

An Account of some Books.

- I. *The ANATOMY of VEGETABLES begun; with a General account of VEGETATION, founded thereon; by Nehemiah Grew M.D. Fellow of the Royal Society. 1671. in 12^o.*

THe Ingenious and Learned Author of this Book considering with himself, that the *Anatomy of Vegetables* hath hitherto been much uncultivated, and that yet it very well deserved the labours of diligent Naturalists, hath here attempted to make a very particular Inquiry into the Constitution and Structure of Plants, and thereupon to found a rational Discourse concerning the Nature of Vegetation. Which being undertaken by him, he advertiseth those that shall think fit to examine these Observations of his, not only, that they begin, and so proceed till they end again, with the *Seed*; but also, that they confine not their Inquiries to one time of the Year, but to make them in several Seasons, wherein the Parts of a *Vegetable* may be seen in their several Estates: And then, that they neglect not the *Comparative Anatomy*, confronting several Vegetables and their several parts together.

The Method he chuseth in the prosecution of this subject, is the Method of Nature her self, in her continued *Series* of Vegetations, proceeding from the *Seed* sown, to the formation of the *Root, Trunk, Branch, Leaf, Flower, Fruit*; and lastly, of the *Seed to be sown again*, or in its state of Generation.

Discourfing of the *Seed* as Vegetating, he dissects a *Garden-Bean*, and shews the two *Coats* thereof; the *Foramen* in the outer *Coat*; and what is generally observable of the *Covers* of the *Seed*. This done, he displays the proper *Seed* it self, and therein finds three constituent and as 'twere Organical parts of the *Bean*, viz. the *Main Body*, always divided into two *Lobes* (though in some few other seeds into more;) and two other appendant to the *basis* of the *Bean*; whereof the *one* is called by him the *Radicle*, being that, which, upon the vegetation of the *Seed*, becomes the *Root*; the *other*, the *Plume*, which becoms the *Trunk* of the *Plant*; and being divided at its

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loose

loose end into divers pieces, (all very close set together as *Feathers* in a bunch) these pieces are so many true and already form'd, though not displayed, *Leaves*, intended for the said Trunk, and foulded up in the same plicature, wherein, upon the Bean's sprouting, they do appear. These Organical parts he finds composed of these Similar ones, *viz.* 1. the *Cuticle*, extending it self over the whole Bean, and herein distinguisht from the *Coats*, that whereas *these*, upon setting the Bean, do only administer the sap, and then die; the *Cuticle* is with the Organical parts of the Bean nourish't, augmented, and co-extended. 2. The *Parenchyma* it self, having some similitude to the pith, while sappy, in the roots and trunks of plants; common to, and the same in, the Lobes, Radicle and Plume of the Bean. 3. The *Inner Body*, distributed throughout the *parenchyma*, but withall essentially different from it; called by the Author the *Seminal Root*, and distinguish't from the *Radicle*, in that the former is the Original root within its seed, the latter is the Plant-root, which the *Radicle* becoms in its growth; the *parenchyma* of the seed being, in some resemblance, that to the *Seminal root* at first, which the *mould* is to the *Plant-root* afterwards; and the *Seminal root* being that to the *Plant-root*, which the *Plant-root* is to the Trunk. Having viewed these parts, he inquireth into their Use, and in what manner they are the Fountain of Vegetation, and concurrent to the Being of the future Plant.

Proceeding to the *Root*, (which he finds substantially one with the *Radicle*, as are the Parts of an Old man with those of a *Fetus*;) he therein observeth its *Skin*, *Cortical Body*, and *Lignous part*, together with the Original of each of these, and the *Pores* of the two latter, and their proportions; as also the *Pith*, and its Original, sometimes from the *Seed*, sometimes from the *Cortical Body*, together with its *Pores*, and Proportions: Moreover, the *Fibres* of the *Lignous* body dispersed through the pith, and the *Cavity* and *Pith* of those *Fibres*. Where he explains, How the Root grows, and what is the Use of its parts; how it grow in length and breadth; and how it descends; adding the Use of the *Pith*, *viz.* for the better advancement of the *Sap*, and its quicker and higher Fermentation, begun in the
Cortical

Cortical Body, inserted through the *Lignous part*, by which In-
sertions the Sap, like the Blood of the disseminations of the
Arteries, is conveyed to its intimate parts: Our Author con-
jecturing, that the design, whereto all these parts are together
concurrent, is the *Circulation* of the Sap.

