him if you can, but do not give too much Money for him; for *Riolanus* has collected out of him the Things that are the most excellent and material.

5. Add to these a little Book of *Le Clerque*, the late King of *France's* Physician, called *Osteologie Complete*, printed at *Paris* in *Octavo* in the Year 1706; there is no one can be more serviceable, in a short Method, to any one's Memory who knows any thing than this Author. It is a most incomparable Book; it has in it two Things very particular.

1. He most accurately describes all the new Discoveries of Authors.
2. He most perfectly delineates where the Aponeuroses of the Muscles unfold themselves upon the Tendons.

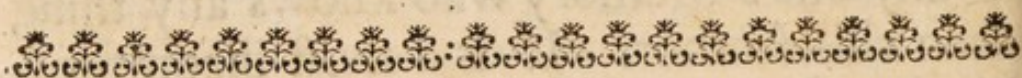
Read this Author over and over; for he will serve you as an *Index* in reading others.

6. *John Palsin*. This Book is published
in

in *Flemish* at *Leyden*; it most compendiously contains all *Du Verney*: But,

7. And more especially you must have recourse to *Clopton Havers* in his new *Osteology* printed in *English* in *Octavo* at *London* in the Year 1695; the *Latin* Translation is good for nothing, the Translator in many Places having varied from the Sense of the Author.

IX. If you read these Books you will acquire a more perfect Idea of *Osteology* than any Author ever yet had; and thus in the Space of two Months you may learn it by coming two Hours twice a Week to our Anatomy Theatre, [School] where are a great many Skeletons.



CHAP. II.

The Second Part of Anatomy.

Myology.

- I.  According to Order, our future Physician should learn every thing which belongs to the Muscles, which Part of Anatomy is called *Myology* from *Mūs*, a Mouse, (or Lizard) by which

which Name the Ancients not improperly called a Muscle, on Account of the Figure and Shape of that little Animal; . and they divided it into three Parts, *viz.*

1. *The Head or Origin where there is an obtuse Tendon.*

2. *The Belly where the Muscle is fleshy in the highest Degree : And,*

3. *The Tail where it ends in a Tendon more acute.*

II. *Myology* is divided into two Parts, *viz.*

1. Into *Myography*, which describes every thing that belongs to a Muscle. And,

2. Into *Myotomy*, or the Description how a dead Body ought to be treated in order to make the Muscles visible and conspicuous.

Which two Parts I shall consider in the two following Sections.

S E C T. I.

*The first Part of Myology, viz.
Myography.*

MYography is divided into three Parts, of all which in their Order.

I. The first Part of *Myography* teaches the Matter of which the Muscles are composed,
O posed,

posed, which is Arteries, Veins, Nerves, Lymphatick Vessels, Tendons, Fat, with their respective Vessels, and lastly Membranes.

The Arteries in the Muscles are divided into Blood-Arteries, Lymphatick Arteries, and (perhaps) Spirituous Arteries; for in all Places there is an Artery which throws Blood into the Veins, and ends in a Lymphatick Artery and Lymphatick Vein; and perhaps, as in the Brain there is secreted some minute Part, so as at the outermost Vessels may be a little Tube to carry a spirituous Liquid; the *Arteria adferens* is called *Arteria Spirituosa*, and the *Vena referens* in like manner, *Vena Spirituosa*. All these Vessels being folded and retorted on each other make the *Reticula* in a Muscle.

There come also Nerves to every Muscle, as likewise the *Vasa Pinguedinis*, which are placed between the fleshy Fibres of the Muscles in such manner, that the Marrow between the *Lamellæ* of the Bones and the use of that Fat is the same with the Marrow, to wit, to smear the Heads of the Muscles with the expressed Liquid, and defend them from Attrition; the Membranes also are made out of the *reticular* Folds of the Vessels, and the outermost *rectilineal* Vessels.

Authors that have treated on this Subject, *viz.* the Structure of the Muscles, and which you must have recourse to, are,

1. *Lower* of the Heart, who was the first that gave us the first Idea of the Muscular Structure, that is, that by this Means every little Fibre ended in a Tendinous Vein.

2. *Cowper*, who published a Book in *English*, printed at *London* in 8^{vo}. in the Year 1692, and has a great many things in his Preface relating to the Structure of the Muscles.

3. *Ridley*, who has written a Chapter in his *Anatomy of the Brain*, in which are many things relating to the Action of the Muscles: These are the principal Authors I would recommend to you to inform you in the History of the Parts which the Muscles are composed of.

II. The Second Part of *Myography* treats of the fixing of the Muscles to the firm Bases, and to the Parts that must be moved. Every Muscle, except the Heart, is made to move one solid Part towards another; while therefore a Muscle moves, it has one Part fixed, which is called its Basis, and another to be moved toward this Basis which is said to be moved; they are likewise called fixed

and moveable Points. The Parts of the Muscles which are thus joyned, to wit, the Head and Tail *Galen* called *Ἀπὸ νέυρεως* for *ὀνέυρον*. signifies a Nerve, and the Ancients thought it was a Nerve that made this Tendon at the Muscles, which afterwards was demonstrated to be false by *Steno* and others. No Part must be more accurately learned than this, for to know the Places where the Tendons are incerted is very useful both in *Physiology* and *Surgery*.

Authors in this Part are,

1. *Andrew Vesalius*, than whom no one since *Galen* wrote more accurately, and no one's Figures are more expressed to the Life, as may be seen in his second Book which treats of the Muscles. His Fault however is, that he has inserted a great many Dogs Muscles instead of those of Men; for Example, the Muscles that bow the Neck which are not in Men; he has besides three or four other Mistakes, but his Descriptions are most exact, tho' digested in a very difficult Manner; his Method is such as no one can possibly remember; for he gives Names only as they occur in their Order, which is a great Inconvenience.

2. *Gabriel Fallopius*, who for beautiful Dissection is much preferable to *Vesalius*; for no one ever reasoned more accurately
in

in relation to the Functions and Offices of the Parts. He published three *Tomes* in one Volume in *Folio* at *Venice* in the Year 1584, which Edition is scarce ; it was afterwards reprinted in the same Place in 1606, which also is become very scarce ; and lastly at *Frankfort*. There was a new Edition printed by *Weckel* in the same Year 1606, with an *Appendix*, which Edition is the best : He wrote Observations on *Vesalius*. The *Institutiones Anatomicae* are of no Value ; but perhaps they are not this Authors. What is wanting and mistaken in *Vesalius* this Author has supplied and amended ; however this Work does not much help the Memory, because his Method is no better than that of *Vesalius*.

3. *John Riolanus* the Father, in his *Anthropographia* printed at *Paris* in *Folio* in the Year 1650 ; this Work contains five Books which any Body may safely rely upon. Before he published his Works he had dissected above a hundred Bodies ; and seeing that his Scholars could not retain the Names as mentioned in *Vesalius*, he therefore gave new Names, taken either from the Function or the fixed Point of the Muscles. These Names are admirably well adapted and easily retained, the Point to which a Muscle is fixed being known from *Osteology* ; and,

4. *Jacobus Sylvius* ; but *Riolanus* is so perfect, that if you only consult him, you need desire no other, tho'

5. *Le Clerque* seems much better to have described the Places of the Muscles in his *Chirurgie Complete* in two Vol. in *Octavo*, and in his *Osteologie* in two Vol.

III. The third Part of *Myography*, teaches the Uses or Effects of the Muscles ; for which read,

1. *Lower*, *De Cordis Musculo* ; but of the Muscles in general, read

2. *Vesalius*.

3. *Fallopianus*.

4. *Riolanus*.

5. *Le Clerque* ; and,

6. *Cowper*, which last has many excellent Observations in his reformed *Myotomy* in relation to the Discoveries of the four immediately foregoing Authors ; as for Example, the ascending Muscle of the *Abdomen* is used for Compression, and he demonstrates that by this Muscle the Body can be moved at the Sides, and the Ribs wreath'd about ; besides many other curious Observations. To these add,

7. *Borellus De Motu Animalium*. None of you ought to be without this Author ; he was not, it's true, an Anatomist, but at the time that the best Anatomists in the World,

World, *Steno*, *Vieuſſens*, *Malphigius*, &c. met together at *Piſa* in *Tuſcany*, he was preſent, and they every one of them gave him all their Discoveries and Demonſtrations, which were the Foundations he built upon.

S E C T. II.

Of the ſecond Part of Myology, viz. Myotomy.

I. IF you would thoroughly be acquainted with the Art of *Myotomy*, conſult theſe Authors who have written thereupon, viz.

1. *Veſalius* wrote ſo admirably well on this Subjects that even *Riolanus*, who was his Enemy, could not help but commend him.

Where, for Example, he deſcribes the Muſcles of the *Abdomen*, he ſays, that any one who would begin the Diſſection of a Body ſhould do it in ſuch and ſuch a manner, &c.

2. *Riolanus*, but the beſt of any is,

3. *Cowper*, who will prove of the greateſt Uſe and Advantage to any one that deſires to be perfect in Anatomy.

4. *Michael Lyſſeus*, in his *Culter Anatomicus* printed in the Year 1653, and reprinted in 1665; and laſtly at *Frank-*

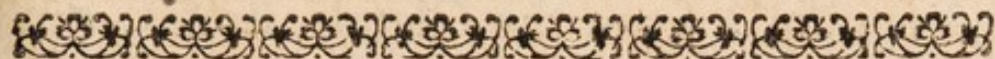
Lyſſe

fort in 1679, which is the best Edition, *Bartholin* having made some Additions thereto ; this Person in his Youth apply'd himself entirely to this Work, and the whole Book is nothing else but how to teach us the best Method of Dissection.

II. But for learning this Part by Figures, in Case you cannot be where a dead Body is dissecting ; and because 'tis impossible the Memory should retain so many Things (tho' the best Anatomists, and especially *Riolanus*, would by no means publish their Works with Figures, lest the Art should grow too easy :) Consult,

1. *Vesalius* in his Work *De Musculis*.
2. *Spigelius*, of the *Amsterdam* Edition by *Blaauw* in the Year 1645 in Folio.
3. The Royal Chart [*Charta Regia*] engraven by *Vander Linden*, where you may see all the Figures ; or *Casseni*us of *Placentia*, as published by *Boncretius*, *Spigelius* : Those of *Godfrey Bidloo*, published at *Amsterdam* in the Year 1685, but the best Impression is that of *London* in 1698 ; the Descriptions are not worth much. This Work which is entirely owing to *Bidloo* appears under *Cowper*'s Name ; but this Edition to which *Cowper* added an *Appendix*, and many Letters omitted in the Figures of *Bidloo*'s Book, with curious Observations on the
hurled

hurted Parts, is much preferable to all others, but can scarce be bought for a hundred Guilders



C H A P. III.

The third Part of Anatomy.

Splanchnology.

I.  A V I N G had a competent Knowledge of what hitherto I have been treating of, Order obliges us to apply our selves to the Knowledge of the *Viscera* or Bowels, which Science is called *Ευτερελογία* from *Ευτερεν* *Viscus* and *Σπλαγχνολογία* from *Σπλαγχνον*, which signifies the same thing. But is it not better one should be first acquainted with [*Αγγειολογία*] *Angiology*? But who is there do you think will describe what *Arteria Pulmonalis*, for Example, is before he has described what *Pulmo* is?

II. By the Name of *Viscera* or Bowels is to be understood a larger Kind of Machine consisting of Vessels the most different from each other; by the Effect of which the Humours

Humours are changed for the Benefit and Advantage of the whole Body. Thus the *Spleen*, for Example, the *Liver*, &c. are truly *Viscera*, that they may by this Name be distinguished from the Glands, Bones, &c.

III. *The Heart* is wont to be called the Principal or Chief of the *Viscera*, but this is very improper, the Heart being a Muscle, so that its Structure is to be learn'd from those who have written of *Myography*. Read therefore these three Authors following, viz.

1. *Lower* in his Treatise *De Corde*, in which he describes its Coverings, Appendices, annexed Vessels, and its very Substance, in such manner as no one before him ever did. By reading this one Author may be known what all others have written hereupon; but yet he omitted several Things which are treated of,

2. By *Raymund Vieussens* in his *Observationes de Cordis Structura interiori vasisque non ita pridem detectis* in Folio: In the same Book he treats of the Brain; but besides these he wrote many Things *De mixtis Principiis* in Quarto, printed at *Lyons* in the Year 1688. From Pag. 79 to Pag. 120, he is taken up in describing the Heart. In this Author there are most beautiful Observations of the running down of the Fibres to
the

the Bottom of the Heart. [He proposed several Opinions in relation to the Aliment of the Heart which do not please, but this is nothing to Anatomy.] There you will see that from the *coronary* Artery there is impelled a Liquid, not only into the *coronary* Veins, but is injected thro' the Arteries: That it distils thro' into the Cavities of the Heart and its *Auriculæ* by certain singular Ducts. That the Heart while it contracts its self throws out the Blood into the *coronary* Artery which returns thence thro' the Veins into the right *Auricula*. But by these Observations it appears that the Blood is carried out of the *coronary* Veins into the Heart two ways, to wit, the greatest and chief of all is through the *coronary* Veins; and that something likewise transfuses it self thence into the very Substance of the Heart. This two-fold Circulation through the Heart is undeniable. This has been evidently made out by *Thebesius* in his *Theses* or Conclusions when he took his Doctor's Cap about three Years since in this our University. *Vioussens* thought the Blood that transmitted it self from the *coronary* Veins into the Cavity of the Heart was the Cause of Fermentation in the rest of the Blood, but he proves this by no Experiment. His anatomical Observations however are very good. Besides these Authors

thors who have written of the Heart, there is scarce any worth your perusal except,

3. *Frederick Ruyschius*, whom you must consult in his Observations and Figures, as also in the very Vessels of the Heart, which he shews to every one with a great deal of Humanity and good Humour. That you may the better know the Vessels of the Heart, he boils it, takes away the Fat, then hangs it up in Water, which he renews every Day for some Weeks, and by this means extricates the Fibres, and the whole becomes a Ball of Vessels.

From these three celebrated Authors you have every thing that may principally be consider'd in relation to the Heart. I cannot reckon the Heart among the *Viscera*, because it only moves, not changes the Blood.

S E C T. I.

Of the Brain.

- I. **A**S the *Viscera* are restraining Things, in which Liquids are changed to do some certain Office, the Brain undoubtedly must in the plainest Sense be reckoned one of them. Now that a Student may distinctly know all Things that relate to the

the Brain, it is necessary first that he know what the Brain is. By the Brain then I understand all that Mass within the Circumference of the *Cranium* and the *Vertebræ*, and in this Sense I always use this Word, unless it be when I use it in opposition to the *Cerebellum*. And which (to omit the ambiguous Term *Ἐγκεφάλῳ*) is the most convenient of any, as expressive of every thing contained in the *Cranium*, and in a larger Sense signifies all its *Appendices* which fall down to the *Os Coccygis*.

II. That the Fabrick of the Brain may be exactly conceived, we must have a true Notion of the *Cranium* and *Vertebræ*, both the *Memiges*, the Brain and *Cerebellum*, the *Cortex*, and the collected Marrow of both; the *Spinal* Marrow, the Egress of the Nerves and their Distribution. None of these must be omitted if you would have an accurate Knowledge of the Brain.

The Authors to be diligently and carefully read upon this Subject are,

1. *Le Clerque* in his *Osteology*. This Author treats with the greatest Accuracy of all Things which belong to the Brain, and what happens to it in the Scull and *Vertebræ* in the least Mutation whatsoever. And thus must you prepare your self for three or four Days before you come to study the Brain.

Brain it self. This Author is sufficient unless you have a mind to add to him,

2. *John Palfin* (whose Book is in *Flemish*) in what he speaks of in relation to the Brain and *Vertebrae*.

3. *Willis* in his *Anatome Cerebri*, especially, if you can get the *London* Edition 1670, which is much more copious than the former Edition in 1664. There is no Book more beautiful than this. The Figures are so exact as if they were the very Body it self; which is owing to *Sir Christopher Wren*, that compleat Mathematician, who was present at the Dissections of *Lower* and *Willis*, and designed them with his own Hand. The other Editions in *Dutch* and *French* are so alter'd that the Figures are scarce worth looking at. In the first Part he gives you the Anatomy of the Brain; in the second the Description and Use of the Nerves.

4. *Raymund Vieussens* in his *Neurographia Universali* in *Folio*, printed at *Lyons* in the Year 1685; you ought rather to buy this Edition than that put out since, tho' it be three times dearer. For the Author compiled this when he was present at the Dissections in the Hospital of *Montpelier*; and it is a general Rule that such Editions are always amended by the Authors: Otherwise they frequently come out faulty and

and incorrect. After you have read these you cannot be without,

5. *Ridley's Anatomy of the Brain* printed at *London* in *Octavo* in the Year 1695.

III. I cannot give you better Advice than carefully to read these Authors ; for the Figures are so beautiful and lively as if you saw the very Bodies themselves. For Order in Writing *Willis* is certainly preferable to the rest. *Vieussens* added some Things to him, viz. that the Blood returning from the Brain is not only carried into five *Sinus* or Cavities, but that the *Basis* of the *Brain* is so rough as to admit so many Cavities to receive the Blood as his Figures represent ; he has likewise several fine Things in relation to the muscular Fibres of the *Dura Mater*. And besides, his Figures shew the Brain every way dissected, so that they alone will teach you that it is impossible you should mistake. *Willis* only shews it you whole and entire ; but *Vieussens* dissected it in Length and Breadth, Horizontally and Side-ways, and thereby has given us so clear and distinct Idea of it that we need not look any farther : And he always added somewhat to *Willis*. *Lower* having been thoroughly acquainted with these new Observations, made some curious Additions relating to the muscular Fibres of
the

the *Dura Mater*; the Lymphatick Vessels in *Plexu Choroideo*, & *de Plexibus Ductuum cera repletorum*. Which no one ever discovered before him.

IV. From these Authors you may learn,

1. All things relating to the Cranium, Memiges, Arteries, Veins, Nerves, Lymphatick Vessels, and Cavities or Sinus.
2. What relates to the Apparatus of the Blood-Vessels, both without and within the Cranium, which Ridley has most elegantly described, as also what belongs to the *Enclomæ* of the *Vertebræ*, which you may find admirably well explained in Willis.
3. You will learn the Description of the Situation, Bulk, Figure of Parts, their Distribution; of the Cavity of the Appendices, the Cortex of the oblong Spinal Marrow, and of the Brain and Cerebellum, as also the Egress of the Nerves, and what wonderful Things they thence infer. Consult Willis and Ridley, why the upper Parts are smooth, and the lower rough? To what End serves the Comb or Crest of a Cock and the Sella Turcica? In what Cavity are the four Eminences? Why the whole
Basis

Basis or Bottom of the Brain is as rough and jagged as broken Rocks? Why the Os Basiliare is every way rough? This we shall be entirely ignorant of, unless we know it from these three Authors; for the Weight of the Brain would have compressed the Vessels, were they not placed in those Sinus or Cavities. For which reason the Dura Mater is extended like a Curtain, that it may not press upon that Body, which is no where more tender than where the Carotides enter, otherwise if it was not held up by the Dura Mater, it would fall down upon the Carotides.

