



Philosophical Transactions

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An Account of two Books.

- I. *TRACTS*, written by the Honourable Robert Boyle, containing *New Experiments touching the Relation betwixt Flame and Air, and about Explofions: An Hydroftatical Difcourfe, occafioned by fome Objections of Dr. Henry More, &c; To which is annex't an Hydroftatical Letter, about a Way of Weighing water in water: New Experiments, of the Positive or Relative Levity of Bodies under water; of the Air's Spring on Bodies under water; and about the Differing Prefsure of Heavy Solids and Fluids.* London, 1672. in 8°.

IN the first of the Tracts, which contains the *New Experiments* about the *Relation betwixt Flame and Air*, the Noble Author, after he had mentioned some of the chief difficulties, both in *making* and *judging* of these Experiments, and occurred also to some thoughts, that might arise in the Reader, about his not ascribing in these Narratives so absolute and equal a necessity of the *Air* to the production and conservation of all *Flames*, as divers Men have concluded from his former Experiments; after this, *I say*, he divides this Discourse into *three* parts. The *first* delivers *Nine* Experiments concerning the Difficulty of *producing* Flame without Air; tryed especially upon *Brimstone, Gunpowder, and Aurum fulminans, in vacuo Boyleano*. The *second*, contains *Six* Experiments touching the Difficulty of *preserving* Flame without Air in the said *vacuum*; tried upon Mineral bodies already kindled, in order to receive some new Informations about the *Diversities* and some other *phenomena* of Flame, and the various *degrees*, wherein the Air is necessary or helpful to them. The *third*, furnishes *five* Experiments of the strangely difficult *Propagation* of *Actual* Flame without the assisting presence of the Air; tried upon *Spunk, Camphire, Gunpowder*; which last, though fired it self, yet would not fire the contiguous grains in this *Vacuum*, except in one tryal, wherein kindled coals being employed, it is guessed, that the Coals acting strongly at the same time on the whole extent of the powder that was next to them (in the absence of the

the Air,) each grain was in that case a kind of a little *Granado*, and the heap of them being uniformly enough acted on by the fire, they were made to go off, as to fence, all at once, as if there had been but a contemporary *Exp'osion* made of them all together by the action of the external fire, rather than any true *Accensjon* made by the flaming grains of the unkindled ones.

To this first Tract our Author adds; 1. Some New Experiments about the Relation betwixt *Air* and the *Flamma Vitalis* or Vital Principle of Animals; In the first of which Experiments are compar'd the Duration of the Life of an Animal, and of the Flame of Spirit of wine, included in a close vessel: In the second, is compar'd the Duration of the Life of a Bird with the lasting of a burning Candle or Coal in *Vacuo Boyleano*: In the third, is observ'd what happen'd to the Light of Glowworms in the Exhausted Receiver: In the fourth, the foregoing Tryal is varied and improv'd: In the fifth, the former Inquiry is still further prosecuted: In the sixth and last, 'tis examin'd whether Animals be heavier dead or alive. 2. An Attempt to produce *Living* creatures; and another made upon *Gnats*, in the same *vacuum*.

In the *Second* Tract the Author considering, that some of the Assertors of the *Flamma Vitalis* do explicate many of the motions of Animals, especially those perform'd in the Muscles by the *Explosions* made of certain juices of the Body, when they come to mingle with each other; as also, that the Maintainers of this *Hypothesis* are found to insist on no other instances in favour of it than the going off of Gunpowder: He was induced to suspect, they were not yet provided with better Examples, and therefore thinks, it will not be lookt upon as useless, if, without offering to determine any thing about the Truth of the Opinion, he supply the Embracers of it with some Examples of Explosions made by the bare mingling of Liquors; as one made with the *spirits* of *Nitre* and *Wine*; another, with *Oyl* of *Vitriol* and *Oyl* of *Turpentine*; a third, by two Bodies actually *Cold*.

