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Experiments and observations made with a view to point out the errors of the present received theory of electricity and which tend in their progress to establish a new system, on principles more ...

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London, 1780

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Introduction.

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INTRODUCTION.

IT has been customary, in treating of any branch of science, to trace it from the remotest antiquity; but as this has been ably and repeatedly done by many others, it seems unnecessary to tread exactly in their steps. For, it can be of but little use to the young beginner, to be informed of the imperfect knowledge of this branch of natural philosophy in the first ages of mankind.

I shall not, on this account, take the Reader any farther back, than to inform him of my reasons for troubling the Public with a treatise on the subject of Electricity, after so many have been published by several eminent men.

It is now upwards of ten years since I had reason to believe, that the present received hypothetical system of electricity could not be founded on truth; and from the experiments I then made, I drew up a few

remarks and observations, to offer to the Public in some periodical work; but an apprehension I might be mistaken, kept them back.

Soon after this, several other avocations drew my attention from this branch of natural philosophy, and I never more thought of reviving the subject, till about four years since, I applied to it again, as an entertaining amusement for a winter's evening. But curiosity, which leads us on from step to step, would not suffer me to rest here: from the entertainment of myself and my friends, I returned again to my first pursuit; and finding more convincing proofs to confirm my former opinion, that the received theory, as established by Dr. Franklin, is erroneous, I have since prosecuted this study with an unwearied zeal.

I was soon satisfied in myself, as far as the evidence of my senses could carry me, of the permeability of glass to the electric fluid. I drew up my opinion on this subject, grounded upon and confirmed by experiments, and offered it to a learned society; but as I happened to differ from the popular theory, the persons to whom my paper was addressed, did not deign to submit it to the inspection of the Public.

As my thoughts on the permeability of glass to the electric

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electric fluid were now out of my own possession, I printed my paper in the Gentleman's Magazine; and, if I could have had my farther opinion, on the subject of electricity, published in detached papers, I should never have been at the trouble of digesting the matter contained in the following sheets.

When I had fixed my resolutions to begin the work, I was at a loss what method to pursue, viz. whether I should write only for such as were competent judges of the subject; or whether I should endeavour to compile a useful work, which might be of some service to initiate the young beginner in the principles of this branch of science. After a little reflection, I resolved to adapt what I had to offer to the comprehension of those who were but slightly acquainted with the subject; for many, who may be at the trouble of reading one book, might not chuse the labour of perusing many other volumes by way of introduction to it. Besides, I the rather preferred this method, as it would give the unprejudiced and unexperienced reader an opportunity, with a little trouble and expence, to enter fully into the subject, and of judging whether what I have offered be agreeable to the simple laws of nature.

The method I have pursued is as follows, viz.

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1. I have

1. I have first explained the technical terms used in this branch of natural philosophy.

2. I have collected a series of propositions, many of which are considered, by electricians, as fundamental axioms in this branch of science, according to the present received theory.

3. I have given a concise account of a few of the principal theories, which have been offered to explain the laws of electric attraction and repulsion, and likewise of the phenomena of the Leyden phial. As every hypothesis, except Dr. Franklin's, have only started up for a moment, and are now all of them exploded, I have only barely mentioned them, to show the different opinions which have prevailed at different times. But the Franklinian system being generally embraced by the philosophers of the first reputation in every kingdom, it may be thought presumption in a person so unknown to, and of so little consequence in, the learned world to doubt the truth of it; but when they consider it is founded upon conjecture, and that time frequently establishes errors, they can have no reasonable objection to the examination of this theory by experiment, which is the best method we have of obtaining an insight into the operations of nature.

4. As I am sensible the building must be fairly overturned,

overturned, before another can be raised in its place, I have undertaken to prove, and I believe I have clearly proved by experiments, that some of the properties which have been ascribed to glass, do not exist. It is the same with many other electrics; and, I believe, the electric fluid passes through all bodies with the greatest ease.

5. As the doctrine of electric atmospheres, or the attraction of light bodies by the electric fluid, is, I think, too intricate to be founded upon the simple operations of nature; I have not only fairly and candidly examined it, but I have extended my examination to the theory of charging and discharging the Leyden phial, and likewise to the electric appearances, distinguished by the names of the Star and the Brush; and how far I have succeeded in proving they cannot act by those laws assigned to them, I must leave to the candid and curious inquirer to judge.

I have not only given a general account of the laws referred to in the second section of the first chapter; but I have given a particular state of each law, at the beginning of the chapter where it is examined; and I have also given my authority for it at the bottom of the page.

6. As what I have to offer as a new theory will nei-

ther admit of a geometrical, nor a mathematical demonstration; I have proceeded by analogy, making experiments, and comparing them with a variety of different operations in nature; and then drawing conclusions from them. To convince the young beginner "that in natural philosophy, the investigation of "difficult things by the method of analysis, ought "ever to precede the method by composition," I have given him Sir Isaac Newton's rules of reasoning in philosophy, that he may the better judge of the plan I have pursued in this part of the work. I may perhaps be censured by some, for introducing into the ninth chapter such a variety of matter, which may at first appear foreign to the subject of electricity; such as magnetism, crystalization, and the dissolution of bodies. As the corpuscular parts of matter in these common operations of nature, as well as in several others, appear to me to act from one and the same principle; viz. a kind of polarity, or an inherent property in each particle, by which they attract and repel; I concluded I could not well be too general, as I proposed to proceed by induction in my enquiry.