4. *In these Authors you will have excellent Comments on the abovementioned Particulars, without which you will know nothing of the Brain and its Functions. These Authors, tho' you read them ten times over, will always afford you Delight and Pleasure.*

V. After reading these, as soon as our Student has impressed in his Understanding the Species of this *Apparatus*, it will be time for him to add thereto the Knowledge of the Structure of the Substance of the Brain. These three foregoing Authors only teach us its inward, and nothing of its outward Structure: To them therefore must be added, P. 1. *Fre-*

1. *Frederick Ruyschius* in his *Observationes Sparsæ Anatomicae & Chirurgicae*; but especially in his *Thesauri*, where are here and there scatter'd several Figures of the Membrane and *Cortex* of the Brain.

2. The chief of all, and which no one ought to be without, is *Marcellus Malpighius* in his first and second Treatise *De Cerebro*: In the first he treats of the Nature of the Glandules; in the second of the Nature of the nervous *Fistulae* or Tubes; then you will with good Judgment see what is to be thought of the *Cortex* and *Medulla* of the Brain; that is, the *Cortex* according to *Malpighius* are Vessels rolled up together in the Form of Glandules or a Substance not glandulous, but merely vasculous, and that the *Medulla* or Marrow is composed of nervous Pipes or Tubes. And thus will you have an entire, distinct, and perfect Notion or Idea of all what we know in relation to this Study of the Brain.

VI. Whosoever has perfectly conquer'd the foregoing Articles, must then apply himself to acquire the Knowledge of the Nerves, their Substance and Origin, their Egrefs from the Brain, their Distribution within the *Cranium*, and the Repository or *Theca* of the *Vertebrae*; their Egrefs from the *Cranium* or *Sutures* of the *Vertebrae*; their

their Distribution through the Muscles, *Viscera*, and sensible Places.

VII. If you have a Mind methodically to learn and retain all these, you must first make your self acquainted with the Substance of the Brain, which is the very *Medulla* or Marrow of the Brain, the *Cerebellum*, and Spinal Marrow, which in its Origin is every where equally soft, but when it comes to issue without the Brain it acquires an ascititious Membrane, *viz.* the *Pia Mater* for its Covering, by which it is made harder; but when it comes to the Muscles, *Viscera*, and sensible Organs, then it lays by its outward Tunicle (produced by the *Dura Mater*) and being covered only with one Tunicle proceeds to the Places of its Function, where it lays aside this *Pia Mater*, and becomes like *Mucus*: (Thus the Olfactory Nerve is so mucous and of such Tenuity, that if the least Atom of Dust fall upon it, it makes us sneeze; and thus in the Eye the *Dura Mater* of the Optick Nerve makes the *Scherotick* and the *Pia Mater* the *Chorcideal* Tunicle, and the Nerve it self is made into that Mucous *Retina*.) Lastly, under the *Epidermis* lies the marrowy mucous Body of *Malphigius* unfolded from its Tunicles, for receiving Sensation; but the other Nerves which only

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serve

serve for Motion do not seem to lose the *Pia Mater*, perhaps they return again towards the Brain, being covered with their *Memiges*. Their Origin is always in the *Medulla* or Marrow of the Brain and its several Parts.

VIII. Of their Distribution, Separation, Recourse, Determination at the *Viscera*, read,

1. *Willis's Anatomy of the Brain*. This is the best Treatise of Anatomy that ever was published, to which is added a new Description of the Nerves and their Distribution in this or that Part ; their Origin, Coition, and End is most excellently described by him, so that neither *Galen*, nor *Sylvius*, who boasted so much of their Tables, are in any wise to be compared to him. This Treatise is absolutely the best of any to teach one the Nature of the Nerves that go out from the *Cranium*, which serve the external Senses, the *Viscera* (these are called *Splanchnici* ;) and the few Muscles of the Head and Neck. You need look no farther than *Willis*, and he was most excellent in these Matters. But if you would know the Nerves which descend to all the Muscles of the Body, then this Treatise of *Willis* must be amplified and corrected by,

2. The

2. The *Neurologia* of *Raymund Vieussens* in *Folio*, where with prodigious Labour, and tedious Dissection, he discovered, painted and described the Nerves as every one of them are carried from the Spinal Marrow to every Muscle; for as he was enquiring only into the *Subcutaneous* Nerves, he saw he could not make this Inquisition without examining into all the Nerves of the inferior Muscles, and he has this Honour given him by all Anatomists, that his Figures are as exact as what they represent in dead Bodies.

So then *Willis* is the best that ever wrote of the Nerves of the external Senses; but here *Vieussens* must be called in to his Assistance, and from these two Authors you may learn every thing relating to this Subject in a very short and compendious Manner.

S E C T. II.

Of the Structure of the JAWS.

AFTER the Nature of Nerves has been carefully examined into as being Products of the Brain, the *Jaws* follow to be consider'd, which deserve to be number'd amongst the *Viscera*, because they receive somewhat to be changed or alter'd. The *Jaws* are defined to be the

Veil or Covering of the pendulous Palate : (For the Palate is two-fold, the foremost which is bony, and cover'd with a rough Membrane, the hinder is an expanded Veil or Covering capable of being drawn up and down) in the Middle of the *Uvula*, and at its Sides the *Tonsillæ*. This Part is explained by *Fallopins* in the Description of his four Muscles, and by *Vesalva*. Read therefore,

1. *Vesalva's* Treatises *de Pharynge de Musculis Pterigostaphilinis, Salpingostaphilinis, &c.*

2. *Conrad Schneider* in his Treatise *de Catarribis*, printed at *Wittenberg* in the Year 1660, this Edition held only one Year; for in the following Years 1661, and 1662, there were added to it several new Treatises full of curious Learning. This Author discover'd that all that whole Membrane which covers the Jaws, Palate, and *Oesophagus* was a common glandulous Membrane which separates the Liquid to moisten those Parts. He likewise described all the Distempers that infect them; but it abounds with too much Erudition, for what he has filled a whole Book in *Quarto*, may be contained in two Sheets of Paper.

S E C T. III.

Of the Lungs.

IF any one would know exactly what the *Lungs* are, let him (to proceed in Order) begin from the *Larynx*, which is the wonderfully composed little Head of the *Aspera Arteria*, and composed of so many Muscles, that in the whole Body there is no Part so noble. Of its Cartilages and Muscles read,

1. *Julius Casserius's* Treatise *de Vocis Organo* in *Folio* with most excellent Figures and learned Descriptions. He not only searched into and examined its Form and Fabrick in Human Bodies, but in Birds, four-footed Beasts, Frogs, &c. It is an incomparable Treatise, the *Italian* Edition of *Padua* is only valuable; in others the Figures are miserable. This Author was a Native of *Placentia*. Add to him,

2. The new Observations in the last *Tome*, and the last but one of the *Monumentum Parisinum*, where *De la Hire*, a famous Anatomist, demonstrates that the Muscles opening and shutting the *Glottis* are not Flesh but white Ligaments.

But of the Arteries, of the Lungs, their Veins, Lymphaticks, Nerves, *Vesiculæ Bronchiales*,

chiales, the Foldings and *Interstices* of the Vessels: Read,

3. *Tho. Bartholin De Pulmonis Structura* printed in *Octavo* in the Year 1663: Or, if you cannot buy that, the *Leyden* Edition in *Duodecimo*, printed in 1672. He admirably well prosecuted what other Authors wrote concerning the Lungs. Add to him,

4. *Malphigius's* two Epistles *De Pulmone*. It is pity that the *English* have omitted in their Edition three or four Plates which are in our *Leyden* Edition. I know of no other Author can be added, unless it be,

5. *Ruyschius* for his Treatise *De Bronchiali Arteria*, and you must make this Observation, that the *Bronchial Veins* rise out of the *Bronchial Artery*, which do not discharge themselves into the Cavity of the Heart, but into the Vein *Ἀζυγόν*, whence the Blood comes at the right Cavity of the Heart, and this was the Observation of the famous Anatomist *Ravins*.

S E C T. IV.

Of the Ventricle and Intestines.

OF the Ventricle and Intestines and all Things thereto belonging these Authors following must be studied, *viz.*

1. Glisson in his Treatise *De Ventriculo & Intestinis*, printed in *Quarto* at *London* in the Year 1677, which Edition is infinitely preferable to any other. This Author was most exact in that Treatise; he described in good Order, and in an excellent smooth Style every thing that was known in his Time relating to the *Oesophagus* the Ventricle and Intestines, adding nothing that was foreign to his Purpose.

2. John Conrad Pyerus; an excellent Physician and Anatomist: (It was pity multiplicity of Business forced him to leave off this Subject.) He wrote an *Anatomico-Medical* Treatise *De Glandulis Intestinorum*. You may safely rely on his Writings. The Edition of *Scharf* in *Switzerland* in *Octavo* printed in the Year 1667 can scarce be purchased for Money; but in his *Parerga Anatomica* there are most elegant Collections of Anatomical Observations printed in the Year 1682 at *Amsterdam* by *Westen*: Add the *Myrcologia*, or a Treatise *De Ruminantibus* by the same Author; printed at *Basil* in *Quarto* in the Year 1685, wherein he treats of every thing most curious in relation to the Ventricle and Intestines.

6. Hieron. Fabricius ab Aquapendente in his Treatises *De Ventriculo & Intestinis eorumq; Varietate*, where that Professor of *Padua* in a most elegant tho' short Style
treats

treats of the Ventricles of several Animals; as may be seen in his *Anatomical and Physiological Works* printed at *Leipsick* in *Folio* with a Preface by *Bohnius*. You need add no other Authors except,

7. *Willis* in his *Pharmaceutice Rationalis* printed at *London* and *Oxford* in *Octavo*, where speaking of Things opposing each other in the inward Parts gives first a Description of the Ventricle : And,

8. Add *Ruyfchius* of *Lymphaticks* which lie scatter'd in his *Observations*, *Epistles*, and *Thesauri*, where are a great many beautiful Remarks.

S E C T. V.

Of the Spleen.

TO understand the Nature of the Spleen you must read,

1. The *Thesis Inauguralis* of *Charles Drelincourt* the Son *De Lienosis* in *Quarto*, who not long since took here his Doctor's Degree with a great deal of Honour. You have there whatsoever has been observed in Anatomy and Practice of the Milt or Spleen in all Ages to that Day when he wrote his *Thesis*. It is pity no one ever got it reprinted, for it was the Work of his Father in his old Age. Add to him,

2. *Lam.*

2. *Lam. Velthufius's* Treatise *De Splene* printed at *Utrecht* in *Duodecimo* in the Year 1657, who described the Spleen in Imitation of *Gliffon De Hepate*.

3. *Malpighius*, who perfected this Work; nor ought you to despise

4. *Ruyschius De Splene*, viz. what you find scattered about in his three several Volumes (it's pity that they are thus scatter'd) wherein after *Malpighius* he wrote many Things of the Fibres, *Cellulae*, and Lymphaticks of the Spleen, which Observations of his (I do not mean his Reasons) are beyond the reach of all Criticism.

S E C T. VI.

Of the Pancreas.

I Cannot but wish we had *Wirsing's* Treatise of the *Pancreas*. This Author was killed in *Italy* for Envy, because he lately found out the Duct of the *Pancreas* at *Padua*; but in his stead you must read these others, viz.

1. *Reyner de Graaf's* Theses, and all his Anatomical Works.

2. What *Malpighius* observed of the *Pancreas* of Insects and Fishes in his Posthumous Works.

3. *Conrad Brunner* (who was always acceptable in all the Courts of *Germany*) in his

his Experiments about the *Pancreas*. Then;

4. *John Poyen* in his *Parerga Anatomica*, written on this Subject. But I cannot omit,

5. The learned *Wharton* in his *Adenographia*, where he has described every thing relating to the *Pancreas* to the smallest and most minute Nerve.

S E C T. VII.

Of the Omentum or Cawl.

TO understand the Nature of the *Omentum*, or *Cawl* read,

1. *Hieron. Fabricius ab Aquapendente*.
2. *Tho. Bartholin* in his Posthumous Works published at *Leyden* by *Hack*.
3. *Malphigius* in his Epistle *De Omento & Adiposis Ductibus*. In which he alone demonstrates what is the *Omentum* and its Use.

S E C T. VIII

Of the Mesentery.

TH E R E are a great many Things to be consider'd in relation to this Part. Read therefore these Authors, viz.

1. *Hieron. Fabricius ab Aquapendente*, who is to be read on all the Parts of the *Abdomen*.

2. *Tho.*

2. *Tho. Bartholin* in his Treatise *De Vasis Lymphaticis*.

3. *Gaspar Asellius* *De Lacteis Venis*. Add to these,

4. *Wharton* in his Chapter *De Glandulis Mesenterii*.

S E C T. IX.

Of the Liver.

TH E Structure of the Liver differs from the Fabrick of all the other *Viscera*, since all the rest have from the Arteries the Blood they receive in order to be changed ; but the Liver as a *Viscus* changes the Blood, but receives it from the Veins. Read therefore,

1. *Glisson* Anatomy Professor at *Cambridge*, who was the first that discovered this, which he describes in his Treatise *De Anatome Hepatis*, where are premised several Things belonging to Anatomy, and a little after he treats of the Lymphatick Vessels ; this is a fine Treatise, not only in respect of the Liver, but also for Dissection : It is printed at *London* in *Octavo* in the Year 1654, and in *Duodecimo* at *Amsterdam* in 1665, which Edition is also very exact. Whoever reads this Author will find with what Exactness and Fidelity he wrote, and that he proceeded no farther than Dissection : Read,

2. *Mal-*

2. *Malphigius's Opuscula De Hepate*, which are as bright as any of his Works; where (when *Glisson* confessed he did not know what could ultimately act in the beginning of the *Bilious Ducts*) he discovered a very small glandulous Kernel between the *Aorta* and the *Vena Cava*. These *Opuscula* were published in *Folio* in *London* after his Death, which also contain what he wrote against *Sylvius*; for after he had published his Treatise, there were raised several Objections against it, which are answer'd in his Posthumous Works. After him read,

3. *Ruyschius*, who observed this ultimate Kernel [*Acinum*] to be only a mere Texture of Vessels. His Arguments against the *Folliculi* of *Malphigius* gave Occasion of making many curious Experiments which were afterwards published.

S E C T. X.

Of the Genital Organs.

OF the Genital Vessels of Men, their Origin about the Loins, their last Issue in Men thro' the *Urethra* [in Women thro' the *Vagina*,] of their Inclination, Distribution, of the Course and Effect of their Parts, the best Authors are these that follow.

1. *Regner de Graaf* of *Delft*. He was Pupil to *Sylvius*, and as to the practick Part of Anatomy [Dissection] was a Person of the greatest Skill and Dexterity; he explained a great many Things, but very obscurely, and had given us more had he not been taken off by the Plague. His Works are printed at *Leyden* in *Octavo* in the Year 1677 in *Latin* with very beautiful Figures; afterwards in *Flemish* likewise in *Octavo*, where the Figures are yet much finer, and there you will see as well the genital Organs of Women as Men.

2. You must read *Leal Lealis*, Professor in the University of *Padua* in his Treatise *de Partibus Viro propriis* [περὶ ὀργάνων σπερματοποιῶν] wherein are some very curious Experiments. I took Care to have them engraven by *Vander Linden*, to be bound up with the Anatomical Works of *Barth. Eustachius* in the Year 1709.

3. *Cowper's* two Works [I mean those that relate to Men] in one of which towards the End you have many beautiful Passages in relation to the Structure of the *Membrum Virile*. The other is a Treatise of Glands printed at *London* in *Quarto* which is very scarce.

4. A small Book put out by *Morgan* two Years since in *Quarto* at *Rome*, containing many Anatomical Observations, wherein
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this Author inserts a great many Things omitted by other Anatomists.

5. *Ruysschii Observationes*, wherein that Author observes, for Example, that the Head of the *Penis* is a Production or an *Appendix* of the spongy Body of the *Urethra*, and that it has nothing common with the two hollow Bodies of the *Penis*. A thing no one ever before took Notice of, by which many Distempers of the *Penis* are discovered. This Discovery therefore is entirely owing to him: And,

6. *Bonclarius Dathyrius* in his Treatise *De Testibus Virilibus*. This Author has a Mind to be unknown, as we may perceive by this fictitious Name: But whoever he be, it is certain his Treatise is very excellent, but very scarce. It was published in the Court of *Tuscany*. He was the first who discovered that the *Testis* consisted of a great many Vessels folded up together. To him if you add *Leal Lealis*, you will have a perfect System of the *Testes*.

S E C T. XI.

Of the Organs of Women.

THese Authors are to be read, *viz.*
 1. *De Graaf*, who has admirably well described what may be discovered by the naked Eye.

2. *Fal-*

2. *Fallopianus De Tubis Fallopiæ.*

3. Besides the Structure of the Uterus and the *Tubæ Fallopiæ* you have many excellent Things in *Valsalva*.

4. *Swammerdam* in his *Miraculum Naturæ*, with his Tables dedicated to *Tulpius*.

5. *Hieron. Fabricius ab Aquapendente* wrote admirably well on this Subject, especially in his Treatise *de Ovo Incubato & Generatione* in his *Physiological and Anatomical Works* publish'd at *Leipsick* in *Folio*, in the Year 1687; no Physician can well be without him.

6. *Harvey de Generatione Animalium*; had King *Charles I.* lived longer and supply'd him with Money, as he began, we should have had a Work of the utmost Perfection: For what is more perfect than his two Books of the Circulation of the Blood and Generation? We want some of this Author's Writings, for in the Civil War they were all dispersed; but these are to be first read, the others else will not be understood.

7. *Cha. Drelincourt, De Fæminarum Ovis de Fætus tunicis, Umbilico, de Humoribus Fætus perilochiis, sive Conceptus de Conceptu.* You ought by all means to find out this Author, he was a deep and most faithful Searcher into Things, his Works are interspersed

persed with admirable Observations, and are printed at *Leyden* by *Bontestein*.

8. *Raymund Vieussens*, *De Vasorum in Corpore humano Structurâ*, printed a few Years since in 12mo.

9. *Anthony Nuck's Descriptio Uteri* in 8vo. printed at *Leyden* in the Year 1697. And lastly,

10. *Malphigius's Epistles de Utero*, and what we find written in his posthumous Works *de Utero & Generationis Naturâ*, and his two Epistles *de Generatione & Ovo incubato*.

S E C T. XII.

Of the REINS.

