

An Account of two Books.

- I. *A CONTINUATION of NEW EXPERIMENTS Physico-Mechanical, touching the SPRING and WEIGHT of the AIR, and their Effects; the 1. PART, &c. by the Honourable ROBERT BOYLE, Fellow of the Royal Society, Oxford 1668 in 4^o.*

THe Illustrious Author of this Book hath therein afresh furnished the Philosophical World, with a set of very material and pregnant Experiments (to the number of 50.) which are partly improvements of the former of this Nature, partly, (and those far more numerous) superadded *new* ones: concerning which, He declareth, that in great part he aimed thereby to shew, that these very *Phænomena*, which the School-Philosophers urge, as clear proofs of Nature's Abhorrency of a *Vacuum*, may be not only explicated, but actually exhibited, some by the *Gravity*, and some also by the bare *spring* of the Air; which latter he now mentions as a distinct thing from the other, not as if it were actually separated in these Tryals (since the *Weight* of the upper parts of the Air does, as 'twere, bend the *Springs* of the lower) but because that having in the formerly published experiments, and even in some of *these*, manifested the efficacy of the Air's Gravitation on Bodies, he thought fit to make it his task in many of these, to shew, that most of the same things, that are done by the Pressure of *all* the super-incumbent Atmosphere acting as a *Weight*, may be likewise perform'd by the Pressure of a small *portion* of Air, included indeed, but (without any new Compression) acting as a *Spring*.

The Experiments themselves, contain'd in this Book, are still of that sort, which need but a short absence of the Air; there being another sort, which require, that the Air should be kept out for a considerable time from the Bodies, whereon the trial is made; concerning which latter, the Author still gives the *Reader* hopes of presenting him in due time with such as may not be unacceptable to him. The Experiments of this *Part* are;

1. About the raising of *Mercury* to a great height in an open Tube, by the Spring of a little included Air; wherein 'tis discours'd, how this Experiment may be made use of against those, who in the explication of the *Toricell*. Experiment recurre to a *Funiculus*, or a *Fuga Vacui*.

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2. Sheweth,

2. Sheweth, that much included Air rais'd *Mercury* in an open Tube no higher, than the weight of the *Atmosphere* may in a *Baroscope*: where notice is taken of the great force of the Spring of the Air then when it could not raise the *Mercury* any higher.

3. Sheweth, that ye Spring of the included Air will raise *Mercury* to almost equal heights in very unequal Tubes; where the reason is added, why this and the former Experiment were not tried in *Water*; as also an Account of an adventitious Spring, that was super-added to the Air by Heat.

4. About a New Hydraulico-pneumatical Fountain, made by the Spring of un-compressed Air; together with the uses to be made of it, as in Hydraulico-pneumaticks, or to shew, by what degrees the Air restores its self to its Spring; or especially to find, what kind of Line the Salient water describes in rarify'd Air.

5. About a way of speedily breaking flat Glasses by the weight of the *Atmosphere*.

6. Sheweth, that the breaking of Glass-plates in the foregoing experiment need not to be imputed to the *Fuga Vacui*.

7. About a convenient way of breaking blown Bladders by the Spring of the Air included in them: and of the usefulness of this Experiment in other tryals.

8. About the lifting up a considerable weight by the bare Spring of a little Air included in a Bladder. Which as 'tis a surprising experiment, so it seems not unserviceable for the explaining of the motion of the Muscles.

9. About the breaking of Hermetically seal'd Bubbles of Glass by the bare Spring of their own Air; with an observation, that they broke not presently, and what the reason might be of the slowness of that effect.

10. Contains two or three trials of the force in the Spring of our Air uncompress'd, upon stable and even solid Bodies, whereto 'tis external.

11. Shews, that *Mercury* will in Tubes be rais'd by Suction no higher than the weight of the *Atmosphere* is able to impell it up: where the Principle of a *Fuga Vacui*, and that of a *Funiculus* are shewn to be insufficient.

12. About the different heights, whereto Liquors will be rais'd by Suction, according to their several specifick Gravities: accompanied with a remark, that the proportion of the weight of *Mercury* to *Water* is not quite as 14. to 1.; as also, that the no-

tion of a *Fuga Vacui* is unreasonable; together with the use that may be made of this Experiment in the estimating the gravity of several Liquors, with some tryals thereupon.

13. About the Heights, to which *Water* and *Mercury* may be rais'd, proportionably to their specifick Gravities, by the Spring of the Air.

14. About the Heights answerable to their respective Gravities, to which *Mercury* and *Water* will subside, upon the withdrawing of the Spring of the Air.