Having thus declared the degrees of *Vegetation* in the *Root*,
he next shews the Continuance thereof in the *Trunk*; the ob-
servables and parts of which are, 1. The *Skin*, derived from the
Cuticle of the Seed: 2. The *Cortical Body*, originated from the
parenchyma of the Seed: 3. The *Lignous Body*, being the Pro-
longation of the *Inner Body*, distributed in the *Lobes* and *Plume*
of the Seed: 4. The *Infertment* and *Pith*, proceeding also from
the *Plume*, as the same in the *Root* from the *Radicle*; so that, as
to their Substantial parts, the *Lobes* of the Seed, the *Radicle* and
Plume, the *Root* and *Trunk*, are all one. Here notice is taken of
the Shooting of the *Lignous body* in breadth; wherein are ob-
servable its *Fibres*, Production of *Rings*, and especially *Pores*;
and these of three sorts, greater, lesser, and least of all; all con-
tinuous and prolonged by the length of the *Trunk*: which he
proveth by an Experiment made by Mr. *Hook*, by filling up
(suppose in a piece of *Char:coal*) all the said Pores with *Mercury*,
which appears to pass quite through them, as is visible by a
good *Glass*. The result of all is, that the *Woody* part of a Ve-
getable is nothing else but a Cluster of Innumerable and ex-
traordinary small Vessels or concave *Fibres*. He farther shews
the *Insertions* of the *Cortical body* in the *Trunk*, and the *Pores* of
those *Insertions*; in none of which *pores* he could observe
any thing, that may have the true nature and use of *Valves*;
the non-existence of which he is asserting. He discourses also
of the *Position* and *Traect* of the *Pores*: and concludeth this
Chapter by declaring, How the *Trunk* ascends; How its parts,
in consequence of that *Ascent* are disposed; How that dispo-
sition is consequent to the different nature and energy of the
Sap; what the effects are of that difference; which way, and
how the *Sap* ascends, viz. by the joynt subserviency of the
Lignous and the *Cortical Body* in some, but in most, and princi-
pally, of the *Lignous Body*, and *Pith*; the latter being here con-
sider'd as a Curious *Filtre* of Nature's own contrivance: where
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he examines, *How* the *Pores* of the *Pith* are permeable; and renders a reason, why a piece of *dry Elder-pith*, set in some tinged liquor, the liquor doth not then penetrate the *Pores*, so as to ascend through the *Body* of the *Pith*? To this part is annexed, by way of *Appendix*, some Considerations of the *Trunk-Roots* and *Claspers*, and the *Use* of both.

After this, he proceeds to the *Germen*, *Branch*, and *Leaf*, and finds in the two former the same parts with those of the *Trunk*, viz. the same *Skin*, and the same *Cortical* and *Lignous* Bodies, as also the same *Infertment* and *Pith*, here; into propagated, and distinctly observable in it. Further, he shews the manner of their growth, and nutrition, and how the *Germen* is secured; as also the *Use* of the *knots*. Then he lays open the parts of a *Leaf*; and explains the Positions of the *Fibres* in the *Stalks* of *Leaves*, and the Cause of their different shape, and of their being flat. Then he discourses of the *Foulds* of *Leaves*, their kinds and *Use*, together with the *Uses* of the *Leaf* it self. To this Chapter also he makes an *Appendix* of *Thorns*, *Hairs*, and *Globulets*, explaining both their Constitution and *Use*.

