	h	′	″
Quodſi mora centri ☿ in diſco ſuppo-			
nitur 4 h. 32′. erit inclinatio orbitæ	0	7	6
Si vero eadem mora eſſet 4 h. 34′.			
tunc inclinatio orbitæ —— ——	0	7	5

IX. *Obſervations upon ſo much of Monſieur* le Monnier *the younger's Memoir, lately preſented to the* Royal Society, *as relates to the communicating the* Electric Virtue *to* Non-electrics; *by* Wm. Watſon, *F. R. S*

Read Jan. 29. 1746-7.

THE World is much obliged to Monſ. *le Monnier* for the many Diſcoveries he has made of the Power of Electricity; though the Reaſon of my troubling you with this Paper at this time, is my differing with that Gentleman in the Concluſions which he deduces from ſeveral of the Experiments contain'd in his Memoir lately preſented to the *Royal Academy of Sciences* at *Paris*, his own Extract of which was lately communicated to the *Royal Society*. *

One of the Queſtions propoſed to be examined is, "In what manner the electric Virtue is to be communicated to ſuch Bodies as yet have it not, and "which are not capable of acquiring it by bare "Friction only?" Monſieur *le Monnier* obſerves hereupon, "That no other Manner is known, by "which the electric Virtue may be communicated, "beſides the near Approach of a Body actually poſ- "ſeſs'd of the ſame: That the Rule laid down by "Monſieur

* *See* Theſe Tranſactions, No. 481, p. 291.

" Monſieur *du Fay*, *That Bodies never receive* " *Electricity by Communication, unleſs they are* " *ſupported by Bodies electric in their own Nature,* " *does not always take place; and that it is liable* " *to great Exceptions:*" For, firſt, in the *Leyden* " Experiment, the Phial filled with Water is ſtrongly " electrified by Communication, even when carried " in the Hand, which is not a Body electric by " Nature."

To this I anſwer, that Monſieur *du Fay*'s Rule is confirmed by all the Experiments yet made public, and even by that of *Leyden* quoted by our Author, or what is uſually called that of Profeſſor *Muſchenbroeck*. For, in this Experiment, is not the non-electric Water contained in and ſupported by the glaſs Phial, which is electric in its own Nature? Its being carried in the Hand is no more than its being placed on any other non-electric Body, and therefore is no Proof againſt the general Poſition. It is well known, that if the Phial is made non-electric by wetting its Outſide, ſo as not to leave ſome Inches perfectly dry, between its Mouth and that Part which is wetted, the Water and Phial part with the Electricity as faſt as they receive it, unleſs it is ſtopped by another Electric *per ſe*. But of this I treated at large, in a Paper I lately did myſelf the Honour to communicate.

Secondly, our Author mentions, " That all Bo- " dies, which are electrified by means of a Phial of " Water fitted to a Wire, and which has already " received a great deal of Virtue by Communica- " tion; all Bodies, he ſays, placed in any curve " Line, connecting the exterior Wire and that Part " of

" of the Bottle, which is below the Surface of the " Water, acquire Electricity without being placed " upon Reſin, Silk, Glaſs, or the like: That thus " a violent Concuſſion may be given to 200 Men " all at once; who holding each other by the " Hand ſo form the Curve juſt mention'd, when " the firſt holds the Bottle, and the laſt touches the " Wire with the End of his Finger; and this equally, " whether they are all mounted upon Cakes of Re- " ſin, or ſtand upon the Floor: That the Electricity " has in this manner been carried through a Wire " of the Length of 2000 Toiſes, or near $2\frac{1}{2}$ *Engliſh* " Miles; Part of which Wire dragged upon wet " Graſs, went over Hedges, Paliſado's, and over " Land newly ploughed up."