WE shall refer the Reins, by reason of their Connection with the foregoing Parts, to this Place. On which read,

1. *Barth. Eustachius's Treatise de Renibus*, which is nothing inferior to his other Works, but most excellent, and is so very scarce as it can hardly be bought for 20 *Florens*; but I have taken care to have it printed in 8vo, to which are added Brass Figures; these Figures were close kept for a long while in the Libraries of the Princes of *Italy*, and were obtained by great Art and Difficulty; he deduces every thing to Mathematical Exactness, and describes several

veral things which he imagines were late and modern Discoveries. He was Contemporary with *Vesalius*; he also said he had some Hundreds of Tables representing Human Bodies, the better to search into the Nature, Use, and Property of the Reins; I have taken Care to make diligent Enquiry after these in *Italy*, but hitherto I could never hear of them; if ever I get them, I shall forthwith have them published.

2. *Laurence Bellini* put out a Treatise in *Italy*, but this I have got printed some Months since for your Use, and is called *Tractatus de Renibus & Lingua*. He borrowed many things from *Eustachius* (for every Body have privately taken from this Author the newest and most glorious Discoveries, and published them for their own) but however he added some things to *Eustachius*.

3. *Malphigius De Renibus*, and

4. *Frederick Ruyschius* in his Observations and *Thesauri*.

S E C T. XIII.

Of the Glands: or, *Adenography*.

A^d_{uv} signifies a Gland, and consequently *Adenography* is the Description of the Glands, which was discovered after *Splanchnology*, and therefore I have put it

into this Place ; but in reality it is indifferent where it be put. Upon this read,

1. The most learned and eminent *Englishman*, Dr. *Thomas Wharton*, a Writer of the greatest Authority, Caution and Fidelity (whom I have before hinted at) he did not trust much to Argument, but a great deal to Experience and Dissection; his *Adenograpia* printed in 4to. in *London* in the Year 1656, is the best of any on Account of the Figures, which are admirable. The *Amsterdam* Edition in 12mo is good enough, but the Figures are not so exact. You will find in this celebrated Author not only a wonderful Description of the Glands, but an incomparable Research into their Nature, Use, &c. For Example, he has several beautiful Observations on the Nature of the *Prostates*, *Testes*, Seminal Vessels; he was the most accurate and exact of any Man living in these Matters, and made a great many curious Experiments upon Animals ; for Example, Whether the *Vesiculæ Seminales* make, change, or contain the *Semen*? or if it is there repositied for Generation, &c.

2. *Malphigius*, *De glandulis conglobatis*, in his Epistles to the Royal Society of *England*, which you will find in the *Philosophical Transactions*, and in his Posthumous Works:

Works: I believe this Treatise of his of the Glands has born ten Editions.

3. The *Adenography* of *Anthony Nuchius*, printed at *Leyden* in 8vo. This Author discovered several Things which had escaped *Wharton*; however he got no great Credit in writing against *Malphigius*, for *Malphigius* in his Posthumous Works admirably well refutes him.

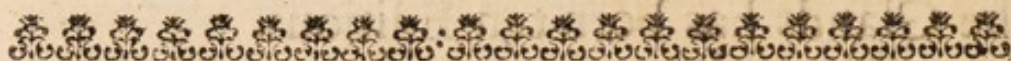
4. *Cowper*, printed at *London* about six Years since in 4to. and,

5. *Frederick Ruyschius*, in his Observations on the Glands, as they are scattered in his *Thesauri*, Epistles, and Observations.

Of the Glands in particular I take no Notice, for they are to be found in the Description of their Situation and Parts; for Example.

1. Those of the Jaws are described by *Schneider*.
2. Those of the Liver and Pancreas by *Malphigius*. And,
3. Those of the Intestines by *Peyer*.





C H A P. IV.

Of the Fourth Part of Anatomy.

Angiology.



Angiology is a Description of the Vessels properly so called, and if you please you may place this and *Adenography* immediately after *Myology*.

1. Vessels properly so called are Canals which carry the Humours from the Heart to the outermost and most minute Point of the Body, and convey them back again from every outward and inward Point to the Heart.

2. They contain in them the secreted and stagnating Humours. These are called by others *Folliculi* and *Vesiculæ*, this Part therefore contains,

1. *Arteries.*
2. *Veins.*
3. *Vesiculæ and Sinæ, &c. of all which in their Order.*

S E C T.

SECT. I.

Of the ARTERIES.

THE Rise, Nature, Distribution of the Arteries, and their issuing out in order to perform their two several Functions, are of absolute Necessity to be known by a Physician; and,

1. *Is required a perfect Knowledge of the Situation and Distribution of the larger Arteries through the whole Body, for the Use of Surgeons, that they may be aided in Dissection or in curing of Wounds.*
2. *Their Rise and End ought to be known for the Theoretick Use of Physick.*

Whosoever would know their entire Distribution, let him inspect,

1. *Vesalius, Page 195,* where is a most exact Table or Figure of every Thing that has been published, but it is not perfect, for at that time he could not attend to it. After him consult,

2. *Cowper's third Table in the Appendix to Bidloo's great Anatomical Work, printed in London;* where are represented all the

Species of the Arteries from the *Fetus*, filled with Wax.

3. *Ruyschius* has published the same by Parcels, but you must however add his Figures, because they shew the Ends or Extremes of the Arteries unknown before that Time.

4. *Lewenhoeck* describes the Extremities of the Veins in living Animals in his Works at large, where he treats of those Vessels that are to be inspected thro' the Microscope, especially in the third and last Tome of his Observations, where he describes the Issue of the Arteries into the Veins.

5. Read every thing contained in the *Philosophical Transactions* of the Royal Society, under the Title *De Microscopio*. And,

6. *Bellinus* in his *Opuscula* to *Pitcairne*.

S E C T. II.

Of the VEINS.

ON the Veins you ought to consult.

1. *Vesalius* in his Third Book, Page 268 of both Editions, where you will find Figures of all the Veins engraven, their Rise, Distribution, and their several Ramifications, and so plain that the naked Eye may perceive them; nor have I hitherto known any

ny Place or Table whasoever so good as this. It is a whole folded Sheet of Paper; but if you would see the Arteries and Veins together, as they run in the Body, read the same Author [*Vesalius*] Page 319, where the Veins and Arteries are represented with the Parts of a Human Body. But if you desire to see the *Valvulae Peruse*,

2. *Hieron. Fabricius ab Aquapendente* (all whose Works I recommend to you) in the Chapter *De Venarum Valvulis*.

And I am very well assured if you study after this Method, you will never err in the Theory of Physick.

S E C T. III.

Of the Lymphatick Vessels.

I. **I** Come now to give you my Advice in Relation to the Lymphatick Vessels: But first of all I must tell you the Opinion which I always entertained on this Subject, and I hope it will deserve your Approbation.

II. A Lymphatick Vessel is then a Vessel in which is contained a limpid Liquor; for what have hitherto been described by Authors are what are obvious to the naked Eye. If therefore such only were to be considered, I could readily give you Instruction;

struction ; but all what occurs amongst Authors, relating to Lymphatick Vessels, teach us only, that they are Veiny Vessels of a sufficient Size, conveying such a Liquid, and are only to be called Veins ; for a Vein is a Canal containing a moved Liquid which is moved towards the greater Canals, and at last to the Heart, but never towards the Extreme Parts : Lymphaticks then by the Ancients are only described to be mere Veins, and that they are mere Veins I thus demonstrate.

1. Every Canal which from a narrow Beginning is parted towards larger Spaces is a Vein : But every Lymphatick by Authors hitherto described are those which from invisible Roots are extended to a larger Place, therefore they are Veins.

2. Every Vein is a Canal in which through the Side Branches is derived a Liquid (but not secreted from it) and all the Veins are largest towards the Heart, and narrowest at the other Extreme, as are the Lymphatick Vessels of Authors, from their invisible Roots, whose Side Branches immediately spread themselves into the great Trunk, but nothing is thence derived.

3. Every Lymphatick has its *Valvula*, which no Arterial Vessel has, unless it be the *Valvula Aortæ* at the Heart ; the Mathematicks

ticks demonstrate that in a Canal in which a Liquid is carried from a narrow to a broad Space the whole Perpendicular Series causes an Obstacle, but so as the Liquor cannot retire; there are *Valvulae* where the Vein is broader, but there are no where more *Valvulae* than in Lymphaticks, which are always about an Inch distant from each other.

4. A Vein is that which at last brings back to the Heart a Liquid infused from the extreme Parts into the greater Arteries, but all Lymphaticks (now described) do this, Therefore, &c.

III. All Lymphaticks of the Brain, according to *Ridley*, discharge their Liquid into the Jugular Vein. On this see,

1. *Lower* of the Lymphaticks of the *Thorax*, which carry its Liquid into the *Ductus Pequetianus*, and thence into the Heart.

2. *Bartholin De Lymphaticis Abdominalibus*, which carry its Liquid into the lacteal Vessels of the *Mesentery*, or the *Cisterna Rubertiana* under the *Diaphragma*, thence into the *Ductus Pequetianus*, and thence into the Heart.

3. *Nuchius De Lymphaticis Partium Inferiorum*.

IV. There-

IV. Therefore there is none of you but what will believe all Lymphaticks hitherto described are mere Veins, but there is no Vein but has its Artery; for all things are moved by the Motion of the Heart, therefore they have their Vessels from the Heart which gave them their Liquid, and which are not Veins, for the Heart does not move its Liquid but through the Arteries; therefore in a Body, besides Blood Arteries, there are also Lymphatick Arteries. Perhaps you may say these are all fictitious; in answer to which I affirm, That there cannot be assigned a Place where a Lymphatick Vein begins, for wherever you see it, it is a hundred times bigger than the ultimate Blood Artery seen through a Microscope. We must therefore find out its Origin from an invisible Artery; for it cannot rise from a Blood Artery, for then it would carry Blood; it must therefore be a Vessel which is an Artery, and carries a Liquid more tenuious than Blood, and which is less than the last or ultimate visible Artery; much less visible then must of Consequence the Lymphatick Artery be, whence it takes its Rise or Origin, which carries a transparent or pellucid Liquor; and therefore such Arterial Lymphatick Vessel is not visible by the Microscope, which yet Reason
son

son tells us is certainly there ; but these Lymphatick Arteries, not the Lymphatick Veins, are visible till a great many Branches of the Veins make a larger visible Branch with the *Valvulae*. I do not see the Blood in the Foot of a Flea, and yet I am certain it is there.

V. Where the red Blood passes from the Artery into the Vein from its Sides there rise almost infinite Canals, at least ten times less than the ultimate or last Artery, thro' which by the Arterial Pulse the Blood applied to the Sides of the Artery is expressed with a strong Motion, while the thicker Blood, deprived of this Liquid, passes into the Veins ; these Side Branches we call Lymphatick Arteries of the first Kind or *Genus*, to wit, which carry their Liquid by the Arterial Motion, that is, by the Canal which throws out, not congregates Liquids, and its Veins at first are invisible, but when a great many meet together they become visible.

VI. That Lymphatick Artery goes into its Lymphatick Vein, and there makes lateral Lymphaticks so much less than the former as the Arterial Lymphatick of the first Kind or *Genus* is less than the Blood Artery ; these we call Lymphatick Arteries of the second Kind, and so on ; for how far

far these Subdivisions may extend we know not, but I am certain that the Law of Circulation in us is so, and that there are actually Lymphatick Arteries of Lymphaticks, and perhaps the *Lympha* which is secreted in the Lymphaticks of the third Kind is the *Succus Nervosus*.

VII. Now this is absolutely necessary to the Nutrition of those Parts which are not red, as the Nerves, Tendons and Glands; for a great Part of the Body has no Blood Rivulets; especially since it is evident we were nourished in the *Fœtus* where there was very little Blood, and this Liquor was necessary to keep the Vessels open, and to the Nutrition and Apposition of the Parts: As also since part of the Body seen through a Microscope plainly appears to be absolutely destitute of Blood Vessels; this Part, notwithstanding, is full of little Vessels, and there must be Nutrition in that Part; there must therefore, of Consequence, be Arteries, since without Arteries there would not be a lateral Pression and Apposition, which is requisite in Nutrition: Besides, a Body must be flexible, but there can be no Flexion unless where the Parts are incredibly tenuious, but such are not the Blood Vessels, for they are too thick (what is more flexible than the *Cutis* Ligaments,

ments, &c. and yet they have no Blood?) but there can be no Flexure made by the largest Vessels without such Vessels suffer a Rupture in their upper Surface or Superficies, as if you would bend a hundred Sheets of Paper, the upper Leaves would be broken, ~~but~~ one Sheet easily be rumpled or folded up together. Vessels therefore were absolutely requisite whose Membranes might be infinitely less than the Tunicles or Membranes of the Blood Arteries; but the largest Vessels which consist of Membranes, are flexible, because their Membranes consist of the most minute Arteries, and so on, and therefore every thing that is flexible is most tenuous.

VIII. But how many Species are there of these Vessels? it is credible their Subdivision is far greater than we imagine, for my part I believe that it goes so far till all the Vessels are equally small and the *Liquidum Nutriens* so tenuous as that in the Rise or Origin of the Nerves in the Brain; hence there may arise Nerves out of every Artery, tho' they are only moveable and sensible from the *Cranium*.

IX. The Lymphatick Arteries lose themselves in two Places, viz.

1. They

1. They exhale their Liquid on all the Superficies of a Body as well external as internal, and there also correspond with these Arteries, the least absorbent Vessels; for *Bellini* discovered that as the whole *Cutis* expired according to *Sanctorius*, so likewise does it inspire according to his own Experiment, so that there is a continual Inspiration and Expiration of the Body, as well internally as externally.

2. The Lymphatick Arteries empty themselves into their correspondent Lymphatick Veins.

X. Authors who have written on the Lymphatick Vessels.

1. *Lud. de Bils* of *Coperdam*, a Nobleman who dedicated himself entirely to the Study of Anatomy in living Animals, but he never troubled himself much with Authors or Letters. He put out a small Book at *Rotterdam* in the Years 1661 and 1669 of his Labyrinth and *Ductus Rorifer*, illustrated with several Figures. It is now very scarce, but his Arguments are not very good; for he fancied they took their Rise from the *Ductus Chylifer*, and that the *Cisterna lactea* was at the Loins from which the Milk is dispersed to the Breasts like driven Dew. Next to him is

2. *Olaus*

2. *Olaus Rudbeckius* a Swede, his *Opuscula* are very scarce but most excellent, and are four distinct Treatises of the Lymphatick Vessels.

1. *Is his Nova Exercitatio Anatomica*, representing in thirteen Tables the Hepatick Ducts printed at Leyden in the Year 1654 in 12mo.

2. *Clears up a great many Things*, and is entituled, *Insidiæ in Olaus Rudbeckium Structæ circa Ductus aquosos à Tho. Bartholino*, printed at Leyden in the Year 1654 in 8vo. and in 12mo.

3. *Is a Treatise Pro Ductibus Hepaticis contra Bartholinum*, printed also at Leyden in the Year 1654 in 8vo.

4. *Contains his Epistles to Bartholin De Vasis Serosis*, printed at Upsal in the Year 1657 in 12mo; which last is the best of all his Works; his Books are very scarce, and therefore you ought to read

3. *Hempsterhuys*, in his Treatise called *Messis aurea Anatomica collecta ab Hempsterhuysio* in 4to, where you will find *Rudbeckius's* Discoveries, as also those of *Bils* and *Bartholin*. This Book you must buy by all means.

4. *Tho. Bartholin De Vasis Lymphaticis nuper inventis* in his Treatise *De Lymphaticis*

ticis & Chylosis Vasis, as also his *Opuscula nova Anatomica* printed at *Amsterdam* in 8vo by *Clave* in the Year 1670; but these you have in the *Messis Aurea* of *Hempsterhuys*.

5. *Glisson De Hepate*, printed in the Year 1654, towards the End, where he has several beautiful Passages *De Vasis Lymphaticis recens inventis*.

6. *John James Paulus* against *Bils's Anatomy and Opinions*, *De Ductu rorifero*, printed at *Strasburg* in the Year 1665.

7. *Fred. Ruyschius*, an Author never sufficiently to be praised on these Topicks, in his Book *De Lymphaticorum Valvulis* printed at the *Hague* in the Year 1665 in 12mo. His first Treatise was published while he himself lived at the *Hague*, and is most scarce. *Hempsterhuys* has collected them all except a few in his *Messis Aurea*.

8. *Malpighius* in his Work *De Glandulis conglobatis*; and in his Posthumous Works he discovered many curious Things relating to these Vessels. And,

9. *Nuckius* in his *Anatome Uteri and Adenographia*. But amongst all these Authors you will only find a Description of the Lymphatick Veins.



A P P E N D I X.

FOR your greater Ease and Memory this shall be divided into two Parts.

1. The first shall shew you what Authors have written on the single Parts of the Eye, Ear and Tongue. And
2. The second shall tell you such Authors who have treated of Enchiresis or Dissection of dead Bodies; and to these shall be added those who have written Systematically, and therefore are called Systematicks [Systematici.] Enche

P A R T I.

Of the single Parts.

I. Of the Eye.

ON the Eye you must read these Authors, viz.

1. *Plempius* in his *Ophthalmographia*, which you may purchase at an easy Rate with all his Works, or by it self.

2. *Nuckius* in his *Observationes de Oculorum Ductibus aquosis & Humoribus*.

3. *Hovius* in his *Disputatio Inauguralis* held at *Utrecht*, wherein are many curious

Observations on the Eye, tho' you must not entirely rely on him in every thing he says.

4. *Ruyfchius*, who has many beautiful Remarks on the Tunicles and Vessels of the Eyes in his *Thesauri* and Observations no where else to be met with.

5. *Briggs* in his *Ophthalmography* printed at *Utrecht* in 12mo.

II. Of the Ear.

Those who have chiefly written on the Ear are

1. *Barth. Eustachius* in his *Opuscula Anatomica* lately put out together in 8vo at *Leyden*.

2. *Du Verney De l' OUIR*, printed at the Royal Press in 8vo. The *Latin* Translation made in *Germany* is not worth much, the Translator having not taken the Sense of the Author; besides, the Figures are dirty and abominable. He is certainly the most perfect Author I know of, but he has notwithstanding three very great Faults in Relation to a certain Nerve and the *Ductus* of *Fallopian*, otherwise he is very valuable. It is pity this Man laboured under such Calumny that he could not publish, as he promised, his Work of the other Organs of Sense.

3. *Valsal-*

3. *Valsalva*, all what he added to *Du Verney* might be contained in twelve Lines; he is not to be compared to *Du Verney* in *Quarto*, but deserves to be read on account of his Observations *De Cochlea & Labyrintho*. To these may be added

4. *Schellamer*, but he is not very necessary since every thing he says may be found in *Du Verney*.

III. Of the Tongue.

Authors on the Tongue are,

1. *Bellini* in his Treatise *De Gustus Organo recens detecto*; but he has not much in him if you compare him with *Malpighius* in his Description of the Organ of Taste.