Next, he gives an *Accompt* of the *Flower*, and its three general parts, the *Empalement*, the *Foliation*, and the *Attire*; explaining the formation, nature, and uses of all three, but most particularly of the *Attire*, which he finds to be of two kinds, *Seminy* and *Flory*; the *Seminy*, made up of two parts, *Chives* and *Semets*, the latter of which are hollow, yet not so but that they are filled up with minute particles, like a powder. The *Florial* Attire is commonly called *Thrums*, which are several *Suits*, of which this Attire is made up: The *outer part* of every *suit*, is its *Floret*, which is the *Epitome* of a *Flower*, and, in many Plants, all the *Flower*. The *next part* is from within its *Tube* brought to light, and is called the *Sheath*, likewise concave. The third part and the innermost of the *Suit* is the *Blade*, which is solid, yet at its point evermore divided into two halves; upon which division there appears a *Powder* of *Globulets*, of the same nature with those of a *Semet*. The *Use* of the *Attire* he assigns to be not only *Ornament* and *Distinction* to us, but also *Food* to a vast number of little *Animals*, who have their peculiar provisions

vifions stored up in these *Attires* of Flowers; each Flower becoming their Lodging and their Dining-room, both in one: Though it cannot as yet be determined, Wherein the particular parts of the *Attire* may be more distinctly serviceable, this to one Animal, than to another; or to the same Animal, as a *Bee*, whether this for the *Honey*, another for their *Bread*, a third for the *Wax*; or whether all do only suck from hence some *Juice*, or some may not also carry some of the parts, as the *globulet*, wholly away, &c.

In the following *Chapter* he treats of the *Fruit*, considering the Number, Constitution, and Original of the Parts of an *Apple*, *Bean*, *Plum*, *Nut*, and *Berry*; and observing, that the general Composition of all Fruits is one, that is, their *Essential* and *Vital* parts, are in all the same, and but the Continuation of those, which in the other parts of a Vegetable he hath already taken notice of. To which he subjoyns the *Uses* of Fruits, both for *Man* and *Beast*, as also for the *Seed*; to which latter it serveth for supply of Sap, and for Protection and Security, the whole Fruit being, by comprehension, that to the *Seed*, what the Hen, by Incubation, is to the Egg or Chick.

In the *Last* Chapter he considers the *Seed* again, but in its state of *Generation*; as he before examined it in its state apt for *Vegetation*: where occurs, what in the other state was either not distinctly existent, or not so apparent, or not so intelligible. As first the *Case* of the *Seed*, and its *outer Coat*, their figures, various surface and Mucilages; together with the nature of the *outer coat* and its original: Then, the original and nature of the *inner coat*, in which the *Lignous Body* or *Seed branch* is described. Whereupon he observeth, that all the *Parts* of a Vegetable, the *Root*, *Trunk*, *Branch*, *Leaf*, *Flower*, *Fruit*, and *Seed*, are still made up of two substantially different Bodies; and that, as every *part* hath two, so the *whole* Vegetable, taken together, is a Compound of two only, and no more; all properly *Woody* parts, *Strings* and *Fibres*, being one *Body*; all simple *Barks*, *Piths*, *Parenchyma's* and *Pulps*, and, for substance, *Pills* and *Skins* also, all but one *Body*: The several parts of a Vegetable differing from each other

other only by the various proportions and mixtures, and variously sized pores of these two Bodies.

But to return, besides these three Covers, he finds a fourth, which is the innermost, called by him the *Secondine*, the concave of which membrane is filled with a transparent liquor, out of which the *Seed* is formed. Through this membrane, the *Lignous Body* or *Seed-branches*, distributed in the *inner Coat*, at last shoot down-right two slender Fibres, like two Navils, one into each Lobe of the Bean: These Fibres, from the superficies of each Lobe, descend a little way directly down; and then presently each is divided into two Branches, one distributed into the *Lobes*, the other into the *Radicels* and *Plume*.