The *third* Tract is a Polemical Discourse, answering some Objections pompously proposed by Dr. *H. More* in his *Enchiridium*

dium Metaphysicum against some Explications of New Experiments, made by our Author, and relating to the Gravitation and Pressure of Fluids. Our Noble Philosopher than in his Vindication still asserts, and with great clearness maintains; That, supposing the World to have been at first made and to be continually preserv'd by Gods divine power and wisdom; and supposing his general concurrence to the maintenance of the Laws by him establish't in it; the *Phænomena*, he endeavours to explicate, may be solv'd *Mechanically*, that is, by the Mechanical affections of Matter, without introducing any precarious Principles, such as he esteems to be *Nature's Abhorrence of a Vacuum, Substantial Forms*, or Dr. Mores *Hylarchical Principle*, i.e. (in plainer terms,) his *created Immaterial Director*. But in this Explication, our Author, to make his Discourse the more Instructive, occasionally adds several Considerations and Experiments, for the clearing up and confirming some *Hydrostatical* Truths, that he fears are but by very few assented to, or perhaps so much as understood. Amongst them, he discusses at large and solves this noble Problem, *Whence it is, that Urinators or Divers are so far from being killed or oppressed by the Weight of the incumbent and ambient water, that they are not so much as hurt by it.* Concerning which he takes notice, that in this Question 'tis taken for granted, that *Divers*, though at never to great a depth, feel no pressure against them by the water; which he saith is an affirmation in point of fact, of whose truth he makes some question, alledging the reason why he doth so.

To this *Hydrostatical Discourse* our Author subjoins a *Letter*, dilucidating an Experiment of his about a way of *Weighing water in water*, upon the occasion of some Exceptions made to it by Mr. *George Sinclair* in his *Hydrostaticks* lately printed at *Edinburg*.

Upon which occasion the Publisher of these Papers finds himself obliged to take notice of a Pamphlet annext at the end of this same Book of Mr. *Sinclair's*, called, *A Vindication of the Preface of the Book intitul'd, Georgii Sinclari, &c. Ars nova & magna Gravitatis & Levitatis from the challenges and reflexions of the Publisher of the Phil. Transactions, as they are to be found in Numb. 50. Aug. 16, 1669.*

Not to reflect, as it deserves, upon the subtle leaving this Pamphlet out of the Copy, that was by Mr. *Sinclair* presented to Sir *R. Moray*, a person whom he knows to be very far from allowing his pretences in the *Preface* here question'd ; the said Publisher first of all desires the Reader to observe, how grossly Mr. *Sinclair* prevaricates in his pretended Vindication, when, alledging the Publishers proof, whereby he asserts, that the Manuscript of *Ars nova & magna*, &c. was not committed by the Author to the Judgment of the *R. Society*, he omits the main part thereof, contained in these words, *Which* (recording) *is yet their constant and careful practice to do in all things of that nature.* For, if this had been taken in by M. *Sinclair*, he must certainly have thought, none but such as are wholly ignorant of the Candor and Justice of that Illustrious Body, and of the care of the sworn Secretaries thereof, would believe him in what he so boldly and immorally asperseth them with, viz. *That it was the interest of them, who had taken out the purposes of his M S., to procure it should not be recorded in the Register ; Unless it should be said (a thing very hard to imagine) that the Register had been in this only case purposely omitted at the solicitation of the pretended Plagiaries ; which who they be in particular, hath not yet been declar'd by M. Sinclair : Who, in the next place, might do well to consider, not only how much, before his pompous *Ars Nova & Magna* came abroad, had been printed of the Doctrine of the Air's Pressure, and likewise how well was known the Way of Counterpoising Air with Quicksilver in Glass-tubes ; but also, that in this so generally Inquisitive and Experimental Age it not seldom comes to pass, that Learned and Curious Men, proceeding in their Researches upon Solid Principles, though they reside in places far distant from one another, and without any mutual communication or knowledge of their respective studies, yet happen to light upon and discover the same things and truths ; as may easily be made out by undeniable proofs in the matter of *Curve Lines* found equal to *Straight ones* ; in the *Doctrin of Motion* ; in the *Anatome of Plants*, &c. And having said thus much, if M. *Sinclair* do yet persist in the good opinion he hath of himself, we shall leave him still to feed upon it ; though we think,*

it may be much sunk by this time from what some of his friends very worthy men and competent Judges of mens habilities, from hence have represented unto him; To return then to our Author, He

In the *fourth* Tra& endeavours experimentally to shew, that, though not only the *Peripatetick* Schools, but the generality of Philosophers both antient and modern, do as well as the Vulgar, ascribe the Ascension of Lighter bodies in water to an Internal principle, by them called *Positive Levity*; yet we need not admit any such thing for the true and adequate cause of the emersion of wood and such lighter bodies, let go under water.