2. *Fracassatus*. What this Author has added is indeed of a considerable Bulk, but of no great Moment.

Bellini therefore is sufficient for Experiments in his Treatise just now mentioned, which is printed by it self, and *Malpighius* for the Organ.

There are several other Authors who have given us not their own but other Peoples Labours, but such I think not worth mentioning.

P A R T II.

Of Enchyresis ; or, *Dissection of a dead Body.*

WHen you have a Mind to dissect dead Bodies and to introspect them without any one to shew you, and to do this in Order you need only these three Authors.

1. *Michael Lyserus* in his Treatise *De Cultro Anatomico* in 8vo. This Author travelled all over *Europe*, and deservedly had Pensions from the Dissectors; and when he returned from his Travels he wrote a Book for the Use of his Scholars, *Of the Order of Dissection*; that is, when the Fat of the *Cutis* is to be removed, what *Viscera* are to be first cut up, and in what Order the Vessels are to be shewn. *Bartholin* was very much troubled that this Book was published, because it too much discovered his own Profession.

2. The great *Vesalius* in his Anatomical Work, printed in the Year 1606 in *Folio* at *Frankfort*, wherein after every Chapter he teaches how every individual Part is to be demonstrated and exposed. There is no one can be compared to this Author, not even *Lyserus*, for he tells you every the most minute Circumstance. This Book, which is in *Folio*, ought to be purchased by every one of you.

3. Those

3. Those that understand *English* ought to have recourse to *Cowper*, whom they will find a most excellent Instructor in his *Myotomy*, printed at *London* in 8vo, to which he added his new Discoveries from *Du Verney* and *Fallopious*. I am very certain you may be Master of all these in the Space of a Quarter of a Year.

SYSTEMATICKS.

Of the *Systematics*, the first is

1. *Andreas Vesalius* in Folio.
2. *Renaldus Columbus*.
3. *Spigelius* in Folio, printed at *Amsterdam* on Royal Paper.
4. *Riolanus* in his *Anthropographia*, you cannot be without this Author.
5. *Tho. Bartholin* in his *Anatomy* printed at *Leyden* in 8vo.
6. *Verheyen* in his *Opera Anatomica*, printed after his Death in Quarto at *Brussels* in the Year 1710, where you have every thing collected that is modern and of late Discovery, and is alone sufficient for those who cannot get the others before-mentioned.

The End of the Second Book relating to Anatomy and all its Parts.



BOERHAAVE's
M E T H O D
O F
Studying Physick.

Book III.

*Of the Theoria Medica ; or, The
Theoretical Part of Physick.*



I HAVE now in the Two foregoing Books told you all Things which are pre-required in a Physician. It remains now that I give the best Counsel and Advice I am able in Relation to the *Theoretical* and *Practical* Parts of Physick ; or, in other Terms, the Contemplation and Exercise of this most useful and noble

noble Science. And herein a great many Things are carefully to be taken notice of, lest you fall into Errors or Mistakes which are always attended with fatal Consequences.

But as this Science (as I have just now hinted to you) is two-fold, *Theoretical* and *Practical*, I shall therefore, for Order-sake, in this Third Book discourse of the former only, *viz.* the Theory, reserving the latter for the next Book and Close of this Work.

That you may the more easily retain in your Memory what I shall discourse of in this Third Book, in Relation to the Theory of Physick, I shall use this Method, that is, divide the whole into the three General Heads or Chapters following.

1st Chapter shall treat of the Use of the Parts or *Physiology*.

2. Of particular Functions; as

1. *The Sight.*
2. *Hearing.*
3. *Smelling.*
4. *Tasting.*
5. *The Touch, or Feeling; and,*
6. *Generation.*

3. In

3. In the 3d Chapter I shall discourse of *Pathology*, under which are comprehended,

1. *Semeiotica*.
2. *Hygieine*, and
3. *Therapeutice*. Of all which in their Order.



C H A P. I.

Of the Use of the Parts, or Physiology.

I.  SE teaches us what Effects every Thing has in Relation to any Good or Profit. The Use of the Parts therefore is to explicate the Functions or Actions of the Body which are exercised by these Instruments. He therefore who knows all the Effects requisite to Sicknefs and Health most undoubtedly knows the Theory of Physick.

II. He who by the *Mathematicks*, *Chymistry*, *Botany*, and *Pharmacy*, hath made himself acquainted with the Actions of Nature which obtain in all sorts of Bodies, and which are exercised by the Common
Laws,

Laws, is certainly sufficiently instructed in that general Knowledge which is requisite to Physick.

III. He therefore who knows first how Bodies commonly act, if from Anatomy he has acquir'd a thorough Knowledge of the Parts of which a Human Body consists, or its coercent Vessels, &c. is prepared in the second Place to understand and explain those Actions which are performed in a Human Body.

IV. An Action of a Human Body is a Motion which is exercised by such a Part which concurs to the Fabrick of our Body, and depends on those Things which are common to our Bodies with other Bodies, and those Things which are proper and peculiar to them. Those which are common to us with other Bodies, are the Objects of the *Mathematicks*, &c. and he who is well acquainted with them, is capable to explain them by others.

V. But he who knows these Principles, and yet makes use of no good Method, will study to very little Advantage; and if he uses more than he need, he errs too that way; but he who makes use of nothing but what may be drawn from the *Mathematicks*

maticks and *Anatomy* will never mistake. If he makes use of; and would know more than these admit of, he will certainly fall into those Errors several great Men before him have fallen into, viz. *Borellus*, *Bellini*, *Bernouille*, *Heckleus*, &c. who were so knowing in the Method of finding out hidden Truths; and yet when they admitted what they could not demonstrate, they straitway fell into very great Mistakes.

1. *Borellus* excellently well exploded the Causes of Muscular Motion thitherto assigned, but he added somewhat which he himself could not explain: For he fancied that there was somewhat that made the Liquid rarify as soon as it enter'd the Muscle, like *Oil of Vitriol* and *Salt of Tartar*, which being mingled together, will expand and fill up the *Vesica*; and when the Effervescency is ended, will slide back again. He therefore imagined something like this in a Muscle; but in this he deviates from his own Method; for it does not any way appear from the *Mathematicks*, that there are such boiling Juices in us.

2. *Bernouille*, in his Treatise of Muscular Motion which you have at the End of *Vander Aa's* Edition of *Borellus*, lays down these things following as *Postulata*, viz. First, he will have it, That in a Muscle the Nervous and Arterious Juices are joined
together

together in one Place. But it appears most evident to me, that where an Artery throws out its Juices, there can be no Nerve; for Arteries are the Cause of the Motion of the Nerves. Secondly, he lays it down for granted, that the Nervous Juices flowing to those of the Arteries, so attenuate them, that the Air being at Liberty expands it self. But he does not demonstrate this by any Experiment or Argument. All that I would infer from this is, that a celebrated Author may sometimes err, when he assumes more than he is able to demonstrate. So did

3. *Heckleus* in his Notions *De Attractione, & Momentanea Aeris Expansione*; when notwithstanding a Contraction of the Muscles may be made in Half an Hour, and left off at one's Pleasure. This is a great *Postulatum* of his, and I despair of ever seeing it demonstrated.

VI. If therefore we would follow good Advice, we must keep our selves within these Bounds in this our Study of the Theoretick Part of Physick; that is, assume nothing but what is certainly demonstrated in *Mechanicks*, which never fail, or *Chymical* Experiments, or clear demonstrated in *Chymicks*, unless it be when the Question is (*Borellus*, for Example, falsely supposed such Actions

Actions in our Body, as there are in *Oil of Vitriol*, and *Salt of Tartar*) either concerning the Nature of Vegetables or Pharmacy, or the Nature of Solids and Fluids in Anatomy. If then we assume no more than is evident from these six Heads, we shall never run into Errors, but when we go beyond these we infallibly mistake.

This Part by many is called *Theoria Medica*, as well as *Physiology*, that is, a natural Exquisition of certain Symptoms, *Phænomena*, &c. But we follow *Galen* (who in this was the best of any) in treating of the Use of the Parts.

VII. We must now speak something of those Authors who have so written on this Subject, that we may know true Effects from true and undoubted Causes. There is no Necessity to crowd your Library with all who have undertaken to do this, but only to chuse those who deserve Credit and Reputation.

Now all those who wrote before the Year 1628, whether *Greeks* or *Latins*, are good for nothing; for they were Strangers to the *Harvean* System of the Circulation of the Blood. For this is the only principal Cause on which depends all the rest: For what signifies it that we know the Structure of the Parts, unless we know by what Order,

der, Force and Velocity the Humours continually flow through them? But this before the Year 1628 was altogether unknown.

For take *Daniel Sennertus*, who was a most learned and ingenious Man, yet in his Explication of the Actions of the Ventricle, for Example, it is astonishing to see how many frivolous Causes he assigned; and as he collected all what he has from the foregoing Authors, you may reasonably suspect what they offered.

Another Reason is, that the very Helps he made use of were prejudicial to him (for he ought to have known the *Indoles*, or Inclination of the Humours, the Structure of a Body, and the Laws of Motion) for at that time rose up the Chymists, who derived all things from chymical Causes. Take any Author you please, and he will have all things made either by *Fermentation* or *Ferment*, or *Effervescency*; and he will reduce all things to these three Heads. If therefore it be demonstrated, that there is no such thing as Fermentation in the Blood, this Doctrine of Consequence is good for nothing.

IX. There remains now only the third Order of Philosophers to be considered of: They, for Example, who would explain
the

the Laws of Motion in our Body by the Help of Mechanicks and Anatomy: But these were almost all of them *Cartesians*, who would explain all relating to Physick according to the Notions of *Des Cartes*. For *Des Cartes* endeavoured to explain the whole Man in a little Treatise which he called *Traité de l'Homme*, where you will see these loose Laws he fancied, *viz.* He would have it, that from a small Bubble of fermented Liquid thrown fully out into an Arm, Head, &c. the whole Man was formed; and thus by a continual Ferment of the former Substance the whole was created. It is strange and astonishing, that this Person who was so bright in Geometry, should produce such *Hypotheses*, while he applied himself to the Study of Physick, which he himself had rejected in a Peripatetick. He saw how a small Drop could be expanded, and that Milk rarified by the Fire; he would therefore have it, that a Fire in the Heart caused an Expansion of the Blood falling into it; and these Philosophers said, that the Pores through which they would have the Secretions of the Blood to be made, were the Cause of all Motions in the whole Body; and set up such Notions which afterwards were soon embraced by all the Mechanicks. But as I said before, we ought to

to admit of nothing but what can be demonstrated or understood.

But *Pitcairne* demonstrated, that the Effects of all the Pores were the same. The Pores therefore contribute nothing to Secretion, since it is evident from *Hydrostaticks*, that they are all circular. Besides this, they called in to their Assistance the *Ætherial Matter* of the first Element; but why does not that glide into infinite Spaces where it may more freely be moved? Most of the Professors who have held these Opinions have used this Explanation. You see then to what Streights we are reduced, since before *Harvey* so little Good could be done.

X. To recommend to you any Authors in this Part of Physick, a Man must act with this Prudence, as to tell you of none but such whom it will be worth your while thoroughly to read and study: who have taken nothing for granted but what they have searched through by the external Senses, and have laid down nothing at all as Principles for Argumentation, but what has been demonstrated in Physicks and the Mathematicks. There are then two Conditions requisite: The external Senses teach us the Laws of *Physical Changes in Genre*, or of our Body *in Specie*; and hitherto we

S

have

have told you what Authors in Physicks and Anatomy have treated of this. Whatever therefore hath been demonstrated in *Physicks*, *Chymistry*, and *Anatomy*, and whatsoever clearly follows from thence by good Reasoning or Argument (that is, which so accurately inheres in them, that it immediately follows the former Conception as a Consequence or Conclusion) may freely be laid down and acknowledged as a Principle.

XI. If therefore you would compose a perfect *Physiology*, first collect with an unwearyed Application all the Experiments of Nature which are in all Observations, and digest this diffused Matter in *Methodum Adversariorum*; and that this you may the more easily do, read

1. Lockius, *De Adversariis conscribendis* printed at *Amsterdam*. If you will have an Example of this, read

2. Sir Francis Bacon, Lord of *Verulam*, in his Treatise *De Vento & Calore*, or his *Sylva Sylvarum*, where you will find what you desire.

XII. Another thing requisite in these Authors, is, that when they would argue from these Principles they must take nothing but a general Principle, which is so clear as to admit

mit no manner of Doubt ; and such are Mechanical Principles, which are called the Laws of Nature, to which belong *Hydrostaticks* and *Hydraulicks*, and these we may faithfully rely upon. No Part is to be fancied or imagined, but to be described according to Nature, in assigning the Motion of Liquid to any Part from the Anatomy of living Bodies, Ligatures, Injections, &c. He therefore who would know hidden Causes from these Principles must call in to his Assistance *Mechanicks* and the *Mathematicks*, an Example of which I will give you in short.

XIII. The *Anatomists* demonstrate, that an Artery is a circular Vessel, in all perpendicular Sections, and the more remote from the Heart is narrower, and broader the nearer it approaches to it. Cutting off any thing that is alive, demonstrates that the Blood is thrown from the Heart only in a most violent Motion. These are Principles laid down in Anatomy; but if you would find out what may follow from hence, you must have Recourse to what the *Mathematicks* have demonstrated, viz. That if Liquor be pressed in a Conick Canal, so much Pression will occupy every Point, as is the Line sticking against the Side; and there is no Particle which is not

immediately changed from its Site, Motion, and Direction; the Liquor then must be attenuated, but never thicken: And all this is true, if a Liquor also is carried thro' a Cone without Gravitation and Shaking.

XIV. Authors on this Subject are

1. *Alphonsus Borellus* (by far the best) in that elaborate Work of his *De Motu Animalium*, in compiling of which he spent so many Years, nay, his whole Life and Strength. Buy (if you can) the *Roman* Edition printed in the Year 1680, which is very scarce; it is absolutely the best on Account of its exact Figures. But it was likewise put out by *Vander Aa* in the Year 1710, the Print of which is very beautiful, and I have taken Care to add thereto *Bernouille's* Treatise of Muscular Motion. I cannot recommend *Borellus* as one that never erred against these Laws, for he admitted more than he should have done, viz. That in the Blood there was somewhat causing an Effervescency; and *Bernouille* would have it, that the Blood and Spirits flowed into one Vessel, which Anatomy does by no means demonstrate. After him read

2. *Bellinus* in his Treatise *De Urinis & Pulsibus*, which no one ought to be without; the Edition of *Bologna* in 4to printed in

in 1683 is the best: But that put out by *Bonchius* (who was a Physician and Philosopher) at *Franckfort* in 4to in the Year 1685 is almost as good, except in the Paper which is not so fair. His Places are very few where you expect the Observation of these Laws; this Author rarely laying down any thing which is not most exquisitely Mathematical: But he deviates from the first Law, when he says that there rises a Rarefaction in Muscular Motion, that as soon as the Spirits are determined into the Blood there rises an Effervescency which expands it self, but this is not demonstrated by Anatomy. Had he contented himself to have lain down nothing but what might be thence clearly demonstrated, viz. that the Blood and Spirits flow to the Muscles, and by their Aggregation make them swell, he had not been in the Wrong. In his Treatise to *Pitcairne* he says nothing of the Cause of Muscular Motion, which makes me believe he afterwards laid by that System. Read also his *Lemnata* (which are prefixed to this Work), of what relates to Muscular Motion, Respiration and the Motion of the Heart. His Dissertations contain a very curious Matter, and they are as so many Rules according to which most things may be explained. You should also read his

Letter to the Grand Duke of *Tuscany* of Respiration, it is indeed short but very nervous, and printed in the Year 1671, and no where to be met with but in the *Miscellanea Curiosa* herein before mentioned. Read

3. His *Tria Opuscula De Motu Cordis*, &c. to *Pitcairne*, printed in 4to by *Bontestein* in the Year 1696. (By his Death we despair of ever seeing his *Opus Anatomicum*, which he entirely collected by corresponding with *Francis Rhede* and *Malpighius*.) In this Treatise he is no way faulty.

4. *Archibald Pitcairne* in his *Dissertationes Medicae*, printed together in 4to at *Rotterdam* in 1701, the Stile is very plain; as to the Circulation of the Blood through the Lungs he is very perfect, in other things he assumed too much, as in his last Treatise of *Opium*. But however his Works are very excellent.

5. *Matthæi Georgii Elementa Scientiæ naturalis* printed at *Lucca* in *Italy* in 4to in the Year 1707, where he builds his Theory on very certain Principles. After him,

6. If you understand *Italian* you should read his Treatise *Of the true Method and Temerity in Physicks*; this Book was printed at *Genoua* in the Year 1709 in 8vo, which he sent to me; it is a noble Treatise. His *Liberal Phlebotomy* printed at *Genoua* in 4to in

in the Year 1697 deserves likewise your Perusal, wherein he philophizes with a great deal of Liberty purely from *Mechanicks* and *Anatomy*. After him,

7. *Ascanius Maria Basicalva*, put out at *Parma* in his *Novum Systema Physico-Mechanicum de Humoribus*; it is a Book entirely Medical. He was Scholar to *Bellini*; in this Work you have the Effects of the *Major Attritus* from Circulation. You may remember I taught this not long since myself, but I did not know this was published by that Author, for I never saw his Book till some few Months since.

8. *Cockburn* in his *OEconomia Animalis* printed at *London* in 8vo. This Gentleman signify'd to me he was preparing another Edition. He has many fine Things deduced from Philosophy.

9. Those who are well versed in the *Mathematicks* let them read *John Keil* Of *Animal Secretion* in *English*, which contains as fine Things in *Physick* as can possibly be written by any Mathematician. But he has supposed what does not appear from *Anatomy*, of the Attraction and Dilatation of the Globules of our Liquid; but what he has written of the Celerity of the Blood in its Vessels, and of the Weight by which the Air presses on the Blood in the Lungs is very fine. Add to these,

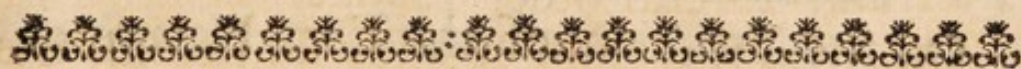
10. *Bernouille* late Professor at *Groningen* and now at *Basil*, in his *Meditata de motu musculari*, of which we have told you before are separately contained in the *Acta Leipsiensia*, and now printed at the End of *Borellus's* Book.

11. *Percault* in his *Essayes de Physiques*. This Author had a great Genius, well skilled in the *Mathematicks*, and perfectly so in *Physicks*, enjoying the Benefit of the *Anatomical Demonstrations* of *Du Verney*, *Mariotte*, &c. at *Paris*. He wrote with great Art and Skill many Things relating to the *Animal Functions*, *Sight*, *Hearing*, &c. and several other Things.