To show I am not singular in my opinion, I have quoted several authors of credit; and have given their opinions in their own words at the bottom of the
page,

page, that the reader may judge, at the same time, whether I have mistaken or misrepresented their meaning.

7. After establishing the theory of an inherent property, or kind of polar virtue in the electric effluvia, upon the best proof the nature of the subject will admit, I have proceeded to apply the theory to use, in explaining the different phænomena of electric attraction and repulsion, and the charging and discharging the Leyden phial. Under this head I have shown, by a variety of new experiments, that the electric particles probably follow each other in glass, as the magnetic effluvia do in steel, in one direction, and give each side of the glass a different property or power, so that one side attracts the same electrified body which the other repels.

I have likewise considered the residuum of a charge, and the lateral explosion; and have shown that they proceed from a different cause than what has hitherto been suspected.

8. As it is generally supposed, that an excited electric, by some secret influence, changes the electricity of a body brought within its sphere of action, and gives it a contrary one to its own; and this doctrine has been promiscuously applied to explain many
singular

singular phænomena, particularly those arising from Volta's electrophorus; I have invented a new set of experiments to show the fallacy of this doctrine; and that the plates act from very different principles.

The mode of investigating this subject, which I have adopted, being (as I apprehend) not hitherto made use of by any other electrician, I may reasonably hope for some little indulgence in the use of it. I have, contrary to the general opinion, asserted, that the plates do part with the electric fluid; that they are permeable to it; and that they have a constant and regular supply from the floor every time they are deprived of any of their electricity by the removal of the tin cover.

9. As the laws of motion of insulating bodies of a rare texture, given us by Pere Beccaria, are so uncertain; and the electricity may be changed in the ribbons from positive to negative, and the contrary, by rubbing a little harder than common, by a counter friction, and several other accidents; I apprehend that nature does not act by such variable and doubtful rules; I have therefore carefully examined this theory, and proved there cannot be any dependence on the laws he has framed, as they do not always agree with the experiments he made himself.

Finding

Finding there could be no certainty in following his steps, I have endeavoured, by a different method, to throw some farther light upon this intricate subject, which has hitherto baffled the ingenuity of all the electricians of this and every other nation.

10. As this doctrine of insulating bodies of a rare texture, is naturally connected with electric cohesion, I have endeavoured to discover the force which is required to separate different electrified bodies; and though I have not succeeded to my wish, I have given an account of my imperfect apparatus made for this purpose, and the result of my experiments, as it may be a hint for some others to improve, who may have more time and ingenuity than myself, to pursue this branch of electricity, which I have barely begun.

In this chapter the reader will find a variety of miscellaneous matter, which may serve as hints to some farther discoveries; and I have also given some curious experiments on the Leyden phial, as well as assigned a reason for the acting of some electric phenomena, which have hitherto been left unexplained.

11. As many conjectures have been offered to the public concerning the electric fluid—whether it be the ether of Newton, or the phlogiston of the chemists—

mists—I have thrown my mite into the public stock. I have endeavoured to trace it up to its first source, and by a variety of arguments to show it is probably the particles of light, which have been absorbed and detained in the different elements of water, earth, and air.

Under this head, I have ventured to dissent from several eminent philosophers, concerning the illuminated appearances of the sea at certain times; and instead of their being occasioned by animalcula, or the particles of putrid flesh and fish, I have given my reason why I suppose they proceed from the particles of the rays of light absorbed by the ocean. As I have not offered any experiments in support of my opinion, I must leave it to stand or fall upon its own ground.

12. As atmospheric electricity has engaged the attention of the curious for some time past; and the similarity of lightning and the electric fluid has been proved beyond a doubt; I have examined the doctrine of thunder-storms by Dr. Franklin's theory, and pointed out some of the apparent inconsistencies in this part of his work, which can never be reconciled with the simple laws of nature. As all vapour ascending from the surface of the earth and the waters has, probably,

bably, in general, its natural quantity of the electric fluid, I cannot conceive what ground there can be to suppose some of the clouds negatively electrified; I have therefore endeavoured to account for the different appearances of lightning, the wandering fires, the aurora borealis, and such kinds of phænomena, from principles which have at least the appearance of plausibility, yet they may be wrong.

13. In drawing the lines of resemblance between the electric fluid and the particles of light, I have proceeded as much as possible by experiments, either of my own or other authors, whose veracity has not been, to my knowledge, called in question.

I have endeavoured to show they are bodies, by their resistance, their gravity, their motion, and their giving motion to other bodies.

I have shown, in a variety of instances, that the electric fluid, and light, have many similar properties, and that they act, in many cases, on other bodies, with nearly, if not the same effect.

From the experiments, and the arguments which I have deduced from them, I have concluded (notwithstanding what has been offered by several of the foreign philosophers, as well as by some of our own countrymen, concerning light being created antecedent

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to the sun; and of the sun's being only an illuminated body, which acts by impulses upon the light) that the electric fluid is nothing else but the particles which have been diffused from the sun through the different elements of water, earth, and air.

I have nothing more to add by way of introduction, than to assure the reader, in the words of an eminent author *, “ That I am sensible of the great plainness of my writings, through the want of such philological ornaments as learned men bestow upon their productions; but I am not ambitious to appear a man of letters; I could be content the world should think I had scarce looked upon any other book than that of nature. For my own part, I always esteem him the most profitable author, who does not endeavour to show his own learning, but to increase the knowledge of his reader.”

JOHN LYON.

Dover,
January 1780.

* Mr. Boyle.

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