In the *fifth*, he adds to the Proofs, already given of the Power of the Spring of the Air, some of the Operations he hath discover'd it to have upon Bodies placed *under water*. In the doing of which he employs two sorts of Tryals, shewing, that a small quantity of inclosed Air may by its pressure have a considerable operation upon bodies cover'd with water, notwithstanding the interposition of the liquor; which Pressure may be manifested, *both* by what it directly and positively operates upon bodies under water; *and* by the things that regularly ensue upon the Removal of the inclosed Air, or the weakning of its Spring.

In the *sixth* and last, the Author considering that it hath prov'd a great Impediment to mens freely acquiescing in the Doctrine founded on the *phenomena* of his Physico-Mechanical Experiments, that if the Atmosphere could really exercise so great a Pressure, as he ascribes to it, it would unavoidably oppress and crush all the bodies expos'd to it; He therefore employs in this Tra& divers weighty Considerations and remarkable Experiments to remove the force of that plausible Objection.

II. *Esperienze intorno à diverse cose naturali, & particolarmente à quelle che ci son portate dall' Indie; fatte da Francesco Redi. In Firenze, 1671. in 4.*

THis Learned and Observing Author, desirous to examine many Traditions about Natural things, takes occasion from certain *Snake-stones*, described by *Garcias ab Horto* and others,

and by the Portugueses call'd *Cobra de Cabelo*, found in the head of a certain kind of Serpents of *Indostan* and other parts of the East-Indies, and believed to be a sure Antidote against the Biting or Stinging of venomous animals, when applied to the wound, to which 'tis said it will stick very fast, till it have imbibed the poison; which done it will fall off: This being invalidated by the Author upon many Tryals, he affirms to have made with many of such Stones, of divers sorts and sizes, and of such as were esteemed to be most genuin, lent him by those very men that had brought them out of *India* themselves, and were persuaded of the great efficacy of those very individual Stones; he proceeds thence to the examination of divers other received vertues of things, found by him likewise to be fictitious, or at least not answering his expectation in the Experiments, himself made with them.

Next, he takes notice of several things, that produce real effects but not always; by reason of some impediments intervening. E.g. 1. That *Aqua vita* swims upon Oyl-olive, which it doth, not when 'tis undephlegmed, but when highly rectified. 2. That all natural waters of rivers, springs, conduits, &c. have been formerly observed by the *Florentin* Academicians to grow turbid upon the Infusion of water distill'd in a Leaden-bell, except the Conduit water of *Pisa*; yet of late this *Pisa*-water grows turbid also; of which the reason is here inquired into. 3. That waters distilled in Glass, if mingled with waters distilled in Lead, grow not troubled, by the observations of the same *Florentins*: Whereas this Author affirms, that sometimes 'tis otherwise; he having stilled *Parietaria* in a Glass still, and shifted the Receiver 14 times, and mingl'd all these shifted waters with Rose-water distill'd in Lead, and yet found them all become turbid; though he often repeated it in several months. Yet after he distilled in *balneo* the remainder of these 14 shiftings in a Silver-vessel with a Glass-head, changing the Receiver 8 times, he found indeed the water, that was gathered in the eight and last Receiver, untroubled, though he mingled it with several shiftings of water stilled in Lead, but all the other 7 shiftings grew still turbid, when thus mixed. 4. That Cinbamon-water, distill'd in Cold, Silver, Glass, with a Glass-head, and kept in Glass, re-