12. To this Subject likewise belong the *Anatomical Dissertations* of *Lamy* (Dr. of *Physick* in *Paris*) with his *Letters* and *Meditations*, entituled, *Dissertations Anatomiques*, the last *Paris* Edition in 8vo in the Year 1685 has more in it than the former Edition; he does not prove every thing, but explains most of our *Functions* from *Physicks*, *Mathematicks*, and by the Help of *L'Emery's Chimicks* and *Dissection* of dead Bodies, there were some warm *Disputes* between him and *Du Verney*, which made them act afterwards with more *Caution*; and thus the *Contentions* of such great Men turn very often to our *Advantage*.

13. Add to these Cole, *De Secretione Animalium Tentamen* printed at Oxford in 12mo in the Year 1674, and afterwards at the Hague in 1682 likewise in 12mo.

These are the Authors you should study if you have a Mind to read with Profit and Advantage those who have treated of *Physiology*; and do not wonder that I have not recommended to you the *Physiological Works of Galen*. For before the Discovery of the Circulation of the Blood it was impossible that any one should explain those Functions which depend only on the Circulation of the Blood.



CHAP. II.

Of Particular Functions.

I. *Of the SIGHT.*

I.  F the Object of Sight, Proprieties of the Rays, Colours, &c. the only one who has written well is Sir *Isaac Newton*, and in Reality the last Edition in *Latin* printed at *London* is preferable to the former.

2. Of

2. Of the Nature of Solar Rays, as they are reflected or refracted, *Andrew Tacquet* a Jesuit *De Catoptriciis* and *Dioptriciis* deserves your careful Attention; and this Author is almost sufficient.

3. But if you will have these explained and applied to the Eye, read *Scheiner's* Works, or *Fundamentum Opticum*, printed at *St. Winnox Bergue* in 4to in the Year 1619; it is a very scarce Book, and explains every thing admirably well. To him add

4. The *Dioptrica* of *Descartes* and *Huygens*.

II. Of the HEARING.

On the Function of the Ear, Nature of Sound, and its Proprieties, read

1. *Kercher* in his *Phonurgia & Tractatus Musici* printed at *Rome* in Folio. Add to these his two Treatises *De Musicis*, wherein he explains how the Sonorous Rays come and go, and are reflected by *Eccho*. These are likewise printed at *Rome* in Folio.

2. *Mersenne's* Experiments in 4to, entitled, *Collectio Experimentorum Physico-Mechanicorum*.

3. *Sir Isaac Newton* in his inimitable Book of the Mathematical Principles of Natural Philosophy, which treats of the Nature of Sound, its Propagation thro' given Spaces in a given Time.

4. Of

4. Of the Function of the Ear read *Lamy* in his *Dissertations Anatomiques*.
5. *Perault* in his *Essays de Physique*.
6. *Du Verney* in his Book *De l'Organ de l'Ouir*. And
7. *Valsalva*, who is far preferable to *Du Verney* as to the Theory of Hearing.

III. Of the S M E L L.

Of this Function read

1. *Le Clerque* in his *Osteology*, where he has many curious Things from *Du Verney* of the Organ of Smelling. After him
2. For understanding the Membrane on the Bone read *Schneider De Cathar*:
3. For the Mechanical Action consult *Palfin* in his new Description of the Bones, printed only in *Flemish*, where you have *Du Verney's* Method.

IV. Of the TASTE.

Authors to be read on this Function are

1. *Fracassatus* (an *Italian* Professor of Physick) in his Epistle of the Tongue to *Malpighius*; you will find this in *Malpighius's* Works. I recommend him because he treats of many things relating to the Nature of solid Bodies, and no one has ever published finer Experiments on that Subject.
2. For

2. For their Application to the Organ of Taste you must read *Malpighius, De Gustus Organo*.

3. *Bellini's* new Experiments on the Taste, which are now sold here. To these you may add

4. *Boyle* in his Treatise *De Mechanicis Saporum Productionibus* printed at London in 8vo.

V. Of the TOUCH.

Read *Malpighius's* Treatise *De Organo Tactus, Lingua & Cute*, which partly you may find in his Epistles, partly in his Posthumous Works, where he has dissected them Physiologically and Modestly.

VI. Of GENERATION.

That you may understand how this wonderful Propagation is made, by what Instruments, Actions of Matter and Principles, and how they are changed, you must read

1. All those Authors just now recommended to you.

2. Of the Origin and Fabrick of the *Ovum* in a Woman, its Maturation and passing into the *Tuba Fallopiana*, its entering into, and Maturation in the *Uterus*: Peruse the *Conceptus de Conceptu Humano*, by *Cha. Drelincourt*. This is the best Author on this Subject.

3. Of

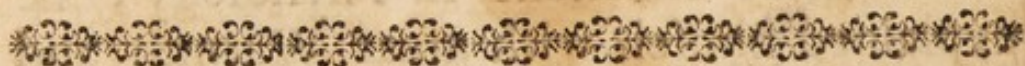
3. Of the Conjunction, Maturation of the *Semen Masculinum in Ovo Famineo* you must read *Hieron. Fabric. ab Aquapendente* in his Treatise *De Pulli ex Ovo Generatione*. And *Malpighius* in his curious Treatise *De Bombyce*, and in his two Treatises (which surpass all the rest) *De Ovo Incubato*, I think he has said all that is possible on that Subject. How many Difficulties in every one of his Experiments has he surmounted? and yet he plainly relates nothing else but Experiments. Add to these

4. *Harvey's Observations De Animalium Generatione* whom I have made honourable Mention of in Anatomy, but he was yet much more excellent in Physiology; he explained himself with great Warmth and Ingenuity in his several Dissections of the larger Species of Animals, as Mares, Cows, and other Quadrupeds (the Expence of which was supplied by King *Charles I.*) one Hour after Coition, two Hours after Coition, and so on to a perfect Gestation. Most of his Papers were burnt in the great Fire of *London*. To him we owe our Knowledge of the *Ovaria*, which the Ancients called *Testes Muliebres*.

5. But of the Rise and Origin of the *Semen* in Man, its Secretion, Collection, Maturation, Fecundity and Expulsion, you must have Recourse to *Leal Lealis, Cowper,*

per, Ruyschius and *Lewenhoeck*, who have all of them very curious Experiments.

6. You have admirable Observations about Generation collected in the *Histoire de l'Accademie Royale de Paris*, printed at Paris in 4to, and afterwards at Amsterdam in 8vo, where you will find the Observations of a great many Authors, as *L'Emery*, *Du Verney*, *Lyster*, and others, viz. that sometimes the *Fætus* is found to be extravasated into the Cavity of the *Abdomen*, and other times in *Teste Fæmineo*, in the *Tuba Fallopiana*, in *Hernia Uteri*, &c. In that you have every thing which before was but very obscurely treated of.



CHAP. III.

PATHOLOGY.



Pathology is that Part of Physick which teaches in general the Knowledge of Distempers, their Presence, Differences, Causes and Effects.

That Part which teaches the Nature of Distempers, is called *Nosology*, to which likewise the Differences of Distempers belong.

Aitiology

Aitiology is that which treats of general Causes, and is called *Symptomatology*, or a Description of Effects or Symptoms.

In this Part there are very few good Authors, so that I can scarce name one that is perfect. My *Institutions* which I wrote for private Uses do by no means please me, for I had not time then to digest them.

Pathology ought to follow from *Physiology*, but this no Author has undertaken. The best that I know of are

1. *John Fernelius* that noble Luminary of Physick in *France*, who from his Infancy dedicated himself to the sublime Speculations of the Mathematicks; when he was advanced to the Professors Chair to teach Physick, he was the first that exploded the Opinions of *Galen*, and evidently demonstrated wherein he was mistaken in his Arguments: But he wanted *Harvey's* Light and Penetration and tript very often, however he is the best I know of. A Distemper as it is *Laesa Actio*, before a Man can know what that is he ought first to be acquainted with the Notion of *Actio Integra*, but this is impossible without knowing Circulation. Hence this Author almost always hesitated; his Book in a very short time bore ten Editions: The best Edition is that of *Geneva* in *Folio* in the Year 1679, at that time he was thought worthy to be
read

read with *Hippocrates* in *Lessons* of Physick. His Books of *Pathology* are excellent.

2. *Sennertus* on Account of his great Judgment, Diligence and skilful Knowledge of Ancient and Modern Authors in Chymistry, was called the *Hippocrates* of *Germany*; his Works have born more than twelve Editions, the best is in Six Tomes in *Folio* printed at *Lyons* in the Year 1676. From this Author you will learn all the several Opinions of the *Greeks*, *Romans* and *Italians* on the several Classes of Distempers and their Symptoms. But neither *Fernelius* nor *Sennertus* are anywise herein satisfactory, as being too prolix and verbose, so that a Man forgets what he had read before; what they wrote relating to the Differences and Causes of Diseases you must pass by; the rest will be useful to you.

These are all I can any ways recommend to you, for the more Modern always feign and invent their own Systems and Hypotheses, from whence they draw their Conclusions, as *Sylvius* for Example, and *Tachenius*, who suppose their *Alkali* and *Acid*. We come now to discourse more particularly what is contained under this Head or Chapter: And

I. Of SEMEIOTICE.

Σημειολικὴ is an Indication of Signs, from σημεῖον, to teach by Signs; that is, by past, present, and future *Phænomena*, past, present, or future Health, Sicknes or Death may be foretold or known: For Example, I know a Man who had yesterday most violent Movements in his Body and drank nothing, this is a past *Phænomenon* (*Phænomenon* is every thing that we can apprehend by our external Senses) and now I know without touching him, that he is short breath'd, has a quick Pulse, is hot, &c. From past *Phænomena* I know, that to Day his Urine is reddish, and thence I likewise foretel what will happen, viz. That his whole Body will seem as if it had been beaten with Sticks.

Semeiotice therefore has for its Object Life and Health as well as Sicknes; this shews its Necessity. The thing signed is what is first known by a Sign. A Sign is a present, past, or future known *Phænomenon*, teaching something not apparent.

There is no Part in Physick better, or more necessary than this, when we are sent for to a sick Person. From the foregoing Signs I know his State of Life, Health and Sicknes; from this I know all *Signata*,
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which

which teach us at the same time what the Distemper requires, or what we ought to do. The Patient, for Example, tells me he has a violent Pain in his Side, a sharp Cough, complains of Heat, difficult Respiration, and has a high Pulse. Two or three Days afterwards I see him spit Blood with Corruption (I do not suppose yet to know his Distemper) and that he either recovers by Degrees, or dyes. In another Person in the like Case I find the whole Body turn livid; and on opening him afterwards find the Place gangren'd, or full of purulent Matter. I am then sent for to another Patient, in whom I discover the like Signs; and from thence I know that they have such internal Effects. For which Reason the most eminent Physicians now-a-days are very expert in *Semeiotice*. Some however, instead of it, have set up *Hypotheses* of their own, and have thence drawn their Prognosticks. The Chymists who have no Manner of Regard to Signs, fancy there is a certain universal Medicine, which they will have to be infallible, which is indeed like the *Materia Prima* of the *Cartesians*. Read all Authors and you will find this to be true.

If therefore you consider the Health of your Patient and Success, be most attentive to this Part; for you had much better be
igno-

ignorant of Anatomy, Chymistry, and Mechanicks, than this.

And here I shall recommend to you the best Authors I can.

1. Read *Hippocrates*; but that you may lay a regular Foundation from him in distinguishing Distempers, and thence to prognosticate, you must read his Works in the following Order.

1. You must read his Book called *περὶ ὄντων* ^{SKOV}
There was never any thing better written than this. He relates every thing with the greatest Prudence in a very plain Stile, rejects Trifles, and reduces all things to Causes the most simple.
2. *περὶ ἐνστάσεων*; or his two Books *De Prædicationibus*. None of his Books have come to us more perfect and entire than these.
3. *κοκκία περὶ γνῶσεως*; or *Coacæ Præcognitiones*. This is a wonderful Book, and far different from the preceding, but cannot be understood till you have first read them: It teaches the Knowledge of things. To this Book alone I owe all what I can prognosticate in Physick. You will not be able to understand it at the first and second Reading; but after reading Authors and Practice, you will wonder to find such things as are there-

in contained. For Example, in the Chapter of the Pleurisie and Quinsie, &c. where he describes all their Species.

4. περὶ μετεωρίων ; or his Liber unicus de Indicationibus ; and there you will find at what time, and how the several Changes are made in human Bodies.

5. περὶ μετεωρίων ; or one Book De Diebus Indicationis. *Judicatorii*

6. ἐπὶ δέμινων, being Seven Books of Epidemical Distempers.

I am very certain that you will thank me as long as you live for this Counsel and Advice. Study all these singly in the Order as I have placed them. You will see at least Examples of all what he proposes, which he did for the Use of his Sons, that he might enrich them with his divine Art. Of the other Works of Hippocrates I shall make mention in the History of Curing Diseases. After him read

2. Galen in the fourth Tome of his Works. The best Edition is that of Venice in the Year 1609. The whole is Semeiotical; read him especially where he treats De Urinis & Pulsibus. There he reckons up a Hundred different Distempers which he never saw ; then he explains all Symptoms by the four Elements of Aristotle, but he gives

gives us the Text of *Hippocrates* in his Commentary in *Coacæ Præcognitiones*.

3. *Lewis Duret* in his Commentaries on the *Coacæ* of *Hippocrates*. The best Edition is that of *Paris*, printed in the Year 1588 in *Folio*, but it is scarce to be had. The other Editions are also good. This Author is a very *Hippocrates*; he reduced into Order what were diffused and obscure, and explained them by his great Skill in the *Greek*: But he is not to be understood at once Reading. If you consult him for the *Apoplexie*, you will find in him all the *Hippocratica* and *Galenica* of this Distemper. No one has a better Index.

4. *Desiderius Facotius*, in his Commentaries *In Coacas*, which is also very scarce, for it goes under another Title. If therefore you can get *Hollerus's* Commentaries on the same Subject (the best Edition of which is that of *Leyden* in the Year 1576, in *Folio*) you will there find *Facotius*; for there were some Disputes between *Duret* and *Facotius* the Son. If you cannot get these, you will find in *Duret* sufficient *De Coacis Holleriana & Facotiana*. This Author (*Duret*) travelled thro' *Arabia*, and was the first in *Europe* who recommended the reading *Hippocrates*. He was Scholar to *Facotius*.

5. *Prosper Alpinus*, in his Treatise *De Prasagandâ Vitâ & Morte*; this Book is lately reprinted, viz. in the Year 1710 in 4to [I wish we had his Book *De Prædicendis Morbis futuris*, which he mentions, and perhaps lies somewhere privately in *Italy*. I have endeavoured to find him out but to no Purpose.] This Book must be read Night and Day, and then the Event of no Distemper will escape you. He has in him every thing that is good relating to Prefages, which *Hippocrates*, *Galen* and the *Arabians* had.

6. *Laurence Bellini* in his Treatise *De Urinis & Pulsibus*, who teaches the true Method of reasoning from Principles on these Subjects, which none before him ever did; he examined Urine in all its Circumstances whatsoever, within and without the Body, and thence concluded, that in such a Distemper such would be the Urine. His Treatise *De Pulsibus* is the best I ever knew published, wherein he examines the Causes of all Changes both *Anatomically* and *Physiologically*.

7. *George Baglivius* printed at *Leyden* in *Quarto* in the Year 1710. He is not near so valuable as the foregoing Authors. He argued without Experiments and with too great a Liberty; but tho' he wrote
without

without Order, yet he has some Signs which you will find no where else.

II. HUGIEINE.

ὑγιεινὴ signifies the Goddess of Health, and consequently the Art of conserving Health and defending our present Strength and Vigour by the Use of external and internal Applications.

The Means or Instruments by which this is done are what we call

1. Gesta.
2. Ingesta, as Meat, Drink, Clysters, Injections, &c.
3. Retenta & Excreta, and
4. Outward Applications.

And in these Four Hugieine wholly consists: The Ancients said it consisted in *Regimine sex Rerum non naturalium*.

Authors to be consulted on this Subject are

1. Cardan [a Physician of Bologna] *De Sanitate tuenda*, which you will find in his Works printed at Leyden in Ten Tomes in Folio in the Year 1663. If you can get this Book you may be without all others, but it is very scarce. No one wrote better than this Author when he wrote well, and

none worse when he wrote bad: For in him Nature knew no Medium: He was a great Critick in his Writings on other Physicians. Read his Life in the Preface and it will please you better than any Comedy or Tragedy.

2. *John Brunner* in his Treatise *De Re Cibaria lib. 22.* printed in 8vo at *Lyons* in the Year 1660, is the only one who has treated this Subject with such consummate Erudition and Art.

3. *Melchior Sebizi*, a Person of the highest Learning, especially in Practice. He lived to be a Hundred Years old in perfect Health both of Mind and Body. He wrote Five Books in *Quarto De Alimentorum Facultatibus*, printed at *Strasbourg* in the Year 1650. If you can but get these you have all you can desire. As this Person wrote from the Age of Nineteen till Ninety, and as his Works in his Youth were admired by all the World, how valuable are those of his last Years?

4. *Galen* in his Treatise *De Tuenda Sanitate*, which treats not only *De Re Cibaria*, but also *De Regimine Omnium sex Rerum non naturalium*. This is one of his most learned Treatises. After him read

5. The *Medicina Statica* of *Sanctorius*, and in reality before him scarce any one came to the Point. He tells us, how what

we

we take is changed into our Humours, what Meats exhale from us without *Fæces*, what Aliments agree with the weaker Sort, and what with those that are more robust and strong, in this his Divine Treatise: which ought to be studied by every Physician.

6. *The Praise of Sobriety*; or, *Methodus ad Centum Annos perveniendi licet Corpus debile sit* of Cornaro a noble Venetian is a very good Treatise. This Author wrote in a Poetical Style, it is printed in a great many Languages and with other Books.

7. *Bacon Lord of Verulam*, in his *History of Life and Death*, and *Aphorisms for prolonging Life*, printed in England in 8vo in English, and not yet translated, containing a Description of the Lives of some that lived a long while in that Country in perfect Health, where you will see their Method of living, and thence you may learn very good Observations and Advice.

8. *Hieron. Mercurialis* in Six Books, *De Arte Gymnasticâ* printed at Paris in 4to in the Year 1577; this Edition is very fine. He was Professor of Padua, and explains the Exercises of the Ancients to strengthen the Body and dispel Distempers at their Beginning. This Treatise is of much Learning not full of Words, which when you thoroughly know you will have a perfect

fect Idea of those Exercises. Others that have written since have only copied from him.

III. THERAPEUTICE.

Therapeutice is that Part of Medical Institutions which teaches us to discern in sick Persons what Distempers they labour under, and thence to learn what is requisite to their Cure and to be applied, that is, to find out and discover

1. The *Signa Indicantia*.
2. Their *Indications*, and
3. *Indicata Remedia*.

1. But first it is necessary to explain the Means or Instruments Physick makes use of, and these are either *Mechanical* or *Chirurgical*, *Viſtus* or *Materia Medica*, of which we shall say somewhat in the next Book relating to the Practice of Physick ; or, *Praxis Medica*.