As for the *Generation* of the *Seed*, dependent upon the History delivered, he saith, that the *Sap*, having in the *Root*, *Trunk*, and *Leaves*, passed divers Concoctions and Separations, in the manner by him described, 'tis at last, in some good maturity, advanced towards the *Seed*. The more Copious and *Cruder* part hereof is again separated by a free reception into the *Fruit*, or other part analogous to it. The more *Essential* part is entertained in the *Seed branches*, which being considerably long and very fine, the sap becoms therein, as in the *Spermatick vessels*, still more mature. From hence it is next deliver'd up into the *Coats* of the *Seed*, as into a *Womb*, and the *meaner* part hereof is again discharged to the *outer Coat*, as aliment good enough; the *finer*, is transmitted to the *inner*, which being a *Parenchymous* and more spacious body, the *Sap* therefore is not *herein* a meer aliment, but in order to its being farther prepared by Fermentation. The *Sap* being thus prepared in the *inner coat*, as a liquor now apt to be the matter of the future *Seed Embryo*, by fresh supplies is thence discharged, or filtered, or transpired through the *Secondine* above-mentioned; and the depositure thereof, answerable to the *Colliquamentum* in an *Egg*, or to the *Semen muliebre*, is at last made into the Concave of the same. The other part of the *purest sap*, imbosom'd in the *ramulets* of the *Seed branch*, runs a Circle, and so becoms, as the *Semen masculinum*, yet more elaborate. With this purest Sap the said *ramulets* being supplied,
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from thence at last the *Navel-fibres* shoot (as the Artery into the *Colliquamentum*) through the *Secundine* into the aforesaid liquor, deposited therein. Into which liquor being now shot, and its own proper Sap or tinctures mixt therewith, it strikes it thus into a *Coagulum*, or into a Body consistent and truly *parenchymous*. And in the interim of the *Coagulation*, a gentle *fermentation* being also made, the said *Parenchyma* or *Coagulum* becoms such, not of any Constitution indifferently, but is raised (as we see Bread in baking) into a *Congeries* of *fixed Bubbles*; the *parenchyma* of the whole Seed being such.

The whole is illustrated by several *Figures*, and these explicated with great care.

II. *Dissertations sur la Nature du FROID & du CHAUD; par le Sieur Petit, Conseiller du Roy, Intendant des Fortifications, &c. Avec un Discours sur la Construction & l'Usage d'un Cylindre Arithmetique, inventé par le mesme Auteur. A. Paris, 1671.*

THE famous Author of these two Tracts, examines in the former, *First*, the Nature, Subject, Cause, and Effects of Cold. As to its *Nature*, he esteems it to be a *Positive* thing, and not a meer *Privation*, the Effects of it being as sensible to us, as those of *Heat*. For the *Subject* of it, he placeth the Supreme Cold in the Pure *Air*, and maketh the Heat, that is sometimes in the Air, meerly adventitious, produced in it by the Sun, but the Cold natural to the same. Concerning the *Cause* of this Cold in the Air, he will not acknowledge it to be *Nitre*, (all sorts of Salt being by him esteem'd hot) much less an Universal Spirit, or any Stars; but esteems, that the Air is the *Primum Frigidum* by nature; the same Cause, that hath made it Air, having made it Cold. The *Effects* of Cold being too obvious to discourse of them in print, he enlarges upon the *Manner* of its operation, performed by the insinuation of the Air into the pores

of Bodies, and increased by the force of Northerly winds ; where he notes , that the Cold Air, by its parts, figur'd for the purpose, and penetrating such bodies as are disposed to glaciation, divides the parts of the same , and arrests their motion. Here he endeavours to prove, that Frozen water is not properly condensed, though it be hardned and fixed ; but that 'tis rather dilated by the ingress of the Cold Air ; whence he observeth that Ice is really lighter than Water.

