WILLIAM WATSON

EXPERIMENTS AND OBSERVATIONS TENDING TO ILLUSTRATE THE NATURE AND PROPERTIES OF ELECTRICITY

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Содержание

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THE PREFACE

The following Sheets were not intended to be made publick, but as part of the Philosophical Transactions. As those Works are printed in the order of Time they are read; these Observations, communicated to the Royal Society *at different Meetings, would, upon that Account, have been publish'd separate in different Numbers of those Transactions. To satisfy therefore the Impatience of several learned and very valuable Friends, to whose Importunities I have neither Will, nor Inclination to deny any thing in my Power to grant, I caused a few Copies to be*

printed, that the whole might be seen together, and then broke up the Press. This has excited the Curiosity of the Publick, and raised a Demand for these Experiments much beyond what I had reason to expect. I therefore found it necessary to send them to the Press a second Time, lest some of those over-officious Gentlemen, who are always ready on these Occasions, should do it for me; so that whoever has an Inclination, may now be made acquainted, by what Means the several surprizing Phænomena of Electricity have been brought about.

I chose to lay these Papers before the Publick in the same Dress wherein they appeared before the very honourable and learned Body, to whom, as the various Effects of Electricity presented themselves, they were regularly communicated, and from whom they met with a very favourable Reception. Many Members of the Royal Society, *as well as several other Persons of great Rank and Quality, have been repeated Witnesses of the Facts which are here laid before the World; particularly the present worthy President*, Martin Folkes, Esq; *whose extensive Abilities and great Knowledge in every Branch of useful Literature are exceeded only by his Candour and Zeal in promoting Science. The Advice and Assistance of this Gentleman, whose Friendship I shall always esteem as one of the greatest Happinesses of my Life, has been of great Moment in the Prosecution of these Discoveries. I therefore take this publick Manner of testifying my sincerest Obligations as well to him, as to Sir* Hans Sloane, Bart. *who, although retired from Business, is nevertheless attentive to whatever tends to the*

Advancement of Philosophy. Upon a Report made to him of these Experiments and Observations, he, as surviving Executor of Sir Godfrey Copley, *was pleased to appoint me last Year to receive the annual Prize-medal of Gold, given by the* Royal Society *in consequence of Sir* Godfrey's *Benefaction. The Honour of being so particularly taken notice of by Gentlemen of such distinguished Merit, as it cannot but give me the highest Pleasure, so shall it ever continue to raise in me Sentiments of the truest Gratitude, and most profound Respect.*

IF it should be asked, to what useful Purposes the Effects of Electricity can be applied, it may be answered, that we are not as yet so far advanced in these Discoveries as to render them conducive to the Service of Mankind. Perfection in any Branch of Philosophy is to be attained but by slow Gradations. It is our Duty to be still going forward; the rest we must leave to the Direction of that Providence, which we know assuredly, has created nothing in vain. But I make no Scruple to assert, that notwithstanding the great Advances, which have been made in this part of natural Philosophy within these few Years, many and great Properties remain still undiscover'd. Future Philosophers (some perhaps even of the present Age) may deduce from electrical Experiments, Uses extremely beneficial to Society in general.

NO present Advantage accrued to those Persons, or to that Age, which first discover'd the Properties of the Magnet. Many hundreds of Years intervened, before they were applied to the great Uses of Navigation. Had these remain'd a secret till now,