15. About the greatest height to which *Water* can be rais'd by Attraction: where the height of the *Water* is compar'd to that of the *Quicksilver* at the same time in a *Baroscope*. and examined according to the proportion of their specifick Gravities; together with a reflexion on a mistake in the common Writers of *Hydraulicks*, having a conceit of carrying *Water* over never so high Mountains.

16. About the bending of a Springy Body in the exhausted Receiver: no alteration of the Spring discover'd.

17. About the making of *Mercurial* and other *Gages*, whereby to estimate how the Receiver is exhausted: of which *Gages* one is preferr'd and described.

18. Concerning an easie way to make the Pressure of the Air sensible to the Touch of those that doubt of it.

19. About the Subsidence of *Mercury* in the Tube of the *Toricell*. Experiment to the Levell of the Stagnant *Mercury*; accompanied with some confirmations of what had been said in the first Treatise of the *Physico-Mechanical* Experiments.

20. Shewing, that in Tubes open at both ends, when no *Fuga Vacui* can be pretended, the weight of water will raise *Quicksilver* no higher in slender than in larger Pipes.

21. Of the Heights, at which pure *Mercury*, and *Mercury* amalgam'd with *Tinn*, will stand in *Barometers*; together with the use that may be made of this experiment, to discover how much two mixt bodies penetrate one another; as also further to illustrate, that the height of the Liquors in the *Toricell*. Experiment depends upon the *Equilibrium* with the outward Air.

22. Proposeth a way of making *Portable* or *Travailing* *Barometers*; with a particular description of the Figure, such a *Barometer* is to be of, the way of filling it, putting it into a *Frame*, and securing it from the harm, the *Mercury* it self might

do in the transportation; where is added the great usefulness of this Instrument, with an intimation of others of a different kind, &c.

23. Confirms, that Mercury in a Barometer will be kept suspended higher at the top, than at the bottom of a hill: on which occasion something is noted about the height of Mountains, especially the *Pic of Teneriff*, esteemed to be in its perpendicular height 7 miles, by the more accurate observations..

24. Shews, that the Pressure of the Atmosphere may be exercised enough to keep up the Mercury in the Torricell. experiment, though the Air press upon it at a very small orifice.

25. Shews, that an oblique pressure of the Atmosphere may suffice to keep up the Mercury at the usual height in the Torr. Experiment, and that the Spring of a little included Air may do the same; together with the use that may be made of the former experiment for a portable Baroscope.

26. About the making of a *Baroscope*, that serves but at certain times; taking notice of the arguments it affords against a *Fuga Vacui*.

27. About the Ascension of Liquors in very slender Pipes in an exhausted Receiver.

28. Touching the great and seemingly spontaneous Ascension of Water in a Pipe fill'd with a compact Body, whose particles are thought incapable of imbibing it: by which is examin'd an Explication, that has been made of the cause of *Filtration*. Whence a probable cause of the *Ascension of Sap into Trees* is suggested. An attempt annex'd, to make a Syphon, that should run of it self without Suction.

29. Of the seemingly Spontaneous Ascension of Salts along the sides of Glasses; with a conjecture at the cause of it.

30. Contains an attempt to measure the Gravity of the Cylinders of the Atmosphere, so as that it may be express'd by known and common weights:

31. About the Attractive Vertue of the *Loadstone* in an exhausted Receiver.

32. Shews, that when the Pressure of the External Air is taken off, 'tis very easie to draw up the Sucker of a Syringe, though the hole, at which the Air or Water should succeed, be stop't.

33. About the opening of a Syringe, whose Pipe was stop't in the exhausted Receiver, and by the help of it making the Pressure of the Air lift up a considerable weight.

34. Shews

34. Shews, that the Cause of the Ascension of Liquors in Syringes is to be deriv'd from the Pressure of the Air.

35. Shews, that upon the Pressure of the Air depends the sticking of Cupping-Glasses to the fleshy parts they are apply'd to.

36. About the making, without heat, a Cupping-Glass to lift up a great weight.

37. Shews, that Bellows, whose Nose is very well stoppt, will open of themselves, when the Pressure of the External Air is taken off.

38. About an attempt to examine the Motions and Sensibility of the Cartesian *Materia Subtilis*, with a Pair of Bellows (made of a Bladder) in the exhausted Receiver.

39. Contains a further attempt to prosecute the Inquiry propos'd in the fore-going Experiment: First with a Syringe and a Feather; then with a Syringe in Water; where 'tis examin'd, if there be an *Aether* or *Materia Subtilis*, what kind of body it must be: with a Confirmation of the 34th Experiment.