Secondly, he discourseth of *Fire*, after he hath discarded it from being one of the common Four Elements , and dislodged it from its reputed place above the Air under the Concave of the Moon : And affirms, that 'tis the Heat of the Sun, which moves, quickens, and coagulates the three families of Mixts, Animals, Vegetables and Minerals, yet withall taking in a Subterraneous heat for the production of Minerals.

In the *Latter Tract* of this Book, the Author explains an Invention of his, of an *Arithmetical Cylinder*. For, finding that in the *Rabdology* of the Noble *Nepper*, the multitude and embarasment of those sticks, filled with numbers on all sides, proved longsom and tedious , and that thereupon the practise of the Invention had ceased ; he consider'd of a way to render it more expedit and casie, and at length concluded, to take bands of past-board instead of sticks ; on which having written the self-same *Multiples* from 1 to 9, and made the same distribution of the numbers into little squares, separated by a diagonal, drawn from the left to the right hand upwards, (as those Sticks are ;) he added thereto a *file* of *Roman Numbers*, I, II, III, IV, V, VI, VII, VIII, IX, to be put on the side, and over against the Multiplying and Dividing Numbers ; very useful as well for marking the beginning and end of the said numbers, to stop where 'tis needful (all the bands not being used in all operations,) as for marking the *Multiple*, which you shall use in each number. As, (*e.g.*) to multiply 7 by 5 or by 9, instead of being at the trouble of counting the ranks of these *Multiples* 5 and 9, they
may

may be presently seen in one or other of the *Files* of those Roman Numbers. Having then employed these bands in raising or abasing them on a table, to make those principal numbers, that are necessary, to appear over against one another, he further bethought himself (for a yet shorter way,) to dispose those pieces into circles very equal, and to glew, upon each of them, 3 or 4 small buttons of wood, of the bigness of a pins-head, and then to put them upon a *Cylinder* of wood or past-board, on which they might be turned by means of those buttons: Which form made him call this little Instrument an *Arithmetical Cylinder*, which is of the bigness or diameter of a Childrens-Drum, or of the form of an Hat, and of what height you will, to hold as many bands or circles as you shall desire to make great Operations.

The practise of this Instrument is shewed by divers Examples, as may be seen in the Book it self.

III. *La DIOPTRIQUE OCULAIRE*, par le Pere Cherubin d'Orleans, Capucin. A Paris, 1671. in Fol.

THE Author of this large and elegant Volume, having proposed to himself to comprehend in it and to teach all that concerns the Theory, Use, and Mechanism of the Telescope (by him called the *Ocular Dioptrique*;) divides it into three principal Parts.

The *First* contains the Doctrine of Opticks and Dioptricks, or, of Simple vision Direct, and that which is made by rays Refracted: both by him pretended to be handled with a succinct, but singular, Method.

Discourfing of *Refraction*, he declares, That the Refraction of a visual ray in Glasse to 30 degrees of inclination, is proportional to the Inclination of the ray, as far as sense is able to judge of it. And that, the Inclination not exceeding 30 degrees, the Angle of the refraction of the ray, which

enters into *Glass*, is about a third part of the Angle of the Inclination of the ray passing into the Air : But that the same Inclination not exceeding 30 degrees, the Angle of the refraction of the ray issuing out of the *Glass* into the Air, is about the half of the Angle of its Inclination in the *Glass*.

Examining, what the Dissection of an Eye may conduce to the knowledge of the Refractions of its Humors, he noteth, That the Extinction of the vital spirits in a dead Animal doth extremly alter the consistence of the Humors of his Eye, which contributed much to the perfect vision in the living animal : And that all the Experiments, that can be made by dissecting of Eyes, to come to the knowledge of the Refractions of the Humors, and of the other parts that conduced to Vision, cannot give the true knowledge thereof ; Experience proving, that the *Chrystallin* and *Vitreous* humors do reciprocally change their consistence.