The Experiments in the ſecond Argument do noways invalidate Monſieur *du Fay*'s Rule; for the Succeſs of them depends upon keeping whatever forms the curve Line mention'd by our Author, whether it conſiſts of Men or Wire, in a non-electric State: And if whatever forms this curve Line acquires any Degree of Electricity more than its original Quantity, which it is well known may be done, by being placed upon originally Electrics, the Effect of the Shock is proportionably leſſened. Thus if a Man, ſtanding upon Electrics *per ſe*, applies his Hand to the Phial of Water, ſuſpended by a Wire to the electrified Gun-barrel as uſual, this Perſon will acquire Electricity, which will be ſufficiently perceptible in him, by his attracting light Subſtances held near his Body, or by his firing inflammable ones, when properly preſented to him; if, I ſay, a Perſon thus electrified, by applying one of

of his Hands to the Phial, touches the electrified Gun-barrel with a Finger of his other, let the Phial be ever ſo ſtrongly electrified, he feels but a ſlight Stroke; and this Stroke is greater or leſs, in proportion to the Difference of the Accumulation of Electricity in the Body of the Man, and that of the Water in the Phial. Thus we know from Experiment, that though a conſiderable Quantity of the Electricity, in impregnating the Phial of Water therewith, pervades the Glaſs, yet the Loſs thereof this Way is not equal to what comes in by the Wire: Therefore we will, for the ſake of a more eaſy Method of Explanation, ſuppoſe, that the Phial, when electrified in the moſt perfect manner, contains a Quantity of Electricity equal to 10; that the Man's Body, by ſtanding upon Wax, and touching the Phial with one of his Hands during its Electrification, contains a Quantity equal to 7: Upon his touching the Gun barrel with a Finger of his other Hand, he will receive a ſmall Stroke only equal to 3, the Difference of the Electricity of the Water and that of his Body: And if he touches the Gun-barrel again, without removing his Foot from the originally Electric, the Stroke will be ſcarcely perceptible, on account of his Body being nearly of the ſame Degree of Electricity with the Water in the Phial. So that here we ſee that the Violence of the Shock, to be felt by whatever forms the curve Line, depends upon its being, in the moſt perfect manner, free from any Degree of Electricity more than the original Quantity; which is contrary to the Opinion of our Author.

Thirdly, Monſieur *Monnier* tells us, " That the " Water of the Baſon of the *Thuilleries*, whoſe " Surface is about an Acre, has been electrified in " the following manner:

" There was ſtretched round half the Circumfe- " rence of the Baſon an iron Chain, which was in- " tirely out of the Water; the two Extremities of " this Chain anſwer'd to thoſe of one of the Dia- " meters of the Octagon: An Obſerver, placed at " one of theſe Extremities, held the Chain with his " left Hand, and dipped his right at the ſame time " into the Water of the Baſon; whilſt another Ob- " ſerver, at the oppoſite Side of the Baſon, held the " other End of the Chain in his right Hand, and a " Phial well electrified in his left. He then cauſed " the Wire of his Phial to touch an iron Rod, " fixed upright in a Piece of Cork that floated " near the Edge of the Baſon. At that Inſtant " both Obſervers felt a violent Shock in both " their Arms. The ſame Fact was again confirmed " by Experiments made upon two Baſons at the " ſame time, that it might appear diſtinctly, that the " electrical *Effluvia* did really paſs along the Super- " ficies of the Water."

The Water of the Baſon in this Experiment was no more electrified than the Wire which dragged along the Ground, *&c.* was in the former. When I was firſt informed, without being acquainted how, that an Acre of Water had been electrified, I was amazed, and told the Gentleman who acquainted me therewith, that if my Idea of Electricity was in the leaſt true, ſuch an Effect could not be produced, without electrifying the whole terraqueous Globe from

from a larger Maſs of Matter. And indeed, when I heard Monſieur *le Monnier's* Paper read, I eaſily ſaw the Deception: So that, inſtead of electrifying the whole Quantity of Water contain'd in the Baſon, the Electricity paſſed only through ſo much of it as formed a Line between the iron Rod faſtened in the floating Cork, and the Hand of that Obſerver which was dipped in the Water.