what other Methods could have been substituted in their Place, by which we could securely traverse the vast Ocean? All the Advantages we receive from distant Commerce, we must still have been Strangers to, but for this fortunate Application of the magnetical Power. And even the Discoveries thus far had been very imperfect, without the Knowledge of the Variation of the Compass. But the present Age, and even this Nation, boasts of a Gentleman[1], who seems to be entrusted with the magnetical Powers themselves. He makes artificial Magnets, increases in a few Minutes the Powers of real ones to a surprizing Degree, changes at Pleasure their Poles, and makes that newly acquired Polarity, permanent. The World, I hope, will not long be deprived of the Manner, by which these extraordinary Changes are produced, which as yet this Gentleman thinks proper to conceal. As Electricity has some Properties in common with Magnetism, as will be shewn in the Course of these Observations; some new Lights probably may be thrown upon both. But to return; admitting even, that no substantial Advantages could arise from the Inquiries before us, (which, however, we can by no means grant, upon our considering the Effects we already perceive of its Operations upon human Bodies) whatever tends to enlarge the Conceptions of the Mind, and to implant in us still more lofty Ideas of the Almighty Author of Nature, deserves certainly, independent of other Considerations, our highest Regard.

THESE Experiments were all made with Glass Tubes of about

[1] Dr. *Gowin Knight*, F. R. S.

two Foot long; the bore about an Inch in Diameter. But a scrupulous Exactness in these Proportions is no ways necessary. The thinner and lighter these Tubes are, the sooner they are excited; though they, 'tis true, don't retain their Power so long as those, which are more thick and substantial. But where you intend to communicate the electrical Power, as fast as you excite it, I should prefer a light Tube; though it ought never to be less than 1/12 of an Inch thick, because of the Danger of breaking it by the Friction.

THE Tube, before it is rubbed, should be always made dry and warm, which may be done by laying it before the Fire. But I cannot omit hereupon making one further Remark; viz. *that Glass Tubes, exactly of the same Dimensions, made at the same Time, and with the same Materials, vary considerably with regard to their fitness for electrical Purposes. Clear and dry Air with some degree of cold is most eligible, though I have succeeded in the greatest Fogs, but with more Difficulty.*

TO *Martin Folkes*, Esq; P. R. S

SIR,

THE Society having heard from some of their Correspondents in *Germany*, that what they call a Vegetable Quintessence had been fired by Electricity, I take this Opportunity to acquaint you, that on *Friday* Evening last I succeeded, after having been disappointed in many Attempts, in setting Spirits of Wine on Fire by that Power. The preceding Part of the Week had been remarkably warm, and the Air very dry, than which nothing is more necessary towards the Success of Electrical Trials; to these I may add, that the Wind was then Easterly and inclining to freeze. I that Evening used a glass Sphere as well as a Tube; but I always find myself capable of sending forth much more Fire from the Tube than from the Sphere, probably from not being sufficiently used to the last.

I had before observ'd, that although[2] Non-electric Bodies

[2] I call *Electrics per se* or originally-*electrics*, those Bodies, in which an attractive Power towards light Substances is easily excited by Friction; such as Glass, Amber, Sulphur, Sealing-wax, and most dry Parts of Animals, as Silk, Hair, and such like. I call *Non-electrics* or Conductors of Electricity, those Bodies, in which the above Property is not at all or very slightly perceptible; such as Wood, Animals living or dead, Metals and vegetable Substances. See *Gray*, *Du Fay*, *Desaguliers*, *Wheler*, in the Philosophical Transactions.

made electrical, lose almost all that Electricity by coming either within or near the Contact of *Non-electrics* not made electrical; it happens otherwise with Regard to *Electrics per se*, when excited by rubbing, patting, *&c*; because from the rubbed Tube I can sometimes procure five or six Flashes from different Parts, as though the Tube of two Foot long, instead of being one continued Cylinder, consisted of five or six separate Segments of Cylinders, each of which gave out its Electricity at a different Explosion.

The Knowledge of this Theorem is of the utmost Consequence towards the Success of electrical Experiments; inasmuch as you must endeavour by all possible Means to collect the Whole of this Fire at the same Time. Professor *Hollman* seems to have endeavour'd at this and succeeded, by having a tin Tube, in one End of which he put a great many Threads, whose Extremities touch'd the Sphere when in Motion, and each Thread collected a Quantity of electrical Fire, the Whole of which center'd in the tin Tube, and went off at the other Extremity. Another Thing to be observ'd, is to endeavour to make the Flashes follow each other so fast, as that a Second may be visible before the First is extinguish'd. When you transmit the electrical Fire along a Sword or other Instrument, whose Point is sharp, it often appears as a Number of disseminated Sparks, like wet Gunpowder or *Wild-fire*; but if the Instrument has no Point, you generally perceive a pure bright Flame, like what is vulgarly call'd the *Blue-ball*, which gives the Appearance of Stars to fired Rockets.