He observeth also, that not only the different Diaphanities of the Humors of the Eye do contribute to the refraction of the visual rays passing thorow them ; but also the Figures of their Surfaces, on which those rays fall unequally inclin'd. He noteth likewise, that the visual rays, having penetrated the *Corneous tunique* and the *Aqueous humor* of the Eye, do not suffer any great refractions upon the *Anterior* surface of the *Chrystallin*, though it be finer than the *Aqueous humor* ; because that its Spherical convexity is con-centrique to that of the *Cornea* and of the *Aqueous humor*, which are likewise spherical : But that they receive their greatest refractions, when they pass through the *Posterior* surface of the *Chrystallin*, which is opposite to them, and of a very small Sphere, and upon which they are found much inclined.

He taketh further notice, That the surfaces of the *Chrystallin* humor are not Hyperbolical but perfectly Spherical ; and that the exactness, which by that means is pretended for Vision, is contrary to Experience, by which he asserts it to be undeniable, that, though by *Glasses* of an hyperbolical

cal figure, the rays, coming from the principal point of the object to the Eye, would more exactly meet in *one* point at the bottom of the *Retina*, and consequently, that from one certain point of a determinate distance you would more perfectly see that point; yet would not such a figure reunite the rays of the other lateral points of the object, each exactly in a point of concurrence in the said *retina*. So that, if the visible object were nothing but a point, and the surfaces of the ChrySTALLIN hyperbolical, (which they are not,) there would then be made a more exquisite vision of that *only* point.

The *second* part delivers the *Theory* of the Telescope in all its kinds: which is usher'd in by a History of the Invention and Antiquity of Telescopes; and by a Discourse concerning the Difference of the Ancient Glasses from the Modern.

This done, he explains the matter of this second Part in XI. Sections.

1. Shews the power, which diaphanous *medium's*, less subtile than Air, and of figures simply Spherical, have in refracting the visual rays passing thorow them.

2. Declares the Effects of Spherical Convex Glasses, to serve for the construction of the Telescope of the *first kind*, which always supposeth the Eye between the Glasse, and its point of Concurrence.

3. Considers the Affections of Spherical Concaves, to serve for the construction of the same kind of Telescope.

4. Demonstrates the Effects of the Junctiōn of Spherical Convexes and Concaves, in the Construction of the same sort of Telescope.

5. Examins the Affections of Spherical Convexes, in the Construction of a Telescope of the *second kind*; wherein the Eye is always more distant from the Convex Objective Glass, than its point of Concurrence, and which admits no Concave.

6. Shews the Effects of the Composition or Multiplication of Spherical Convexes, in the construction of all sorts of Telescopes of the *second sort*,

7. Demonstrates, that the long Telescopes, which serve to see remote objects, may also serve to see near objects that are small.

8. Demonstrates the Construction of Microscopes, to see the smallest Objects.

9. Shews the Construction of a kind of Mixt or Catadioptrique Telescope, composed of Refraction and Reflection.

10. Shews, that one may see at one and the same time, with both Eyes, one and the same Object, by a Telescope; and how to make such an one.

11. Treateth of the Proportion of the respective Convexities and Concavities of Glasses, to serve for the construction of a Telescope.

The *Third* part of this Volume is subdivided into two, which the Author calls the *Positive*, and *Mechanical*. The *Positive* teacheth the actual Construction of Telescopes, and their Uses, and that in 12 Sections.

1. Delivers the manner of proportioning positively the Power of Glasses for Telescopes; together with the choice of their figure, though spherical, and the tryal and graduation of their goodness.

2. Teaches how to work actually all sorts of Telescopes, and how to use them.

3. Teaches the manner, actually to put into use the Catadioptrique Telescope, which redress the object by Reflection, that before had been inverted by Refraction.

4. Shews the way of making a double Telescope in all its kinds, to make Objects to be seen by both Eyes at the same time, much greater and much clearer, than with one Eye alone.

5. Teaches in general, how to make actually all sorts of Microscopes, to see distinctly and to magnifie very considerably the smallest objects.