mains

mains always clear, but in *Cryſtal of Piſa* grows turbid in a few hours, and then milky, and in few days after, yellow, and at laſt bitter; whereas in *Cryſtal of Rome* and *Venice* it grows not troubled but after 2 or 3 days, and never yellow, nor bitter; and in *Cryſtal of Paris* it will ſcarce grow turbid but after a very conſiderable time: Which whether it depend upon the diverſity of the materials, or the different way of preparing the *Cryſtal*, or both, or upon other cauſes, is here curiouſly diſcuſſed. 5. That Powder made of *Niter*, *Salt of Tartar* & *Flower of Sulphur*, will ſometimes fulminate, ſometimes not. 6. That *Oyl of Tobacco* kills not all animals, nor diſpatches thoſe which it kills in the ſame ſpace of time. Where he ſpeaks of the great difference, he found between the *Tobacco of Braſil* and that of *St. Chriſtophers* as to this effect: *Varino* and *Braſil-Tobacco* producing almoſt the ſame effect, whereas that of *St. Chriſtophers*, *Terranova*, *Nieve*, *St. Martyn*, have very different effects. 7. That the fiſh *Torpedo* cauſeth ſtuporificion; but to our Author then only, when he held and ſqueezed it, not at any the leaſt diſtance. The Fiſh he diſſected, to ſee whether he could diſcover the ſeat and cauſe of its ſtuporificative power; and notes, that all that part of it between the gills and head, and the place where the fins are, as far as to the foremoſt extremities of the whole body of it, is taken up by a fibrous, ſoft and very white ſubſtance, the fibres being as big as a big ſwans-quill, and interlaced with nerves and ſanguineous veſſels; and the ends of theſe fibres reaching to and touching the ſkin of the fiſh's back and breaſt, ſo that they all united together form two *Muſcles* of a *falcate* figure, weighing $3\frac{1}{2}$ lb. in a fiſh of 15 pound weight, as this was. In which two *Muſcles* he ſuſpects that benumbing force to reſide more than in any other part; obſerving, that that virtue was felt more vigorous, when he took the *Torpedo* and ſqueezed it in his hand; at which it ſtrove to ſlide away. By the by, he took notice, that the *Iris* of this Fiſhes Eye is of ſuch a figure, that half of it is concave, the other half convex, and that the convex part entering into the concave, the pupill is cloſed. Many other things he obſerved in this Fiſh, which ſee in the Book it ſelf. 8. That certain *Water-nuts* or *Efts* in *Braſil*, *Cuba*, *Mexico*, breed a ſtone in their ſtomach, which being pulveriſed are by *Ximenes* himſelf affirm'd to cure *Nephritical* pains, and even to break the ſtone. Which yet

yet being often tried by the Author, had no effect. No more had Eagle-stones, famous for facilitating the travel of women; nor stones swallow'd by *Caymans*, said by *Monardes* to be very powerful in curing Quartans. 9. That the great digestive power in Fowl being notorious, he made very many Experiments upon Hens, Ducks, Capons, Pigeons, by cramming into them many Crystal-bullets, both hollow and massy ones; in which, upon killing & opening those animals, he found many very remarkable changes; too long to be here recited. We shall only note thence, that by some of his Tryals he saw verified that *Florentin* Experiment, by which Glass-bullets in the stomachs of Hens and Ducks had been found full of a certain white matter like curdled milk; which he thinks comes thither, from being expressed out of those innumerable *papillæ* which are seated in the inner part of the *oesophagus* of all Fowl, that is fastned to the upper orifice of the stomach. Whence he is inclined to believe, that Digestion in the stomach of Birds is not fully made by Grinding alone, but that there is required a *Menstruum* besides, to ferment, dissolve, subtilise, and to convert the meat already ground into Chyle: And he is persuaded, that the gravel and stones, swallow'd by Fowl, and stir'd about by the Muscles, perform the office of Teeth.

To these he adds some Tryals made by himself with the famous *Glass-drops*, which, when *temper'd in water*, and crammed into Ducks and Capons, were after many days found intire in their stomach, though afterwards they flew in pieces, as they are wont to do, the tail of them being broke off. Two also of the same kind being weighed and given to a Capon to swallow, were after 30 days taken out sound, but weighed less between 2 and 3 grains. But having *un-temper'd* (*stemperato*) or taken off the temper with *fire*, of one of these Drops, weighing three penny weight, and crammed it into a Capon, he found it had lost 4 grains in 4 days; and being given to such another Fowl, he found, it had, in 6 days more, lost 9 grains: An Argument, he saith, that those Drops are much harder when temper'd in water, than when un-temper'd with fire.

He likewise tryed small *Diamonds*, *Topazes*, *Leaden-bullets*, *Bohemian Jasper*, *Porphy*; and found, the first had lost nothing at all of their weight in the stomach of a Duck; the second, almost

nothing; the third, had lost considerably in the stomach of Hens; the fourth and fifth, nothing at all, after many days, in the stomach of Hens, Ducks, Turkey-cocks. Four *Pearls*, which all of them altogether weighed 12 grains, lost 4 grains in the stomach of a pigeon in 20 hours; and 8 other pearls, weighing together 30 grains, lost, in the stomach of another pigeon, 20 gr. in two days.

Having done with this sort of Observations, he goes on to recite more relations about other vertues ascribed to divers other Natural things; As, that the Blood of a *Rhinoceros* doth marvels in curing the Colick, and in stopping the Bloody flux; and the Decoction of the skin of the same is very stomachical; and the Horns of it very Antidotall. All which he found groundless in his frequent Tryals.