On these the best Authors are

1. Fallopius.
2. Dale in his *Pharmacologia* printed at London.
3. Markgrave *De Materia Medica*, which are sufficient for this Part.

2. The

2. The Second Part explains the *Methodus Medendi*, which proposes Rules by the Help of which you may find out the *Indicantia*, *Indicata* and *Contra-indicantia* or *Repugnantia*.

It is no easy Matter to ascertain what Authors deserve to be read in this Part; for before *Harvey* they were all full of *Elements*, *Faculties*, &c. if, for Example, you consult *Greek Galen*, *Roman Celsus*, or any *Arabian* whomsoever, how these *Indications* are to be taken? they tell you from the *Elements* or *Faculties*, whether the Patient be dry, humid, affected with the *Bile*, *Melancholy*, &c. and they say you must take away what is superfluous, and supply what is deficient. If you have a Mind to see this read the Works of *Argenterius* printed at *Padoua* in *Folio*. This Author had a great Name amongst the *Methodists*, but he was very unhappy in curing of Distempers, for he was a *Systematick* and built on a false *Hypothesis*.

But those who began to write well on this Subject, are

1. *Melchior Sebizius* in his Treatise, entituled, *Galenus Methodus Medendi* printed at *Strasbourg* in 4to in the Year 1639. But

2. The *Methodus Medendi* of Bernard Swaloe printed in 12mo at Amsterdam in 1657 is yet much better and more compendious; and as it was written since the Discovery of the Circulation of the Blood; is of Consequence the only and best Treatise for Beginners.

3. Francis Sylvius De la Boe wrote a small Treatise *De Methodo Medendi*, it is the clearest Book he ever published, if you pass over his *Alkali* and *Acid*; you have it in his Works in 4to but not in 8vo, nor in his *Praxis* with his *Theses*.

4. John Walleus, heretofore an Ornament to this University, wrote also a *Methodus Medendi* printed at Augsburg in 12mo in the Year 1679; how great a Man this was you may learn from his two Anatomical Epistles of the Circulation of the Blood, and of the Chyle to Tho. Bartholin. The last Edition of *Leyden* is full of *Anatomical Experiments*. He wrote a *Methodus & Praxis Medendi* accommodated to Circulation, but this Work is very difficult to be met with. Add to these

5. Daniel Sennertus.

The End of the Third Book relating to the Theoria Medica; or, the Theoretical Part of Physick.



BOERHAAVE's
M E T H O D
O F
Studying Physick.

BOOK IV.

*Of the Praxis Medica ; or, The
Practical Part of Physick.*



WE have now laid the Foundation of Studying Physick, what remains is only that I give it a finishing Stroke, by considering what is requisite in order to learn its *Praxis* in respect of Authors. If any where, most certainly here, must be recommended such only as are approved : But I shall not tell you of any but such
as

as I my self most like, and who therefore will not bind any Body.

The Practice of Physick consists in the knowing in every particular Patient by particular Signs the Particulars of his Distemper, and thence to cure him by a particular Method as well as particular Remedies. It differs from Institutions in as much that in these general Observations are proposed to a Physician which he must observe and keep, the better to exercise this practical Part; for Practice is the ultimate Perfection of Physick, which therefore consists

1. *In knowing every particular Distemper by particular Signs, and*
2. *In curing such particular Distemper by a particular Method. For Example, I see a Man faint away, which I cure not by any thing good in general against Fainting, (for there is no such thing in Nature as a universal Method) but I consider this particular Fainting, and that it is perhaps the Effects of seeing some frightful Object, or smelling to Musk, or the like. I ought therefore to search out particular Causes, but at the same time to retain the general.*

All Cures are made by some certain Means or Instruments which may repel either

1. *The*

1. *The Cause of the Distemper ; or,*
2. *The Distemper it self ; or,*
3. *The Effects of the Distemper.*

Hippocrates and Celsus reduced these to three, viz.

1. *The Hand.*
2. *Diet : And*
3. *Medicines.*

And therefore the *Praxis Clinica* consists in finding out and duly applying

1. *Chirurgery, or Surgery.*
2. *Diæteticæ, and*
3. *Pharmaceuticæ.*

Which are properly comprehended in these two Parts, viz.

1. *Chirurgery, or Surgery, which cures Distempers externally by the Hand.*
2. *By Medicines inwardly taken, which is an internal curing of Distempers.*

I shall therefore accordingly divide this Book into two Parts.

1. The First shall treat of *Chirurgery (or Surgery)* or the *Praxis Medica externa ; to which*

which I shall add the Names of those Authors who have written *Systematically*, those who have written of particular Distempers, and such others whom we shall call *Operators* and *Observers* on Account of their Operations and Observations.

2. The Second shall treat of the Method of Diet [*Dietetice*] and the *Praxis Medica Interna*; to which also I shall insert the Authors who have written *Systematically* on this Subject, those who have written on particular Distempers, and those who have made their Observations; and lastly, those who have treated *De Consilio Medico*, and then close up the whole.

PART I.

CHIRURGERY; or Surgery.

CHirurgery, or Surgery, is that Part of practical Physick which teaches us how to know and cure those Distempers which can either mediately or immediately be managed and cured by the Hands. Since therefore the Hand by a dexterous Application assists us in curing of Distempers, it is evident that this Art has for its Object those Distempers only which can be cured by the Hand, which we for that Reason call *Chirurgical*. For Example, in
an

an Inflammation of the outward Parts no Diet or Medicine will avail any thing, but we must have Recourse to the Surgeon's Launcet; so also a Dislocation of the Shoulder is only cured by a dextrous Application of the Hand.

Surgery may be considered four Ways, viz. either as Systematical, or as treating of particular Distempers, or describing Operations, or lastly Observations; on all which there are an Infinity of Authors, and some very confused; I must therefore divide them into these four Classes following.

1. *Into those who have written of Surgery Systematically, whom we therefore shall call Systematicks.*
2. *Those who have written better on some particular Distempers than the Systematicks.*
3. *Those who have written of Operations only; for Example, of the Trepan, that the Skin must be cut in such a Place and the Trepan applied, &c. And*
4. *Those who have described some Cases in Surgery that have occurred to them in Practice, and these we call Observators.*

I. CLASS. SYSTEMATICKS.

The *Systematics* are those who relate to, and treat of, the general Nature of all *Chirurgical* Distempers, their different Causes, Effects, Remedies, and their Method of Cure. I do not recommend to you those who were only Compilers in their Chambers, but those who have been famous in Practice, or who have been first Professors of Anatomy. In this Part the Prince of all is

1. *Hippocrates*, in the Sixth Section of his Works published by *Fæsius*. There is no better Book in the World, tho' I must confess there are some Things very obscure, because the Writings of *Hippocrates* were suppressed for many Ages, and at last brought again to Light by Chance, and because in the first Translation a great many Errors were committed, which are likewise contained in those that have been made more lately, otherwise it is a glorious Book, and you will find he was a famous Surgeon. You will do well if you add to him,

2. *Galen's* Commentaries upon the Surgery of *Hippocrates*. For *Galen* was a *Grecian*, and lived in the Reign of *Septimius Severus*,
Fifteen

Fifteen Hundred Years ago, and wrote before Barbarism had destroy'd the Writings of *Hippocrates*; and thus you will have the most perfect Work of Antiquity.

3. Read *Cornelius Aurelius Celsus*, who is better than all the Ancients and Moderns in Surgery. Read this Author on what Chirurgical Distemper you please, and you will see he tells all what we now-a-days know; and therefore those who say he was only excellent in the Theory, are false in their Judgment; nor was his High Birth any Impediment to him in exercising this glorious Art. He was famous for Dexterity of Hand, Caution, &c. and universally so thro' every Part of Surgery. He is admirable for Eloquence of Diction, full of Erudition, and inimitable in Cleanness and Brevity of Style. After him, read

4. *Gabriel Fallopius* in his *Opera Chirurgica*. He was a most dextrous Anatomist, and practical Surgeon; and I have often recommended him to you in this Treatise. Add to these,

5. *Joh. Andreas a Cruce*, a publick Professor in *Italy* (known to a very few) in him you will see Art in Perfection, nor can you well be without him. He wrote with the greatest Candour, and without Pomp or Magnificence of Style. This Work was printed at *Venice* in *Italian*, and

afterwards was translated into the *Latin*, *French*, and *German* Languages ; and yet (which is very wonderful) is scarce known to any one now-a-days. He wrote excellently well of Medicines, Instruments, &c. The *Italian* Edition in *Folio* is the best ; in the *French* Edition he is called JEAN DE LA CROIX.

6. Hieron. Fabricius ab Aquapendente excelled every Body in his *Opera Chirurgica* in *Folio*. These Works are printed in *Folio* at *Padoua*. He was an incomparable Anatomist, and was in his time very famous for Surgery all over *Italy*. He was good at Prognostication ; and was also incomparable in inventing of new Instruments ; you may better be without all the rest than this Author. If any one would consult an experienced, clear and candid Author, let him read *Aquapendens*, who in a very kind manner tells us what must be done to our Patients in our first Visit.

7. Marcus Aurelius Severinus, a *Neopolitan* (in reading whose Works *Bartholin* said he was amazed and struck with Astonishment.) He was a most expert Professor at *Naples* in Anatomy, Physick, and Philosophy, and a Surgeon from his Infancy to his Old Age. His Treatise *De Trimembri Chirurgia*, and his other *De Medicina Efficaci*, must be often your Study. In Practice he

he teaches when Distempers are to be cured by Causticks and the Knife, and when by Medicaments and Diet. You must buy these together, for the first is very difficult to be got; but this latter you may see at the End of *Hildans Observationes Chirurgicae*.

8. *Ambrose Pareus* printed in *French* at *Paris* in *Folio*. This Book is translated into *English* and *Dutch*; but the First Edition in *French* was put out by himself. It is wonderful how in so much Practice he could find Time to write such a Work. But *Riolanus*, that invidious, tho' true, Censor of Authors, says, that as *Pareus* was in the Favour of three Kings successively, he made use of their Authority, and obliged the most learned Physicians and Surgeons to compile that great Work; but owns that he supply'd them with Observations, and put his Name to it.

9. *John Vigo* an *Italian* deserves your Reading; but it must be acknowledged he was in the wrong to have every thing to be cured by Incision and Causticks, otherwise his Book is excellent; but he is often mistaken when he will have nothing else apply'd but such or such a Chymical Medicine, when nothing but the Knife will do. There are many Editions of his Works in *Quarto*.

10. *Vidus Vidius* an Italian, who was heretofore so very famous, is now scarce known; (he is commonly called *Vidi Vidi*) He wrote Four Books of Surgery in *Folio*, which were printed at *Frankfort* in the Year 1667. which is the best Edition, and there you have every thing together which you find scattered amongst other Authors.

II. CLASS.

AUTHORS who have written on *PARTICULAR DISTEMPERS*.

Authors who have written particularly on some Distempers are to be made much of: And it is said, that

1. *John Beringarius* of *Carpi* excels in the Fracture of the Skull, but I never saw him. He was the first that reformed Anatomy in *Italy*, and he boasted that he got a vast Sum of Money only out of Mercury. This Work is printed at *Leyden* by *Herman Coryngius*.

2. *Marcus Aurelius Severinus* is excellent on *The Secret Nature of Imposthumes, hard and waterish Tumours, the Cancer, and other Abscesses of Matter into any Part*. This Author (where-ever you buy him) will afford you so much Pleasure, as you cannot easily leave off reading him.

3. *Fabricius Hildanus* is most perfect on the *Gangreen* and *Sphacelus*, and such like Distempers, as also Burns by Fire or Gunpowder, and wrote admirably well on the Running in Ulcers.

4. *Christopher Schellamer* of Tumours in Human Bodies. This Book was printed at *Geneva* in the Year 1695. If you have a mind to know all what relates to this Subject in a few Hours, you will find it in this Treatise.

5. Of the Distempers in the Eyes the only one in my Opinion is *Maître Jean Traité des Maladies de l'Oeil*, printed in 1707.

6. Of the Surgery of the Ears, *Du Verney's* Treatise *De l'Ouir* mentioned before.

7. Of the Diseases of the Bones, the best Author is the famous Surgeon of *Paris*, *PETIT*, in his Book *Des Maladies des Os*, published at *Leyden* by *Haak* in the Year 1709. This Author never had his Equal, and will hardly be mended; there is not so much as one little Mutation of a Muscle in any Case omitted. He describes the Instruments with a Mathematical Exactness, and never forgets the Vessels, Nerves and Ligaments.

III. CLASS.

O P E R A T O R S.

Those Authors who have described *Encheireses*, or Manual Operations, must likewise be read ; and these are,

1. *Palsin*, a Native of *Gandt*, an Anatomist and Surgeon, in his Book printed at *Leyden* in *Dutch* in the Year 1710, there you have most accurately *Du Verney's* Method, and the Demonstrations he observed in Dissecting of Bodies at *Paris*. He presupposes an Anatomical Knowledge of the Parts. Add to him,

2. The *Operations Chirurgiques* in *French*, which give you the publick Demonstrations made every Year by the King's Command in the Royal Garden at *Paris*. This Work deserves the highest Encomium, for there you will find all the late Discoveries that have hitherto been made in Surgery. It is not the Author's Fault if you do not understand the Operations, for never any one wrote better on this Subject.

3. The *Operationes Manuales Chirurgicae*, written by *Van Solingen*, printed while he was living by *Bontestein*.

4. Of Cutting for the Stone, read the last (not the first) Treatise put out by *Tolet*, *De Calculi Sectione*, printed in the Year

Year 1709. He cut a Hundred every Year, but heretofore he used another Method. This Book was written after *FREERE JAQUES* had published his.

5. The fullest Author *De Extirpatione Cancrorum* is *Denis* [*Dionysius*.]

IV. CLASS.

OBSERVATORS.

Those who relate the History of single Cases as they have occurred to them, are

1. *Fabricius Hildanus* in his *Observationes Chirurgicae & Medicae Centuriis plurimis*. This Book is in *Folio*; you will never find one who will tell you more than this Author.

2. *Forrestus* in his Books of Surgery, where first of all he writes its History, then adds his *Scholia*, which contains very learned Observations.

3. *Marchette* an Anatomist of *Padoua*, in his Treatise, entitled, *Les Observations Chirurgiques*.

4. *Roonhuysen Heelkoust* written in *Dutch* in 8vo.

5. *Schultetus*, who has many excellent Things.

6. *Ruyfchius* also is admirable in his *Observationes Anatomicae & Chirurgicae cum Audacissimis Casibus*, printed at *Amsterdam* in 4to.

7. Bem-

7. *Beukelmann*, } both famous Pra-
 8. *Petrus Adrianus*, } cticians.
 9. *Stalpert Vander Wiel* in his *Anatomicae*
 & *Chirurgicae Observationes* in *Latin* and
Dutch.

These are the principal Authors as I know of.

PART II.

Diætetice, and the Praxis Medica Interna.

DIÆTETICE.

Diet properly signifies a Regimen of Food, but *Diætetice* is now used to signify the whole Regimen of a sick Person, as to Meat, Drink, Sleep, Retentives, Motion, Rest, &c. There are very few good Authors on this Subject, but these following are the chief, viz.

1. *Hippocrates* in his Treatise *De Victu in Peracutis*, as also in his Treatise *De Victu in Acutis*. Add to him
2. *Galen De Victu Aegrorum*, for perhaps there is no one better.
3. *Peter Girardet* in his Commentaries in *Dietam Acutorum Hippocratis* in 8vo. printed at *Paris* in the Year 1631.
4. Read *Arnold De Villa Nova*, an Italian, the Pope's Physician, *De Preparandis Cibis & Potu Aegrorum*. In the first Tome of his Works

Works in three Tomes in *Folio*. Add to these

5. *Sydenham*; than whom I do not know of any that have written better.

These Authors have treated this Subject very seriously, and advised nothing but what may be Serviceable, and you have in them all you can desire.

Of the Praxis Medica Interna.

In the Study of inward Distempers, or the Advice how to make proper Medicines to be taken inwardly, we must be very careful in recommending Authors: For in this Case Mistakes would be of a very fatal Consequence. I shall therefore speak here only of such as I my self have made use of, or who have been commonly cried up and commended.

All those from whom we may learn the Nature of inward Distempers I divide into these three general Classes following, as you ought to do in your Libraries.

1. *Into those who have written Systematically.*
2. *Those who have written of particular Distempers.*
3. *Those who only have described their Observations.*

1. A System is a sure, entire, well order'd *Compages* of a certain Art, in which is prescribed the Instruction of all those things which are required in curing Distempers: In no Part are there more Authors than in this if you regard their Promises; but none fewer if you consider their Merit, and whether they have stood to what they have so largely promised.

2. Those only have described particular Distempers who have so penetrated into every thing that belongs to such or such a Distemper (in as much as it is knowable to Man) that nothing remains undescribed of its *Phænomena*, *Curing*, and *Events*. What Good is to be found in the *Systematics* is derived from hence; for they must first know all particular Distempers.

3. The *Observers* are all such Authors who have described inward Distempers, and who have not treated of this or that Distemper only, but of every one whatsoever in its Rise, Progress, Effect, Remedies, Tractableness and Pertinacy, as also those obvious Mutations which have happened in any Case. These have made Observations on every thing that has happen'd in Life, or after Death; in the first the best is *Hippocrates*, after him those who have dissected by his Observations, and thence arrived to the utmost Perfection.

I. CLASS,

I. CLASS.
SYSTEMATICKS.

Amongst these,

1. *Hippocrates* is the first, his vast Volume is not to be read in the Order it is written, but first of all his *Aphorisms*, which contain all physical practical Axioms, and such as for Twenty Three Ages were incontestable, and to which all Physicians, in their several Controversies with each other, always referred themselves (except in some few Things which seem to be foisted into his Manuscripts.) These are confirmed by a Thousand Cases in getting, demonstrating, and curing Distempers. He wrote in such a Style as scarce any one now-a-days understands, and they who have translated him have done it according to their own Capacity; if any one reads him untranslated he will find it the greatest Difficulty in the World to understand his Meaning. You must therefore have Recourse to his Commentators (to whom all such Persons are much indebted) the most skilful in the *Greek* and *Latin* Languages, and the most conversant in ancient Writers (for *Hippocrates* had a Family, and he communicated his Domestick Method of Physick only to his own People, and which continued for a
Hundred

Hundred Years in the Family of *Asclepiades* to *Augustus* so called.) The best of these Commentators is;

1. Galen, who commented on Hippocrates's Aphorisms ; after him no one better than
2. James Holler a Professor of Paris and Reformer of Physick, whose Commentaries are practical and most strong and nervous.
3. Valesius wrote Commentaries on Hippocrates in Eleven Books in Folio ; what the Ancients and others taught of the Aphorisms of Hippocrates you may find in him. He was a Spaniard and a Person of consummate Learning. If you can get these Books you have no Occasion of any other, for other Authors generally run into Errors, because they write out of their own Hypotheses, not by Observation. In the next Place you ought to observe his *Præcepta Medica*, where he describes some Precepts in Curing. And lastly, the whole Section of *Fœsius's* Edition, which ought to be read before you undertake to practice ; and there you will see several general Precepts relating to the Diet of sick Persons and those that are in Health, or such as labour under acute Distempers, &c. of
want

want of Sleep, Aliments, and the Office of a Physician. All this may be read and easily understood in three or four Days, for here Hippocrates is not so obscure.