40. About the falling, in the exhausted Receiver, of a light Body, fitted to have its motion visibly varied by a small resistance of the Air: where is mention'd a Design to try this way, what the degrees of Celerity would be of descending Bodies in an exhausted Receiver. Directions given, which way to lengthen Receivers for the Trial of this and other Experiments.

41. About the propagation of Sounds in the exhausted Receiver: Two Trials perform'd by the contrivance described as necessary for this and divers other Experiments: Where also is examin'd an assertion of *Mersennus*, and a Proposal of his shewn to be unpracticable, &c.

42. About the breaking of a Glass-drop in an exhausted Receiver, wherein an *Hypothesis*, ascribing the Cause of the breaking of them to the force of the External Air, is examin'd.

43. Concerning the Production of Light in the exhausted Receiver.

44. Touching the Production of a kind of *Halo* and Colours in such a Receiver: The reason of it propos'd, with a suggestion, that the same cause might have been of that Apparition of Light mention'd in the formerly publisht Experiments.

45. About the Production of Heat by Attrition in the exhausted Receiver.

46. About the flaking of Quick-Lime in its.

47. Of an attempt made to measure the Force of the Spring of included Air, and examine a Conjecture of the difference of its strength in unequally broad-mouth'd Vessels.

48. About an easie way of making a small quantity of included Air raise in the exhausted Receiver 50 or 60 pounds, or a greater weight.

49. Concerning the Weight of Air, and the estimating thereof, both by the help of a seal'd Bubble, and by weighing the Receiver it self: together with an Advertisement of the variation of the Gravity of the Air; and that, by Experiments made at different times or places, there are obtain'd different proportions betwixt It and Water.

50. About the disjoyning of two Marbles (not otherwise to be pull'd asunder without a great weight) by with-drawing the Pressure of the Atmosphere.

Which Experiments are, where 'twas necessary, illustrated with *Figures*, to the number of 30 in 8 *Plates*.

The whole is concluded with some *Notes* and *Trials* about the Atmospheres of *Consistent* Bodies (here below) shewing, that even *Hard* and *Solid* Bodies (and some such, as one would scarce suspect) are capable of emitting *Effluvia*, and so of having *Atmospheres*; which is prov'd first *a priori*, both by the *Atomical* and *Cartesian* Hypothesis; and then demonstrated by particular Examples in several Bodies: where, instancing in those, that are most fixt, the Author examines the Argument of *Descartes* against *Electrical* emanations, drawn from the fixedness of Glafs.

Whereunto are subjoynd not only some Observations about the *Electricity* of Bodies, as that of *Amber* by the Sun, and that of Glafs by the Heat of the Fire; but also some Considerations, that may induce us to believe, that very many other Bodies, not yet discover'd to do so, emit their *Effluviiums*.

II. *HYDROLOGIA CHYMICA*, or, *The Chymical Anatomy of the SCARBROUGH and other Spaws in YORK-SHIRE*, &c. by *W. SYMPSON*. London, 1668. in 8°.

IN this Curious and Experimental Treatise the Reader will First meet with some *Animadversions* upon Dr. *Witties* Tract of the *Scarborough-Spaw*; our Author affirming, that upon bringing

bringing the said *Dr. Witties* constituent Principles of those Waters to the Test, he could not find them there; nor, upon a thorough examination of the Vertues ascribed to them, see cause to believe them to be such as that *Doct̃or* affirms; but, after he hath endeavour'd to make it out by severe Trials and Observations, that the five Ingredients assign'd by the said *Doct̃or*, viz. *Iron*, *Vitriol*, *Allum*, *Niter*, and *Sea-Salt*, are not there, as he layes them down; he declares that he means not to deny them all, but to assert those, which he finds there demonstrable by Experiment; and thereupon affirms, that that, which indeed gives the Essence to this *Spaw*, is an acid *Aluminous* Mineral Salt, preying upon and dissolving a slight touch of the Mineral of *Iron*. And having cleared this by Experiment, he proceeds to consider its Vertues; where, after a short account given of the Original of most Diseases, how they arise from a vitiating of the several Ferments, either causing a rawness, or over-acidity, or other hostile qualities in the Nutritive Juyce; he declares, for what Diseases this *Spaw* is proper, and for what not; affirming, that it avails nothing in *Pestilential Diseases*, *Pleurisies*, *Poysons*, *Leprosie*, the *Lues Venerea*, *Morphew*, *Cancer*, *Falling-Sickness*, *Apoplexy*, *Palsie*, *Asthma*; but that its efficacy is most discernable in the *Scurvy*, *Dropsie*, *Strangury*, or *Stone*, *Furundice*, *Hypochondriack Melancholy*, *Cachexies*, and *Womens Diseases* proceeding from the *Obstructions* of the *Menses*: adding, that in the Esurine Salt of *Allom* are as noble medicinal Vertues to be found, as in any other Mineral specificated Salt whatever; this Salt being, in its first Essence, volatile and exquisitely penetrative, forcing its passage through the obstructed Meanders of the bowels, and notably opening the closed parts, and thereby restoring the blood, and other peculiar spirituous Juyces of the *Genus nervosum*, to their primitive fermental vigor.