Hence he proceeds to discourse of the Horns of Staggs and other Deer, and observes, after others, *that* Staggs put forth their first Horns the second year of their age: *That* they cast them every year a little after the beginning of March; *That* those that are well-fed and lusty, cast them off first, the lean ones stay longer, sometimes till the end of April: *That* these Horns are fastned to the bones of the skull, not to the skin only, as some say: *That* 8 or 10 days after they are cast, new ones bud forth, which are hairy, growing hard in about 3 months, at which time the Stagg rubs off the hairy skin: *That* the branches of these Horns are more or less in number according to the Age of the Staggs, and the several Countries wherein they live, the oldest of them in *Tuscany* having but 6 or 7, and very seldom 8 or 9 on one horn, but in *Germany*, and above all in *Saxony*, 14 or 15, and sometimes more: *That* a young horn, yet tender, if cut, especially at the bottom, emits blood in streams & so violently, that the Stagg often dyes of it: *That* this blood coagulates like the other blood of the Stag, that comes out of the veins or arteries; though this be denied by *Aristotle* and *Galen*; sanguineous vessels being diffus'd through all the Horns when tender, for the conveyance of sufficient nourishment; though by little and little they are dried up: *That* a Hart being castrated whilst young and before it puts forth his Horns, never gets any; if gueld when horn'd, he never casts them, but keeps those always he had when he was cut.

After

After this discourse, he examines what is related of a certain Spice, called *Pimienta di Ciapa*, which *Ciapa* is a province of *Guatemala* in New Spain; and esteems that Spice to be the same with what *Hernandez* describes under the name of *Xocoxochitile*, or *Pepe di Tausco*: which by his description seems to be the very same with our *Jamaica-pepper*, it having those several tastes of Cloves, Pepper, Cinamon, Ginger. Mean time the virtue, for which it is by writers commended, against the Epilepsy and the *Gutta serena*, he saith he could never find in it, though he acknowledg it to be a good Cephalic, and very Stomachical.

Next, he speaks of the praises given to *China-fennel* against many infirmities, though he found it little better than the European Fennel, Annis, and Cumin. What *Ximenes* relates of the chips of *Sassafras*, that, being kept 7 or 8 days in Sea-water, they make it fresh and potable, he was not so happy to find true, though he kept *Sassafras* thin sliced, in considerable quantity, infused 20 days in a small proportion of Sea-water. What is written of the Root *John Lopez Pineiro*, growing in *Zanguebar* in Africa, and of the Root *Della Manique*, both commended for their virtue of Infallibly curing Tertians and Quartans, and the bitings and stings of venomous animals, he had neither the good fortune to discover. Further, what is recorded of the shrub of *Cheggio*, a lactescent plant, found in *Cambaja*, that the knobs and beards of it, that look Nord-ward, are only Anti-apoplectical, but those that look South-ward, are so far from being endow'd with that virtue, that they are poisonous and deadly; he could not find to answer his Tryals: Neither could he find any great matter in the celebrated wood of *Calamba*, nor the *Vanillas*, nor the wood of *Lahor* and *Solor*. But he must acknowledge the virtue of the Bark of the *Pernian Tree* in *Gua-jachil*, known by the name of *China di China*, curing Quartans and all sorts of Tertians. He wisheth, it were as true, what is recorded in the praise of those two Herbs of China, called *Pusu* and *Gudseng*, whereof the former is said to render men Immortal, the other, to preserve them always in good health.

He cannot believe what *Martinus* in his *Atlas* relates of certain Fiery Pits in *China*, able to dress any meat in them, and incapable to consume wood: Nor what is written of the two Rivers, *Chieppo* and *To*, in the province of *Xensu*, the waters of which are said to be so pure and light, that the lightest straw sinks in them: Nor that the Leaves of certain Trees are metamorphos'd into Swallows, nor lastly, that in the Seas of *China* there are certain scaly Fishes of a Saffron-colour, which in winter live in the water, but in spring cast their scales, get feathers and wings, and so fly a shore into the woods, and their live all summer and autumn, but then return to their former shape and betake themselves again to the habitation of the Sea.

Errata left un-corrected in N. 90.

In the Dedication p. ult. l. 8. for Rhine r. Rhone. p. 5166. l. 32. r. above it. p. 5167. l. 7. r. what the other. p. 5168. l. 27. r. than is ordinarily accountable for.

Errat. in this Numb. Pag. 5177. l. 9. in the margin r. diminut.

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