Theſe Experiments ſtill more and more eſtabliſh the Account I lately laid before you of the Electricity's always deſcribing the ſhorteſt Circuit between the electrified Water and the Gun barrel; or (which is the ſame thing) the Wire of the electrified Phial. And this Operation reſpects neither Fluids or Solids, as ſuch, but only as they are non-electric Matter. Thus this Circuit, in the preceding Experiment between the Phial and the Wire, conſiſted of the two Obſervers, the iron Chain, the Line of Water, and the iron Rod in the floating Cork.

Fourthly. Monſieur *le Monnier* mentions, "That "it has been confirmed, by repeated Compariſons, "that a Bar of Iron, placed in the above-mention'd "Curve, does not at all acquire more Electricity "when it is ſuſpended in ſilken Lines, than when "it is held in the bare Hand: Whence it appears to "him, that, in this Caſe, the contiguous non-"electric Bodies do neither partake of, nor abſorb "in any way, the Electricity which has been com-"municated."

The curve Line before-mention'd, let it conſiſt of whatever Non-electrics it will, unleſs the Whole thereof be properly ſupported, the communicated Electricity cannot be accumulated: So that the ſuſ-

pending one Part thereof in ſilk Lines cannot be ſuppoſed to produce any Effect.

This Gentleman further obſerves, " That the Phial of " Water fitted to its Wire does not receive the leaſt De- " gree of Electricity, if its Wire, ſuſpended by a ſilk " Line, is applied to the Globe in Motion, or if that " Phial is placed upon a dry glaſs Stand." This Monſieur *le Monnier* takes to be directly contrary to Monſieur *du Fay*'s Rule; eſpecially as the Phial cannot be replete with Electricity, unleſs, while it is exciting, ſome non-electric Body touches the Phial below the Water.

That the Phial of Water receives no Degree of Electricity in this Caſe is not ſtrictly true: It receives as much as any other Maſs of Matter of the ſame Bulk would, under the ſame Circumſtances. For we find, that we cannot highly electrify the Water, unleſs the Electricity from the Globe be directed through the Water and Phial to the Non-electric in Contact; in which Paſſage a great Quantity thereof is accumulated, by its not pervading the Glaſs ſo faſt as it is furniſhed by the Wire; and therefore we find, that when the Water will contain no more, the Surcharge runs off by the Wire: So that this Experiment, no more than thoſe which precede, contradicts Monſieur *du Fay*'s Opinion; the Thinneſs of the Glaſs permitting it, not wholly, but partially, to ſtop the Electricity. This Matter is explained further under Experiment the firſt.

I differ from this ingenious Author with Reluctance, inaſmuch as I greatly honour him, not only for his Diſcoveries upon the Subject of Electricity, but alſo for the Pleaſure and Improvement I received

in

in my reading his learned and curious Obſervations in Natural Hiſtory, made in the Southern Parts of *France*, where he accompanied Monſieur *Caſſini de Thury* in meaſuring a Degree of the Meridian. Theſe Obſervations are publiſhed with Monſieur *Caſſini*'s Book: But as the reverſe of ſeveral of the Opinions deliver'd in his Memoir is experimentally found to be true, and as the Diſcovery of Truth, and carefully ſeparating it from Deception, ſhould be the only Aim of our Philoſophizing, I take the Liberty of laying before you my Opinion thereon.

X. *Abſtract of a Letter from Mr.* William Arderon, *F. R. S. to Mr.* Henry Baker, *F.R.S. concerning the* perpendicular Aſcent *of* Eels.

Norwich, July 9. 1746.

SIR,

Read Jan. 29. 1746-7. WHEN I read, ſome Years ago, what Dr. *Plot* in his Hiſtory of *Staffordſhire* relates concerning the Paſſage of Eels acroſs Meadows, in the Night-time, from Pond to Pond, I could hardly forbear thinking, that the Gentleman there mention'd muſt by ſome means or other have been deceived; but what I have lately ſeen with my own Eyes gives me great Reaſon to believe his Account to be ſtrictly true.

On the 12th Day of laſt *June*, whilſt I was viewing the Flood-Gates belonging to the Water-works in this City of *Norwich*, I beheld a great Number of