

the *North*; and on the contrary *sinks* below its *Level* upon the retreat of the *Water* both ways, in the *Tide* of *Ebb*; so it is very probable, that the *Air* may *ebb* and *flow*, after the same manner; but by reason of the diversity of Causes, whereby the *Air* may be set in moving, the times of these *Fluxes* and *Refluxes* thereof are purely casual and not reducible to any *Rule*, as are the *Motions* of the *Sea*, depending wholly upon the regular *Course* of the *Moon*. The next *Transaction* shall give an *Historical Relation* of those *Winds* which are found to have any thing of *Constancy*, and shall endeavour to assign the *Causes* thereof.

An Account of two Books, (1.) *A Free Enquiry into the vulgarly received Notion of Nature*, by the Honourable *R. Boyle, Esq.*; Printed by *J. Taylor* at the *Globe* in *St. Paul's Church-Yard*, Anno 1686. 8vo.

'TIS not without reason, that the renowned Author of this Treatise wonders that none have written concerning *Nature* herself, and yet so many have so largely treated of the *Works of Nature*. But this will seem less strange to him that considers for how many Ages the whole learned World has been devoted to the *Peripatetick* Principles of *Matter* and *Form*, and with how blind an Obedience the *Doctrine of Aristotle* hath been universally received and maintained: For the vulgar *Notion of Nature* concurring with the *Peripatetick*, having been generally admitted, all Men thought it unsafe to oppugn the Opinion of the Multitude, and at the same time to call in question the Authority of those reputed for Learning; subjecting their own Judgments, by a servile Resignation unworthy the Name of a Philosopher, to the *Dogma's* of others. This seems to be the chief, if not the only Cause of the Propagation

tion of Errors, as well in *Philosophy*, as in other Matters of more Concern, as Religion and Divine Worship: but these not being the present Scope of our Author, he in this excellent and learned Essay shews, that in Philosophical Inquiries, the vulgarly received Notion of *Nature* hath given great occasion of Error, being admitted without a due Examination.

The whole is divided into eight Sections, the Scope of which is briefly as follows:

In the first Section, after having premised something of the Manner of Conception in the Rational Soul, our Author, with his usual Acuteness, answers two Objections, shewing, that it is neither ungrateful nor blameable, for a Son of *Nature* to oppugn *Nature*, after this manner: likewise, that there is sometimes a Necessity to recede from the common Opinion of Men.

The second Section, reckons up the several vulgar Acceptations of the Word *Nature*, and then substitutes in their Places, other Words and Expressions more suitable to the true Notion of *Nature*.

The third, examines the *Aristotelian* Definition of *Nature*, and proves it obscure, intricate, and affording no Light whereby to explain other things; which done, our noble Author sets forth the Reason why he endeavours to avoid the frequent use of this Word *Nature*.

The fourth Section, in the first place, examines several Axioms concerning *Nature*, whereby she is described after the vulgar Apprehension; and then lays down a much better Description of her, after a most learned Dissertation concerning the several Forms of Speech relating thereto: Here our Author distinguishes *Nature* into general, which he calls *Cosmical Mechanism*, and particular, which he names *Individual Mechanism*. In the Conclusion is shewn, the Original of *Polytheism*, and how *Nature* came to be a made Goddess by the Antients.

The fifth proposes the Reasons whereby our Author was perswaded to reject the received Notion of *Nature*; as first, that such a Notion has no sufficient Proof to establish it; that it is unnecessary, obscure and unintelligible, that it is dangerous to Religion in general, and consequently to the Christian, and that it is contradicted by the daily Observation of several *Phænomena*, &c.

The sixth discusses the Arguments in behalf of *Nature*, drawn from the common Consent of Mankind; from the Endeavour observable in Bodies to maintain their Natural State; from the Distinction of Motion into *Natural* and *Violent*; from the *Crises* of Diseases, &c.

The seventh Section, with the usual Clearness and Subtily of our Author, expounds, according to the Doctrine here laid down, the several received Axioms or Attributes of *Nature*; among others these two, *Natura Vacuum Horret*, and *Natura est Morborum Medicatrix*, are largely and most accurately handled.