2. The Second practical Systematick is *Aretæus* a Cappadocian, and I think this Author to come the nearest to *Hippocrates* of any we have, for he did not live long after him. There are two Treatises of his, in both which he gives us several general Instructions in Relation to Medicines and the *Ratio Medendi*. *Hippocrates* wrote every thing very confusedly, but this Author did not digest only one or two things, but every thing Systematically. I do not see that the nervous Style of *Aretæus* is much inferior to that of *Hippocrates*, and then he observes greater Order. His best Edition is only in *Greek*, printed in 8vo at the Royal Press at *Paris*, but it is scarce to be had. The *Augsburg* Edition in *Folio* is likewise very beautiful.

3. The Third in this Class is *Aurelius Cornelius Celsus*, who lived in the Reigns of *Augustus* and *Tiberius*, and after *Aretæus* is the next to *Hippocrates*. This Author is the best one can trust to in informing us of *Hippocrates's* Opinion, and if we were without him we should make a Thousand Mistakes

Mistakes in reading *Hippocrates*; for in his Time the *Latins* learned the *Greek Language* as we do now the *Galenical*, and at that time likewise the *Bibliotheca Alexandrina*, *Romana*, &c. were in being; as also a great many of *Hippocrates's Manuscripts*. You cannot follow a better than *Celsus*, for he explain'd *Hippocrates* and *Aretæus* in a most easy, strong, yet smooth Style. This Author, by often reading him will make excellent Physicians, and from him only you may know how the Ancients cured Distempers by *Friction*, *Bathing*, &c. without a huge Gallimawfry of Medicines. The *Elziver* Edition is the best, it was printed in the Year 1650 in 12mo by *Vander Linden*, which is entirely corrected from his Manuscripts. The *Antwerp* Edition in *Folio* is likewise very good; but this is to buy Antiquity too dear; this was likewise perused by *Vander Linden*.

4. The Fourth is *Galen* whom I have so often mentioned in this Work.

5. The Fifth in order of Time is *Paulus Ægineta* a Greek Author later than *Galen*, 450 Years before Christ, *Aretæus* about a 100 and more after *Hippocrates*, and *Celsus* flourished about the time of Christ, *Galen* in the Year of our Lord 140, *Ægineta* about the Year 300. This learned Man is certainly the best Physician *De Re Medica*.

He

He wrote Seven Books which contain every thing relating to internal and external Practice, but his Style and Method are entirely *Galenical*, that is, altogether *Aristotelian* in his Arguments. This Author amended all what *Galen* had before written in three large Volumes in *Folio*, made easy what was difficult, digested what lay confused, and reduced all things that were scattered about in *Galen's* Works under certain Heads. Read what Author you please after *Ægineta*, and you will find such Authors Writings to be the same with his; for as *Ægineta* lay buried up in Manuscripts, other People made bold to suppress his Name and publish his Works for their own. He is a most exact Author, but for Gravity is nothing like the three first I mention in this Place, for he ever follow'd *Galen's* Doctrine. His *Greek* Works are very scarce. The *Greek* Edition is absolutely the best, and is that of *Aldus* (which is very dear) in *Folio* printed in the Year 1538; (it is very hard to be got being snatched up into Libraries, especially those of *England*) for at that time Printers were very learned Men, as *Aldus*, *Stephanus*, &c.

6. The Sixth is *Aetius Amadeus*, whose Work after the three former Authors is most excellent, and is called *Tetrabiblos Medica & Jatraca*. Before you publish

any thing relating to any Distemper, consult *Aetius*, for he has an admirable Index. He collected all things that lie dispersed in *Hippocrates*, *Galen*, and others, so that in my Opinion this Book ought to be compared to *Justinian's Codes*, which *Fabian* reduced and digested under several Chapters. If, for Example, you would know what the Ancients thought of the *Pleurisie*, you will find the Sentiments of Fifty Authors which you could not know but from *Aetius*. The best Edition is in *Greek* in *Folio* by *Aldus* in the Year 1534.

7. *Alexander Trallianus* follows next in Order of Time : This Author is very short, his Writings are supported by *Galen's* Authority, but they have notwithstanding several beautiful Passages. No one ought to be without this Book, it is printed at the King's Press in *Paris* in *Folio* only in *Greek*, in a pretty large Volume ; it is easily understood, but it was likewise printed in *Latin* and *Greek* at *Basil* in 8vo in the Year 1556. He prescribes proper Remedies for every Distemper, and is really very good, as may appear by his Treatise of the Worms, which is not in this last Edition.

8. *Oribasius* was a Writer of the next Age. (for now the *Greek* Language began to decay.) He was Physician to *Julian* the Apostate, and reduced into a regular System

Item every thing he found loose and indigested in other Authors; the Emperor employ'd him in this Work that he might make a Collection, and explain, in one Volume, the Sentiments of all preceding Physicians. This Book was printed at *Basil* in 8vo in the Year 1557. Compare this Author with all others and you will find he very commodiously explains the Opinions of the Ancients on every Distemper; and gives us frequently an Opportunity of inventing Medicines for Distempers not easily curable; his Advice is excellent, and his *Materia Medica* incomparable.

Here ends the *Greek School*. I should do ill not to recommend to you the Merits of these Authors; you must buy the Editions I here mention, which have all of them very curious Indexes; nor can I recommend to you any other amongst the *Greeks*. I can find every thing almost in *Aetius*. Since the *Greek Tongue* was seldom read by Physicians, *Stephanus* gave his Assistance, who by his applying himself to the publick Good reduced himself to an extreme Poverty. He was learned in the *Greek* and *Latin Tongues*, and put out the Works of the principal Physicians after *Hippocrates* and *Galen*. You have from him all the said Authors, except these two last mentioned, and several other *Romans*. He

wrote an Index full of great Learning, which contains the most minute Particulars; for Example, *The Cause of Madness in Aetius*, &c. such a Page. Its Symptoms, Cure, &c. in *Ægineta*, &c. such a Page, &c. It is two Volumes in *Folio*, tho' sometimes bound up in one about two Hands breadth in a very small Character: Heretofore this Work was bought for three Florens, but it is now snatched up into Libraries. You may trust to this Version more than any other.

Amongst the *Roman* Authors the

1. Is *Celsus* before mentioned.

2. *C. Pliny*, who was a Person of a vast Genius, tho' no Physician; he collected what he could out of some Thousands of Volumes in the time of *Vespasian* for his Natural History. The Edition of *De le Campius* [or *Des Champs*] a *French* Physician, may be bought any where; this Author indeed is not so valuable as any of the foregoing, but yet we cannot be without him; for he has several Things which others do not mention, and many things not to be met with in *Dioscorides*.

And here the *Romans* left off, for the others who wrote in the *Latin* Tongue were of all Nations. After these I do not know any one I can recommend to you; for all others are purely *Galenical*, and so much

much versed in the *Aristotelian* Philosophy, that they are therefore not worth your Notice; you lose your time in reading them, for they give but very bad Informations.

All those that came after were *Arabians*. For after the *Vandals* had destroyed all Letters, and the *Moors* came out of *Africa* into *Spain*, when they were thence driven out they carried back with them a great many Books, and set up in the Cities of *Fez* and *Morocco* Libraries and Universities, and applied themselves to the Study of Physick out of those Spoils they had brought along with them from *Europe*.

The *Arabians* of all Men were of an excellent Genius and Penetration, the chief of whom were *Avicenna*, *Almanzor*, *Rhases* and a great many others I cannot name. *Hippocrates* and *Galen* had been translated into *Latin*, and then the Science of Physick began to be entirely *Arabian*; and as they had every thing from *Aristotle* and *Galen*, they abounded with the Chimeras and Trifles of the *Peripatetick* School.

From the Sixth Age to the Year 1507 every body almost followed the *Arabians*, and their Writings accordingly were suitable to their Notions.

Of the Arabian SECT.

Of this Sect the best Author is

1. *Hieron. Capiuaccius* a practical Professor of Physick. He was most famous all over *Italy*. He wrote a Treatise entituled, *Medicina Practica* in Seven Books, printed at *Franckfort* in the Year 1594; in him you will find a System of all Distempers, their Description and Method of Cure. He acquired great Riches and Honours. When he was asked what Secrets he made use of, he replied, *When you know me you will know my Secrets*. You may notwithstanding do very well without him, since he is too trifling like the *Arabians*, and too full of Words with the *Peripateticks*.

2. *Felix Platerus* wrote a noble Treatise called *Medicinæ Praxis*, than which nothing can be better, only that he abounds with too many Remedies; but in digesting of Distempers he is by far the best of them all. This Book was printed in three Volumes in *Quarto* at *Basil* in the Year 1656, which Edition is much more exact than that printed in the Year 1625: For the fifth Part, which the Father suppressed, was put out by the Son; I speak of his Practical (not Anatomical) Works.

3. *Nicho-*

3. *Nicholas Piso*, Father to *Charles Piso*, wrote an excellent Treatise *De cognoscendis & curandis Morbis*. This Book is in *Folio*, and may be had at *Wechel's* for a small Matter. The *Arabian* Doctrine corrupted all things hitherto; but these Authors I mention are the most pure and incorrupt.

And now the *Greek* System began to revive.

About this time they began to read *Hippocrates* again, especially in *France*; [for People plainly saw *Galen* had corrupted a great many things by Philosophical Notions.] Of these,

1. The first was *James Holler* in his *Practical Works* with *Duret's* Notes. This is really a *Golden Treatise*. He was a most learned Man, and very skilful and most famous in Practice: He wrote when he was in Years; he is full of admirable Experiments, of exact Fidelity, and plain in Style. His *Medico-Chirurgica* are very excellent in that Book.

2. *Duret*, who wrote admirable *Scholia* upon *Holler*; you may buy this Book for a very small Matter, for eight or ten Stivers; it was printed in *Quarto* at *Geneva* in the Year 1635.

To the *Systematics* may also be referred some who have written other Peoples Works.

Works. It is said that nothing heightens and exalts a Genius more than Travelling, for by this Means those Prejudices we have of Good and Bad, &c. are rectified, and that no Body is fitter to govern People than a Person thus accomplished. So likewise in Physick a Physical Genius can no ways be better improved than by reading the Methods of the *Egyptians, Indians, Persians, &c.* for Experiments are proved by Success, and where Men do not follow the same Opinions in Speculation, yet agree in Practice, it is the same thing.

Thus

1. *Prosper Alpinus* made himself well acquainted with the *Egyptian* Method of Physick. This Author was an *Italian* born, who, that he might learn the chief Seat of Physick went to *Egypt*, where *Hippocrates* gained all his Knowledge; and there he collected his Observations, which you may see in his Book called *De Medicina Ægyptiorum*; where you will find a great many of *Hippocrates's* Observations likewise. The *Paris* Edition in the Year 1646 is the fullest and most compleat.

2. *James Bontius* born in these Provinces, heretofore Professor in *Leyden*, undertook a great Journey into the *East-Indies*, as far as *Persia, Java, &c.* that he might acquire the true Notions of the *Indians* relating to
their

their own Distempers. Never Man cured more Distempers by Simple Remedies than *Bontius*. Read him on the *Dysentery*, *Contraction of the Nerves*, &c. His Book *De Medicina Indorum* is bound up with the *Medicina Ægyptiorum* of *Alpinus*, tho' you may buy it here at *Leyden* by it self; it is a very little Book.

3. *William Piso* wrote a Book at *Amsterdam* *De Medicina Brasiliensi vel India Occidentalis*, you have it in his Works at large printed in *Folio* at *Amsterdam* in 1648, where you may likewise have

4. *Markgrave's Opera Brasiliensia*. Nor should we make slight of the Method of these *Indians* in Physick, for there are no where People of a greater Genius and healthier Body, than these People living in those Countries commonly to a Hundred Years.

5. *Guten Rhyne* wrote a Treatise *De Chinesium Medicina*. This *Hollander* for many Years together, in the *East-Indies*, dived into the *Arcana Medicinæ* of the *Chinese*.

II. CLASS.

Authors on particular Distempers.

These following are the Authors who have written on particular Distempers only.

1. *Hip-*

1. Hippocrates in his Books *De Affectibus & Morbis internis*.

2. *Celius Aurelianus*, but this is a Writer whom we have great Reason to doubt of. His Style is scarce intelligible, and so very barbarous, that one can hardly find out his Meaning; but yet his Matter is most excellent: He wrote *Of the quick and slow Passions*, as also somewhat of Surgery, which Book is quite lost. His Works are printed at *Amsterdam* in *Quarto* by *Wetsten*; but the best, and which is to be had almost any where, is *Helvetius's* Edition printed above two Years since. I take this Book to have been written by *Soranus* of *Ephesus*, for it is impossible for a Man who had composed such beautiful Monuments in Physick to write in so barbarous a Style; which makes me think that that noble *Ephesian* [*Soranus*] who was thought to be lost, was translated in *Africa* into *Latin* by *Celius Aurelianus*, which Tongue he did not very well understand; he has notwithstanding every where hit the Sense of the Author. In this Book the Signs and Presages of Effects are admirable, and the Sentiments of all Physicians that preceded him are here collected; he very exactly tells us all even the most minute Signs of the Distempers he describes, and also what Effects are likely to follow; nor is there any Author, that has
come

come to our Hands, who deserves more than this. Next to him

3. Is *Bellonius*, whose Works were printed at *Paris* in *Quarto* in three Volumes in the Year 1640; as many Authors as have read *Bellonius*, and understood his Method, have unanimously commended him. He wrote every thing in a most compendious yet elegant Style, and with the Exactness of *Hippocrates* without any Prejudice; he is useful both for the Study, and the Chamber of the Patient. He wrote *De Morbis Virginum & Mulierum Epidemicis* and several other different Subjects, as also on *Hippocrates*. If he can be bought for a moderate Price let every one get him. Add to him

4. The Compendium of those three most noble *English* Authors in Physick, *Morton*, *Harris* and *Lyster*, as printed in *Germany* in one Volume. *Morton* wrote practically, but he was too fond of some certain Medicines. He is a Writer that has seen a great deal, made a great many curious Observations which he very candidly delivers down to us. *Harris* is without his Equal in his Way, whom I always found in Practice to have said every thing very true; for Example, in sucking Children, that many of their Distempers were owing to indigested and coagulated Milk. Next follows

5. *Sydenham*.

5. *Sydenham*, whom no one ought to mention but with Honour. This Author laying aside all the Pomp of Learning and Systems, did nothing else but observe by the *Clinica Methodus* of the Ancients what happen'd in Distempers. He was excellent in this, that one may so know the Nature of Distempers as to admit no deductory Conclusions, to use no Authors, nor take up any Prejudice; but he tells what pre-existed in the Body and Life of the Patient; for Example, that he fell into such or such a Distemper, then describes after the same Method the Idea of such known Distemper, that at such a time there were such Symptoms and what thence followed, and if he had the Assistance of any one he owns it; he praises nothing, but very plainly says, that such a thing was effected by such Means; then he observes the Issue and Event of such Distemper as to Death, &c. and this he relates in such manner that you can no where have a clearer Notion of its Nature than in the Writings of this Author; for Example, he says, that at five a Clock in the Afternoon in the fourteenth Day of the Small Pox, when the Patient was supposed to be pretty well recovered, he began to breath with much Difficulty, grew delirious, fell into Convulsions, and at such a time expired. So in like manner

he

he describes the Events of other Distempers; for Example, he tells us of one who to all Appearance was recovered from the Small-Pox, had Suppurations at the Joynts which he cured after such a manner. If a Distemper was curable he describes the Signs that indicated such future Cure; I know no one like him, his Method is most excellent. He said, That when a second Distemper came upon a Man during the first, one must give way to the other; in the first Place he made his Observation on the Progress of the Distemper by doing nothing at all, and thence framed his Method of Cure. He then observed by the Application or Omission of what things a Distemper grew most violent, and by the Application or Omission of what, it grew more quiet and easie, and thus discovered an almost never erring Method. But this Method has one very great Inconveniency in it, and that is, it is such a long time before we can be able to know any thing. Now Distempers have a great many things common, as for Example, in all Inflammatory Distempers letting Blood takes away their first Root, then purging Clysters must be used, and Anodynes in the Evening, and thus all such like Distempers are cured. For by his Observations on the Small-Pox, Inflammation in the Lungs, Pleurisie, &c. you will

will see that all what I have mentioned comes to pass, and therefore we must not always proceed by that Method, where there are so many Experiments to be made before any thing is to be done. In his *Schedula Monitoria ultima*, which I look upon to be the best of all his Writings, he says, he learned that several Distempers, which he particularly describes, may be cured by a sure Method; and he said this after a long Course of Practice. But I do not advise you, as he does, to read nobody at all, for the time that others spent in reading he past in Observations; for Example, he observed that after fourteen Days a Pleurisie never ended in any other Distemper, which yet you will find to be otherwise in my Book printed for the use of Families. Thus therefore are our Observations to be continually augmented and corrected by those of other People; and certainly he would have written much better had he consulted other Authors. However in his Cure of the Plague he quoted several, and by their Opinions confirmed his own. In this his Intention was, that we should pass our whole Life in making Observations only.