The following is the Method I made use of and was happy enough to succeed in. I suspended a Poker in silk Lines; at the Handle of which I hung several little Bundles of white Thread, the Extremities of which were about a Foot at right Angles from the Poker. Among these Threads, which were all attracted by the rubbed Tube, I excited the greatest electrical Fire I was capable, whilst an Assistant near the End of the Poker held in his Hand a Spoon, in which were the warm Spirits. Thus the Thread communicated the Electricity to the Poker, and the Spirit was fired at the other End. It must be observ'd in this Experiment, that the Spoon with the Spirit must not touch the Poker; if it does, the Electricity without any flashing is communicated to the Spoon, and to the Assistant in whose Hand it is held, and so is lost in the Floor.

By these Means, I fired several Times not only the ætherial Liquor or Phlogiston of *Frobenius* and rectified Spirit of Wine, but even common proof Spirit. These Experiments, as I before observ'd, were made last *Friday* Night, the Air being perfectly dry. *Sunday* proved wet and *Monday* somewhat warm, so that the Air was full of Vapour; Wind South-West and cloudy. Under these Disadvantages, on *Monday* Night I attempted again my Experiments; they succeeded, but with infinitely more Labour than the preceeding, because of the Unfitness of the Evening for such Trials. *Your Candour* will not permit you to think my Minuteness trivial, with Regard to the Circumstances of the Weather, who know, how many Things must concur to make

these Experiments succeed. I shall wait with Impatience for a proper Opportunity to have these Experiments repeated in your Presence, and am, with the utmost Respect,

Sir, your most obedient,

humble Servant,
W. Watson.

Aldersgate-Street,
March 27. 1746.

TO THEROYAL SOCIETY

Gentlemen,

I lately acquainted you, that I had been able to fire Spirit of Wine, *Phlogiston* of *Frobenius*, and common proof Spirit, by the Power of Electricity. Since which (till Yesterday) we have had but one very dry fine Day; *viz. Monday, April 15*. Wind E. N. E.; when about four o'Clock in the Afternoon, I got my *Apparatus* ready, and fired the Spirit of Wine four Times from the Poker as before, three Times from the Finger of a Person electrified, standing upon a Cake of Wax, and once from the Finger of a second Person standing upon Wax, communicating with the first by means of a walking Cane held between their Arms extended. The horizontal Distance in this Case between the glass Tube and the Spirit was at least ten Feet.

You all know, that there is the repulsive Power of Electricity, as well as the attractive; inasmuch as you are able, when a Feather or such-like light Substance is replete with Electricity, to drive it about a Room, which Way you please. This repulsive Power continues, until either the Tube loses its excited Force, or the Feather attracts the Moisture from the Air, or comes near to some non-electric Substance; if so, the Feather is attracted by, and its Electricity lost in, whatever Non-Electric it comes near. In electrified Bodies, you see a perpetual Endeavour to get rid of their Electricity. This induced me to make the following

Experiment. I placed a Man upon a Cake of Wax, who held in one of his Hands a Spoon with the warm Spirits, and in the other a Poker with the Thread. I rubbed the Tube amongst the Thread, and electrified him as before. I then ordered a Person not electrified to bring his Finger near the Middle of the Spoon; upon which, the Flash from the Spoon and Spirit was violent enough to fire the Spirit. This Experiment I then repeated three Times. In this Method, the Person by whose Finger the Spirit of Wine is fired, feels the Stroke much more violent, than when the electrical Fire goes from him to the Spoon. This Method for the Sake of Distinction, we will call the repulsive Power of Electricity.

Конец ознакомительного фрагмента.