The eighth and last Section shews, that *Nature*, according to the vulgar Acceptation, is not a real, but an imaginary Being; and conformable to the Doctrine of this Treatise, a new and peculiar *Hypothesis* of Divine Providence is proposed. In the End, the Advantages and Utility of the whole are briefly touched upon.

*Traite du Mouvement des eaux & des autres Corps
fluides par feu Mr. Mariotte, A Paris. An. 1686.
Octavo.*

THis Book having been designed by the Ingenious Mr. *Mariotte*, and by him in a great Measure compleated at his Death; has had the good Fortune to receive the last Hand from Mr. *De la Hire*, whose great Abilities in the Mathematicks, are too well known to need mention in this Place. The whole is divided into five Parts, and each Part again into Discourses or Chapters; the first Part contains 3 Discourses, whereof the first is about the several Properties of fluid Bodies, as their Glaciation, Evaporation, Dilatation upon Heat, and Admission of the Air into their Pores, &c. The 2^d is about the Original of Fountains, which he deduces from the Rains that fall, and sink into the Earth, till they meet with a Clayey or Rocky Soil, which being not able to pass, they run alongst, till they find their way out into the Air, where they become Fountains. And to prove the Quantity of Rain Water sufficient to furnish the Rivers, he shews by Experiment that there falls in the Countries about the Fountains of the *Seine*, at least 7 times as much Water, as the said River evacuates. The 3^d is about the Origin and Cause of Winds, of which he assigns 3 general and 4 particular Causes; the first of the general, is the Diurnal Motion of the Earth; the second is the Condensation and Rarefaction of the Air, caused by the Heat of the Sun. The 3^d is from the Moon's respect to her *Apogæon* or *Perigæon*, whereby she sometimes rises from, other times descends towards the Earth. The particular Causes are, 1st. the extraordinary rising of the Vapours and Exhalations out of certain Places of the Earth.

2d. The fall of great Rains and Hails. 3d. The great Quantity of nitrous and sulphureous Exhalations in Earthquakes. 4th. The sudden melting of Snow in the high Mountains; and from these several Causes combined, he thinks he can account for all the Phænomena of Winds, particularly the *Trade Winds* between the *Tropicks*, called by him *Vents Ali-zees*, but in so doing he seems not sufficiently informed in their History: In this Discourse are several curious Remarks, and Observations touching the Course, Propagation, &c. of the Wind.

The second Part treats of the *Æquilibrium* of Fluids; the first Discourse demonstrating from the Principles of Mechanicks, how Fluids counterpoise one another's Weight, and giving the Rules of the Doctrine of floating Bodies: The second Discourse shews the Nature of the *Elasticity* of Air and Flame, and how their Spring is counterpois'd by Weight. The third Discourse treats of the Equipollence of a Fluid Body to a Stroke or Shock; shewing the Rules of the Force of *Jets d'eau*, from several Heights of the Reservoir, and differing Diameters of the Bore of the Pipe; giving in the End an account of the comparative Force of Wind and Water-mills, with the Manner of computing them; together with a Description of 3 or 4 sorts of *Mills* with *Horizontal Sails*, and the Author's Opinion thereupon.

The third Part treats of the Measure of running and spouting Waters; in the 1st. Discourse, are produced several Experiments to find the Quantity of Water passing through the Bore of an Inch Diameter, just under the Surface of the Water, which at length is concluded to be 14 *Paris Pints* in a Minute, or 72 *Muides* in a Natural Day: where, by the way, notice is taken of the Length of the *Pendulum* vibrating Seconds, in Parts near the *Equinoctial*, having been found at *Cayenne* a tenth, and at the Isle of *Goreé*, near *Cape Verde*, an eighth of an Inch shorter, than at *Paris*; of which the Cause is proposed to proceed from the Diurnal Motion of the Earth.

The second Discourse shews by Experiment that the Quantity of Water expended by a *jet d'eau* of the same Diameter of Bore, but at different Heights of the Reservatory, are in a subduple Proportion of these Heights; and it being found that at the Height of 13 Foot, a *jet d'eau* of $\frac{1}{4}$ of an Inch Diameter, evacuated 14 *Paris* Pints, or 14 Parts of 35 of the *Paris* Cube Foot in a Minute, thence is concluded the expence of Water at any other Height of the Reservatory through the same Bore.