6. Christopher Bennet a London Physician put out a small Book in 8vo printed at London in the Year 1654, which was reprinted two Years afterwards in London,

as also at *Franckfort*; the Title of the *London* Edition is *Vestibulum ad Theatrum Tabidorum*, his Observations are most profound, and received with the greatest Applause. He promised to put out another perfect Work, viz. *Theatrum Ipsum Tabidorum*, which made the *German* Printers in their Edition instead of *Vestibulum* to put *Theatrum Ipsum Tabidorum* in the Title Page to make it sell the better. But I cannot say whether the Author ever finished that Work, or whether he died before. He wrote likewise a Treatise *De Phthisi & de Morbis Pulmonum*; he treated of their Origin, Nature, Secretion by Spitting, &c. very profoundly. One thing amongst all the rest he took particular Notice of, and that is, he says, That a *Vomica Clausa* in this Distemper would either consume or be excreted by Spitting, which had escaped the Observation of all other Physicians. He likewise observes that one Sort of Meat by its Quality leaves in the Body somewhat which cannot be perspired, and demonstrates that these Particles being carried into the Blood, and being inseparable, cause Articular Distempers, Rheumatisms &c. but if there be a Coalition or Aggestion of these in the *Fistulae Pulmonales* it will cause difficult Respiration and a Cough, which will terminate into Spitting, *Vomica* or Imposthume, or the Destruction

Destruction of the Lungs; whatever others have written of this Distemper you will find in him. He says, That the Dropsie, before it has gathered any Water may easily be cured, but not afterwards, for then it is insuperable. He demonstrates from the Colour of the Spittle, the Nature of the Distemper; for Example, if it be Dark and Ash coloured such a Matter is gathered together, and that by such a Method it requires such a Medicament or Medicine; and that Milk may cure one Man and kill another, which no one ever wrote of but himself. He was a Man of consummate Learning, and of the *English* Writers it must be allowed that they stick, very candidly and without Prejudice, close to Truth, and write with Eloquence and a great deal of Life and Spirit. This Gentleman was troubled himself very much with the Phthisick, and had a great many of his Friends under his Care that laboured likewise under the same Distemper, and thus he found out and collected every thing himself very compendiously, not from Arguments but from above a Hundred Observations; However scarce one of a Hundred of his Readers will perhaps understand him, his Observations are so very profound; I have my self very often, when I have been doubtful what to do to my Patients,

Patients, have had Recourse to him and found the greatest Assistance.

7. *Herman Vander Heyden* wrote in the *Walloon Language* (those that understand *Montaignes French* may understand him) several Observations on the Gout, Rheumatism, Laske, Bloody Flux, articular Distempers, and the like. He demonstrates that all these are rather cured by refrigerating Medicines than hot. He put out a Treatise of cold Water to be used in curing Distempers either by drinking it or Immersion; whence the use of Immersions in cold Water are now a-days so much in use. He wrote this Work while he practised Physick, in *Quarto*; it was then published by Pieces in a small *Octavo* or large *Duodecimo*. He wrote another Book in *Latin* but not so good. But you must observe this is not the same Person with *Vander Heyden* who wrote a Book of Anatomy in *Zeland*.

8. *Conrad Schneider* put out a Treatise *De Morbis Catharrofis*.

9. *John Baptist Helmont* wrote also very well of some Distempers, but he must be read with Prudence. He was the first good Writer that ever wrote *De Lithiasi seu Seminali Dispositione in Corpore ad Concretiones Calculosas*; for other Matters I cannot re-

commend him, for he was a most violent Chymical Physician.

10. *Bellini* on the Pains in the Head and Breast, and Fevers, is absolutely the best Author that ever was, but not in respect of Method of curing. He wrote admirably well of *Prognosticks* and *Diagnosticks*, and indeed as often as I turn over this Author I cannot believe it to be the Work of one Man, but that he collected what was communicated to him by a great many others. In the Apoplexy he teaches us what is *Antecedent*, *Concomitant* and *Subsequent*. He brings in Anatomy, and says, That in such a Part there is such a Matter which has such an Efficacy: scarce any Man reasoned better. I could have placed him in the Number of the *Semeioticks*, but he is also very good on Distempers themselves; he gives a good Reason for Distempers, which I myself have observed in my Patients to be true.

11. Of the *Lues Gallica*, or *French Disease*, and every thing relating to it, I shall only recommend to you one Work, and that is very scarce, viz. the *Variorum Opus* printed in two Volumes at *Venice*, in which you will find collected by the most skilful Persons all things both Ancient and Modern (relating to this Malady) to the very time of its Edition; and this Work will supply the Place of a whole Library on this Subject.

I come

I come now to mention such as have written

De Morbis Mulierum.

Authors who have written on this Subject are

1. *Bellonius* in his late Treatise *De Morbis Virginum ac Mulierum.*

2. *Mercatus* in his Book *De Morbis Virginum*; there is only one Edition of this Work.

3. *De Morbis Gravidarum, Puerperarum Parturientium, &c.* *Mauriceau* alone is sufficient in his two Treatises; in the first he admirably well discourses *De Morbis Gravidarum & Puerperarum*, and the second is full of excellent Observations relating thereto. He writes in a very plain Style without Argument, after a long Experience, and we cannot expect any thing more perfect on any one particular Distemper. I could add several others, but if you have these you need desire no more.

III. CLASS.

OBSERVATORS.

Observation is a simple, natural, true Enumeration of all those things which may be taken Notice of by the external Senses in any

sick Person. There are some who think there is nothing more easy than to publish Observations, but in reality there is nothing more difficult. I shall not here recommend to you those who have ascribed the Events of Nature to their Medicines, but those who have made their Observations after a long Experience; for there are a great many who have published their Observations where a natural or spontaneous Cure of Distempers is ascribed by an Author to such or such a Medicine, and this I could shew you did I not hate Envy: I shall therefore only recommend to you the most candid, and the chief of these are

1. *Charles Piso*, that incomparable Physician of *Lorrain*, who wrote a Book *De Morbis a Serosa Colluvie ortis* (before *Harvey*) printed in *Quarto* in the Year 1618; but the finest Edition is that with Marginal Indexes referring to the Contents in *Octavo* printed by *Hackius* in the Year 1650. This Author was well skilled in the *Greek*, *Latin* and *Arabian* Tongues; he was Son to that noble Professor of Physick *Nicholas Piso*; he applied himself from the Beginning to the Study of Physick; after much Travelling and a long Experience he thought on this Book, wherein he refutes the Chimerical Notions of *Galen* and the *Arabians*, tho' he was of that Sect. This Book may serve

as a Pattern to all Writers of Observations. He first observes the Antecedent Causes of a Distemper both within and without the Patient, then how the Distemper begins, ends and is cured; or if the Patient should die, he Anatomically describes the dead Body, and that with the greatest Exactness; and at last makes a Conclusion of the Nature of the Distemper. This Book is very scarce, but I hope I shall take care shortly to have it reprinted, since it is so much hoarded up in Libraries.

2. After him comes *Petrus Forrestus*, tho' not comparable to him. He at first began to read Lectures of Physick in this University, but did not long continue in that Station, having heaped up immense Riches, and after fifty Years Practice of Physick, which he learned in *France, Italy, &c.* (for he practised almost all over *Europe*,) at last had a most splendid Practice at *Delft* and the *Hague*. His Observations are written with great Fidelity, having *Scholia* annexed to every one of them, where he tells you every thing that the Ancients, *Greeks, Romans, Arabians*, or the Followers of the *Arabians*, had amongst them worth taking Notice of. It is a most compleat Work. He wrote on Surgery as well as Physick. His Works are printed at large at *Roan* in *Normandy* in *Folio* in the Year 1654. The other Editions

are good enough, but this is the best because of the Index.

5. *Theophilus Bonet* wrote his *Sepulchretum Anatomicum* in two or three Volumes in *Folio*. This Author studied Night and Day on that Work, that he might collect out of all Authors such Observations as they made on dead Bodies. Every particular Place is mentioned in the Index; you will read him a thousand times over to inform your selves in the Notion of a Distemper. He briefly described the Symptoms while the Patient was sick, and afterwards what he observed in his Body when he was dead. He does not make use of much Argument. I have known many a one made a good Physician by using him, nor can we want him without great Inconveniency.

4. *John Schenkius* wrote his *Observationes Medicæ ac Chirurgicæ*, printed in *Quarto* in *Germany*. This Author is very faithful and exact and easily enough to be had.

5. *Nicholas Tulpius*, a Physician very well received every where; at Fourscore Years of Age he wrote to his Son *Peter* his more curious Observations which he made in his most excellent Practice at *Amsterdam*; the last Edition which contains above a hundred Observations is what you must buy. It was printed by *Elzevir* in 8vo at *Amsterdam* in the

the Year 1672. This Book is well known. Next to him follows

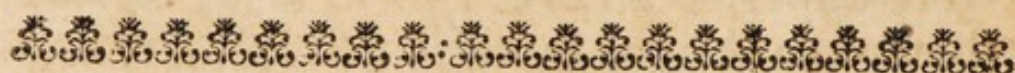
6. *Felix Platerus* in his Observations (I recommended him amongst the *Systematicks*) who lived to a great Age. His Son perfected this Work; it is entituled, *Observationes Medicae*, and printed in three Books in *Folio* at *Basil* in the Year 1623.

7. There are likewise Collections of Observations written by some Authors, called the Curious Miscellanies [*Miscellanea Curiosa*] in a great many Volumes in *Quarto*, or the *Ephemerides Academiae Leopoldinae*, instituted by the Emperor *Leopold*; its Members were dispersed all over *Africa*, *Asia*, &c. and they were obliged by certain Statutes to send to the President every thing they observed relating to Physick, Chymistry and Natural History. There are indeed a great many Trifles intermixed, but they are easily distinguished. No body can be well without these, though they are very dear: I am very sorry they have been left off for these two Years.

8. It is likewise great pity that *Du Blegay* has discontinued his *Journal des Sçavans* (that Zodiack for Physicians) which was first published in the Year 1685, and continued for some time in several Volumes in *Quarto*; in which that Author digested the most curious Observations of the *Persians* and others that communicated

them to him. There are in that Work a great many things worth your reading.

Besides these there are a hundred others who have made their Observations, but these only I have now mentioned please me. *Sydenham* says, That nothing hurts Physick so much as particular Observations, for we can improve nothing by them, since perhaps in the next Year another Man will publish those that are quite contrary. But to write Observations well, all the Characters and Conditions aforesaid are to be required which all those Authors I have mentioned were Masters of.



A D D E N D A.

AUTHORS that have written,

De Consilio Medico.

A Great many very grave Authors in Physick have undertaken to communicate their Thoughts about the Direction of this Study; amongst whom there are some who quote Modern Physicians only, others have given us a Method how, and what Authors are to be read, as

i. *George*

1. *George Walter* wrote a Book on this Subject, called *Sylva Medicorum* in Quarto, printed in the Year 1675.

2. *Hermann Coryngius* a German, that incomparable Professor at *Helmstadt*, who contended with others for the Palm. He wrote a Book called *Introductio ad Universalem Medicam*, printed at *Helmstadt* in 4to in the Year 1654. He had read much and with an inimitable Diligence, and retained the Opinions of all Authors to a Miracle, for he was wont to cite the Pages of Books *Extempore*; he was of so bright a Judgment that he was called from the Professors Chair to be a Statesman in *Germany* and left our Art. He wrote a great many fine Things.

3. *Gunther Christopher Schellamer* put out this Book of *Coryngius's* with excellent Notes in Quarto, printed at *Spicrs* in the Year 1688; in which is likewise inserted *Gaspar Bartholin's* Treatise *De Studio Medico inchoando & continuando*, as also the *Consilium Medicum* of *Peter Castelli*, who was a Roman Doctor and chief Professor of Physick at *Messina* in *Sicily*, otherwise called *Optimus Medicus*; in which he tells you the best Authors in every Part. In that Book also, you have *John Vander Linden's* *Manuductio ad Medicinam*, as also *Rhodius's* *Introductio ad Medi-*

Medicinam, which otherwise would never have seen the Light. This Book deserves to be read by every body. *Schellamer* is still living, and this very Year about two Months since he sent me his Book in *Quarto*, entituled, *Via Regia ad Artem Medendi*, where he acts with much Candour in his Direction of this Study of Physick; and I am glad you can add this Book to the rest.

II. There are several other Authors who have written *De Consilio Medico*, and the Choice of Books which will give an insight into all Authors who have written of Physick; as

1. *John Ant. Vander Linden De Scriptis Medicis*, printed at *Leyden* and afterwards at *Norimberg* in *Germany* with Additions, entituled, *Lyndenius Renovatus*. You may have it any where.

2. *Lypenius* in his *Bibliotheca Medica* in *Folio*. This Author, with the Assistance of several others, took the Titles of Distempers, and under every Title put down the Names of the best Authors Alphabetically. And thus you have a most excellent Index of universal Physick, and he has left Spaces to insert others.

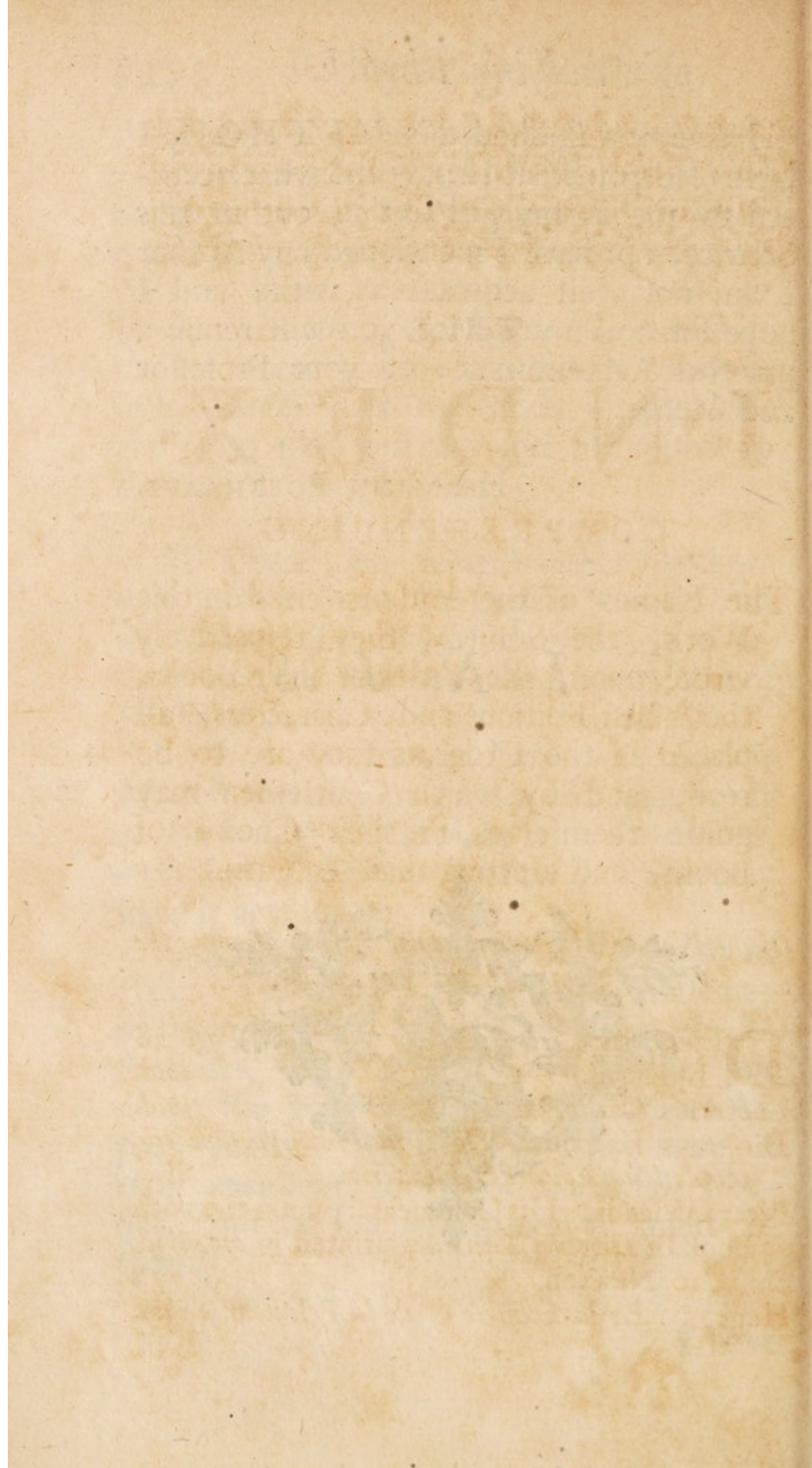
I have

I have now finished this METHOD, I have told you what I know and what occurred to me in my first setting out in this Science, nor have I mentioned any Author I am not well acquainted with; and I hope for this my Advice you will retain a grateful Remembrance of your Professor and Master,

HERMANN BOERHAAVE.

F I N I S.







THE
INDEX.

COMPREHENDING

The Names of the Authors cited in this Work, the Subjects they respectively wrote upon, the Titles of their Books, their best Editions and Characters, all placed in the Order as they are to be read, and by which Gentlemen may guide themselves in their Choice of Books, and erecting their Libraries.

Of the Nature of Bodies, Diversity of Atoms, the Figure and Propriety of Bodies.

Democritus.	Page 28
Epicurus.	<i>ibid.</i>
Lucretius Carus.	<i>ibid.</i>
Diogenes Laertius. <i>De Vita Philosophorum lib.</i>	
10. <i>de Vita Epicuri & Democriti.</i>	<i>ibid.</i>
Peter Gassendi. His Commentary upon the 10th Book of <i>Diogenes Laertius</i> , printed in 4to.	<i>ibid.</i>
Sir Isaac Newton.	29
Hugens. <i>De la Lumiere & de la Pesanteur</i>	<i>ibid.</i>
	Keil.

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- Keil. His Introduction to true Natural Philosophy. Page 29
- Andrew Taquet. His Arithmetick, in 8vo. 37
- C. C. Prester. *Elemens de Mathematique*, in two Vol. in Quarto French. 38
- Euclid's Elements first six Books. *Furnier's* Edition with *Melder's* Notes. ibid.
- Euclid's Elements. By *Barrow*, printed at London. ibid.
- Clavius on Euclid. Printed at Rome in two Volumes Octavo. ibid.
- Bernard Lami. *Elemens de Geometrie ou Traité de la Mesure de Corps*. Printed in Octavo in the Year 1655. 39
- Philip Lansberg. *De Geometriâ Triangulorum lib. 4*. Amsterdam in 4to, 1631. 45
- Andrew Taquet. His *Geometria Practica*, printed at Antwerp in Folio, 1669. 47
- Adrian Vlacq. His *Tabula Sinuum & Tangentium*. Revised by *Francis a Schoten*, and printed at Dort in 1664. ibid.

In MECHANICKS.

- Wallis. His Treatise of Percussion, at Page 668, printed at London in 4to in 1670. 66
- The Royal Society of England. In their Philosophical Transactions, No. 403. London. ibid.
- Keil. His Introduction, &c. ibid.
- Hugens. *Tractatus de Percussione* in his Posthumous Works. Printed and sold at Leyden by Bontestein. 69 ibid.
- Galileus. *De motu locali & gravitate Corporum*, at Lyons and Pisa. 70
- Alphonfus Borellus. *De vi Percussionis*. ibid.
- Wallis. His Mechanicks, in Quarto. 71
- Descartes.

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Descartes. *De la Loy Mechanique.* Page 72

In HYDROSTATICKS.

Archimedes. *De his quæ humidis insunt*, revised by Barrow, and printed at London in 1675.

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Stevin. His *Hypomnemata Mathematica vel Hydrostatica*, in Folio. ibid.

Wallis. *De Hydrostat. Mechanicorum.* London in Quarto 1670. ibid.

Alphonfus Borellus. *De vi Percussionis*, at Bologna in Italy, as also by Vander Aa. ibid.

Mr. Boyle. In his *Hydrostatick Paradoxes*: ibid.

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