Secondly, In the same Treatise is contain'd a short Description of the Spaws at *Malton* and *Knarsborough*; the former of these two having, in our *Author's* opinion, the like ingredients with those of *Scarborough*, but with a fainter spring; the latter, imbued only with a small portion of Esurine acidity, that hath preyed a little upon, and acquired a slight touch from the *Minera* of *Iron*.

Thirdly, He discourses of the *Original* of *Hot Springs* and other Fountains; where having shew'd that they come from Mineral Salts, and how those

those Salts, upon the contact of one another, or of Mineral Bodies, are the Efficient causes of Heat in those Springs; he thence takes occasion to teach, How *Artificial Baths* may be made analogical in vertue and operation to the *Natural*; shewing withal the efficacy of Hot Springs and Baths, whether Natural or Artificial, in curing most of the stubbornest Diseases.

Fourthly, The Author digresses to the Vindication of *Chymical Physick* describing first, what the Chymical Art is; next, endeavoring to remove the reproach laid on it: and lastly, declaring the great assistances thereby afforded to Nature, above ordinary Shop-preparations, in order to the Cure of Diseases: From which last he takes occasion to expatiate into the praise of this Art, upon the account also of its great usefulness for improving Experimental Philosophy, and for penetrating into the Principles of all Concretes, whether Vegetable, Animal, or Mineral: inserting withal, by way of digression, his thoughts of an *Universal Character*; meaning such an one, which, being known in all parts of the World, should signify the same thing in all Countreys; so that all People skill'd therein should every where read it every one in their own Language.

To all this is annex'd an *Appendix* concerning the *Original of Springs* in general, in which the Author admits, that Rain-and-Snow-waters are indeed the proximate Cause of all Land-Springs and sudden Floods, filling the Porosities and Channels of the Earth's surface, and that the remaining part restagnats, till it meet with convenient Currents out of Brooks and Ditches into other Rivolets, and those again, by further passages, swell into Rivers, and thereby cause Inundations of low grounds, till those Rivers empty themselves, by other intermediate ones, into the Sea it self: But that the same should be the cause of the *Fontes Perennes*, or Living Springs, he positively denies; advancing this *Thesis*, That there is a *Circulation of Water* in the *Terraqueous Globe*, as requisite to its well-being, as the *Circulation of Blood* in *Animals*, whereby the water, through subterraneous Channels along the *Sabulum bulliens*, runs from Sea to Sea, and also from the Sea to the Heads of Springs, and from them into Rivolets, and those into Rivers, and thence into the Ocean, and so circulates round: which, he saith, includes also another Circle of Rain and Snow, which first arising by Exhalations from the Sea and Earth, are carried down again upon the Earth and Sea, and joyning issue with Rivolets from Springs, do swell Rivers, which again discharge themselves into the Sea.

Lastly, The Author concludes, first, with an account he gives of a *Ternary of Medicines* used by himself, for curing many Diseases; viz. 1. *Cathartick*, or Solutive; 2. *Cordial*, or expelling of Wind; 3. *Diaphoretick*, or Sweating. The first he calls *Scorbatick Pills*; the second, *Elixir Proprietatis*, or *Cordial Elixir*; the third, *Diaphoretick*, or *Sweating Pills*. Which three Preparations, he saith, are composed of the best Vegetables, extracted by Salts, that are graduated to the highest pitch; experienced by himself to be both safe and effectual in the cure of Diseases. *Secondly*, with a Description of the *Essence*, as he calls it, of *Scarbrough Spaw*; which he maketh to be the result after divers fabulous separations; viz. a kind of *Alumino-nitrous Salt*; which, being duly order'd, shoots into long *Christalline Stiria's*, and branches it self forth in curious shapes in the bottom of the Glais, exposed to a *Balneum Mariae*.

Errat. N^o 41. p. 826. l. 21. r. ut fiant, ib. l. 30. r. augentur, p. 827. l. 23. r. Tellure, ib. l. ult. r. quid, p. 832. l. 35. r. notanda.

Errat. N^o 42. p. 838. l. 15. r. proceed in, p. 844. l. 17. r. albuginea, ib. l. 29. r. videre est.

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