The third Discourse shews that the Quantity evacuated by different Bores at the same Height of the Reservatory, are as the Squares of the Diameters of the Bores; the which is proved both Mathematically and Experimentally: The fourth Discourse shews the manner of finding the Quantity of Water which a River or an *Aquæduct* furnishes, which is illustrated by the Example of the *Seine* at *Paris*.

The fourth Part treats of the Height to which the Water of Fountains rises; and its first Discourse, shews that the *jets d'eau* never rise so high as their Reservatories, but always fall short thereof, by Spaces which are in duplicate Proportion of the Heights they rise to, which is proved by several *Experiments*: The next thing enquired after, is the best sort of *Ajutages* or Spouts for *jets d'eau*; affirming from Experiment, that an even polished round Hole in the end of the Pipe, gives a higher *Jet* than either a *Cylindrick* or *Conical Adjutage*, of which yet the latter is the better. Lastly, 'tis made out, that very great Heights of Reservatory are altogether Useless, the Water being by its great Velocity dispersed into small Drops and its Force lost, so that the Height of the *Jet* is not proportionably increased. A second Discourse of this Part handles the Amplitudes or Distances of *Oblique Jets*, according to the Doctrine of *Galileo* and *Torricelli*, and concludes with a Geometrical way of finding the Height of the Reservatory by the Horizontal Stream issuing out of a Hole bored in the side of the Pipe.

The fifth and last Part treats of the Pipes that are to convey Water, and of the Strength necessary thereunto, and consists of 3 Discourses, the first whereof shews the Size of Pipes requisite for the several Expences of Water, proving that in small Pipes emptying the same Water, the Water running faster, has more Friction, and is consequently more retarded; to avoid which this Rule is given, that the Squares of the Diameters of the Pipes be as the Quantity of Water to be expended, in which Case the Water will run in all alike fast, and the Friction be the same; and when a great Pipe branches into several smaller, distributed to different *Jets*, the Square of the Diameter of the main Pipe must be proportioned to the Sum of all the Expences of its Branches; and for a Foundation of a *Calculus* of the most commodious Size of Pipes, 'tis laid down that for a Reservatory of 52 Foot high, whose *Ajutage* is half an Inch Diameter, the Pipe ought to be 3 Inches Diameter. The second Discourse treats of the Strength of Pipes requisite for bearing the Weight of the Water, where are several pretty Experiments of the Resistance of Solids. The last of all gives a Method of distributing Water by Pipes into a City, and shews how those Pipes are to be cleansed from Mud, by leaving Apertures to let out the Water in those Places where the Pipes lie lowest; and from Air, by the like Apertures left on the tops of those Eminences where the Pipes pass.

N. B. That the *Paris Foot Measure* is to the *London Foot* as 1279, to 1200, *viz.* 79 *Centesmes* of an Inch greater; so that to reduce the Experiment here produced, 'tis to be noted that 14 *Paris Pints*, or 14 Parts of 35 of the Cube of the *Paris Foot*, is equal to 3 *Gall. 5 Pints*, or 29 *Pints London Measure*; and so much was evacuated in a Minute through a Bore of a *Paris Inch Diameter*, just under the Surface of the Water; but a Bore of a *London Inch* so placed, will pass but 3 *Gall. 1½ Pint* or 25½ *Pints our Measure* in a Minute, at which rate near 73 *Hogheads* will run through such a Bore in a Day.

The

The same Quantity of Water will by the Experiment of our Author, furnish a *Jet d'eau* of the diameter of a quarter of a *London* Inch, when the Reservatory is at the height of 13 *French* feet, or 13 f. 10 $\frac{1}{4}$ Inch. *English*; and the Expences of Fountains of the same Bore, being as the Square Roots of the heights of the Reservatory, 4932 gall. or 78 Hogsheads will furnish a *Jet* of 16 foot high, with a Quarter of an Inch Bore. Generally the Rule is, that the Expences of all Fountains, are as the Square Roots of the heights of their Reservatories, into the Squares of their Bores, and according to what is delivered in the 5th. Part of this Book, the Squares of the Diameters of the Pipes must be proportioned thereto.

IMPRIMATUR,

John Hoskyns *Vice P. R. S.*
July 17th 1686.

Printed by *J. Streater*, and are to be sold by *Sam. Smith*
at the Sign of the *Prince's Arms* in *St. Paul's Church-yard*.