6. Treats of the Use of the Telescope generally in all its kinds.

7. Teaches a New and peculiar use of Telescopes, for drawing

drawing to the life in proportion, from a great to a small volume, any Terrestrial objects, that are at a competent distance to be well seen; without a necessity of having any skill in drawing.

8. Contains the Use of the Microscope in all its kinds; together with a way of measuring, how much a Microscope magnifies the Object.

9. 10. 11. Treat of the Use of Telescopes in the Observations of *Celestial* Objects: Where the Author enumerates the many excellent Discoveries, that by their means have been made by modern Astronomers, who therefore may be said,

*Admovisse oculis distantia sidera nostris,
Ætheraque ingenio supposuisse suo.*

Such as are, 1. The Conjunction of *Mercury* with the *Sun*. 2. *Venus* having her phases like the *Moon*. 3. The Body of the *Moon* appearing like an other Earth, full of Mountains and Vallies, Seas, Rocks, Islands, Lakes, Forrests and vast Plains; as also the Libration of the *Moon*. 4. Spots in the *Sun*. 5. The Four Satellits of *Jupiter*. 6. A Satelles of *Saturn*, and Rings about the same. 7. Several Belts about *Jupiter*, and divers Spots in *Mars*, *Venus*, &c. 8. The *Milky way* nothing but an innumerable company of small Stars, near to one another. 9. The finding an Eclipse to begin and end sooner when observed with the naked Eye, than when seen with a Telescope; as also, that it appears always less by a *digit*, being observed by the bare Eye, than it is indeed. 10. *Pleiades* consisting of many more Stars than *Seven*. 11. *Orion* having 80 other Stars besides those three in his *Belt*, and the six in his *Sword*: And the same having in his head 21, instead of the one, called the *Nebulosa*. 12. The Observation of many New Stars, as in *Cassiopea*, in *Cete*, in *Cygn*, *Andromeda*, &c. Here the Author taketh occasion to intimate, that the rich Blew of the Sky seems to be nothing else, but a Confusion of the mixture of lights diffused by that innumerable number of Stars, dispersed through the whole extent of that immense profundity of the *Æthereal* Region,

12. Teaches a new way, of using a Telescope for drawing in proportion all the new Appearances in the Heavens; for measuring the Bodies of the Planets, and of the Fixt Stars themselves and their distances, in such parts, that a *Line* (the twelfth part of an inch) shall contain a 1000 of them; an inch (the twelfth part of a foot) 12000, and a foot, 144000: Besides, a very easie and certain way of making all these parts (though very small) perceptible to the bare Eye.

So far of the *first* Head of this *Third* Part.

The *other* Head is the *Mechanical*, shewing the several ways of Forming and Polishing all sorts of Glasses, that serve for Telescopes; which is done in *six* Sections.

1. Rectifies the *Common* way of forming Glasses Spherically, and all the Moulds, in which the Vulgar Artifts are wont to work them.

2. Teaches a way of excellently forming and polishing such Glasses by hand, without any Engin.

3. Teaches a way of working Glasses by the hand guided by a simple Engin.

4. Treats of the working of Glasses by Instruments and Engins, regulating and directing the hand.

5. Teaches a New way of working Spherical Concave Eye-glasses, to serve Telescopes of the first kind, above-mentioned.

6. Teaches a New way of working all sorts of Spherical Glasses, Convex and Concave, for Telescopes, very universally, speedily, with ease, and in a small room; even for the longest Tubes.

All which the Author concludeth with a Direction for a way of making Tubes that may serve to fit up Telescopical Glasses.

E R R A T A.

In *Numb.* 74. p. 2221. l. 25. *r.* is by *Bruerus* described to *Musset*.
 In this *Numb.* 78. p. 3023. l. 22. *r.* predicted, for *practised*. p. 3029. l. 16. & *unum.* *ibid.* l. 25.
r. spectantur.

L O N D O N,

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