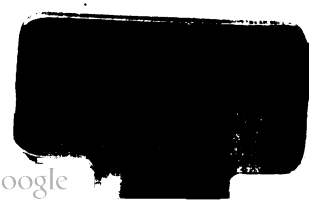

(John Wesley)

Bridges

THE DESIDERATUM: OR, ELECTRICITY Made PLAIN and USEFUL.

By a Lover of Mankind, and of Common Sense.

THE THIRD EDITION.

LONDON:

Printed and sold at the New-Chapel, City-Road; and at the Rev. Mr. WESLEY's Preaching-Houses in Town and Country. 1790.

THE PREFACE.

1. IN the following tract, I have endeavoured to comprise the sum of what has been hitherto published, on this curious and important subject, by Mr. *Franklin*, Dr. *Hoadly*, Mr. *Wilson*, *Watson*, *Lovett*, *Freke*, *Martin*, *Watkins*, and in the *Monthly Magazines*. But I am chiefly indebted to Mr. *Franklin* for the speculative part, and to Mr. *Lovett*, for the practical: tho' I cannot in every thing subscribe to the sentiments either of one or the other.

2. Indeed I am not greatly concerned for the philosophical part, whether it stand or fall. Of the facts we are absolutely assured: altho' they are of so surprizing a nature, that a man could not have asserted them a few years ago, without quite giving up his reputation. But who can be assured of this or that hypothesis, by which he endeavours to account for those facts? Perhaps the utmost we have reason to expect here, is an high degree of probability.

3. I am much more concerned for the physical part, knowing of how great importance this is: how much sickness and pain may be prevented or removed, and how

many lives saved by this unparallel'd remedy. And yet with what vehemence has it been opposed! Sometimes by treating it with contempt as if it were of little or no use: sometimes by arguments, such as they were; and sometimes by such cautions against its ill effects, as made thousands afraid to meddle with it.

4. But so it has fared with almost all the simple remedies, which have been offered to the world for many years. When Sir *John Floyer* published his excellent book on *cold-bathing*, many for a time used and profited by it. So did abundance of people by *cold-water*, when it was publickly recommended by Dr. *Hancock*. The ingenious and benevolent Bishop of *Cloyne*, brought *Tar-water* likewise into credit for a season: and innumerable were the cures wrought thereby, even in the most desperate and deplorable cases. Nor was it a little good which was done by the use of *Sea-water*, after Dr. *Russel* had published his tract concerning it. Indeed each of these did wonders in its turn. But alas! their reign was short. The vast party which were on the other side, soon raised the cry, and ran them down. In a few years they were out of fashion, out of use, and almost out of memory: and the foul, hard named *Exotics* took place again, to the utter confusion of common sense.

5. Must not *Electricity* then, whatever wonders it may now perform, expect soon to

to ſhare the ſame fate? And yet it is abſolutely certain, that in many, very many caſes, it ſeldom or never fails. "I can truly ſay, (ſays Mr. *Lovett*) I ſcarce ever knew any who made the trial and did not ſucceed. Not that all diſorders will yield thereto. Neither in this any more than the common way, will the ſame treatment of the ſame diſorder in different perſons have always the ſame ſucceſs." Indeed there cannot be in nature any ſuch thing as an abſolute *panacea*: a medicine that will cure every diſeaſe incident to the human body. If there could, Electricity would bid fairer for it, than any thing in the world: as it takes place in ſuch a vaſt number of diſorders, ſome of them ſo widely different from the others.

6. And yet there is ſomething peculiarly unaccountable, with regard to its operation. In ſome caſes, where there was no hope of help, it will ſucceed beyond all expectation. In others, where we had the greateſt hope, it will have no effect at all. Again, in ſome experiments, it helps at the very firſt, and promiſes a ſpeedy cure: but preſently the good effect ceaſes, and the patient is as he was before. On the contrary, in others it has no effect at firſt: it does no good; perhaps ſeems to do hurt. Yet all this time it is ſtriking at the root of the diſeaſe, which in a while it totally removes. Frequent inſtances of the former we have in

Paralytic, of the latter, in *Rheumatic* cafes.

7. But ſtill one may upon the whole pronounce it the *deſideratum*, the general and rarely failing remedy, in nervous Caſes of every kind (Palſies excepted); as well as in many others. Perhaps if the nerves are really perforated (as is now generally ſuppoſed) the electric either is the only fluid in the univerſe, which is fine enough to move through them. And what if the *nervous juice* itſelf, be a fluid of this kind? if ſo, it is no wonder that it has always eluded the ſearch of the moſt accurate naturaliſts.

8. Be this as it may, Mr. *Loveit* is of opinion, "the electrical method of treating diſorders, cannot be expected to arrive at any conſiderable degree of perfection, till adminiſtred and applied by the gentlemen of the faculty." Nay then, *quanta de ſpe decidi!* All my hopes are at an end. For when will it be adminiſtred and applied by them? truly, *ad Græcas Calendas*. Not till the gentlemen of the faculty have more regard to the intereſt of their neighbours than their own. At leaſt, not till there are no apothecaries in the land: Or till phyſicians are independent of them.

9. Therefore, without waiting for what probably never will be, and what indeed we have no reaſon to expect, let men of ſenſe do the beſt they can for themſelves, as well as for their poor, ſick, helpleſs neighbours. How many may they relieve from racking

eaſe,

pain or pining ſickneſs by this unexpenſive and ſpeedy remedy? reſtoring them to eaſe, health, ſtrength, generally in a few minutes, frequently in a moment! And if a few of theſe lovers of mankind, who have ſome little knowledge of the animal oeconomy, would only be diligent in making experiments, and letting down the more remarkable of them, in order to communicate them to one another, that each might profit by the other's labour: I doubt not, but more nervous diſorders would be cured in one year, by this ſingle remedy, than the whole *Engliſh Materia Medica* will cure, by the end of the century.

10. It is not impoſſible, but the *gentlemen Reviewers* may beſtow a compliment on me as well as on Mr. *Lovett*. If they are ſo kind, I would only beg them, not to plume themſelves upon a diſcovery, which I have helped them to myſelf: namely, that the following is little more than an extract from others: I intended it ſo to be. I deſigned only to collect together the ſubſtance of the moſt celebrated writings on the ſubject; and to place them in one connected view, for the uſe of thoſe who have little time or money to ſpare. I only wiſh, ſome who has more leiſure and ability than me, would conſider it more deeply, and write a full practical treatiſe on electricity, which might be a bleſſing to many generations.

Nov. 1, 1759.

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DESIDERATUM:

OR,

ELECTRICITY made PLAIN.

I. 1. FROM a thouſand experiments it appears, that there is a fluid far more ſubtle than air, which is every where diffuſed thro' all ſpace, which ſurrounds the earth and pervades every part of it. And ſuch is the extreme fineneſs, velocity and expanſiveneſs of this active principle, that all other matter ſeems to be only the body, and this the ſoul of the univerſe. This we might term *elementary fire*; but that it is hard for us to ſeparate the ideas of *fire* and *burning*: altho' the latter is in reality but a preternatural and violent effect of the former.

2. It is highly probable this is the general inſtrument of all the motion in the univerſe: from this *pure fire*, (which is properly ſo called) the vulgar *culinary* fire is kindled. For in truth there is but one kind of fire in nature, which exiſts in all places and in all bodies. And this is ſubtle and active enough, not only to be, under the great Cauſe, the ſecondary cauſe of motion, but to produce and ſuſtain life throughout all nature, as well in animals as in vegetables.

3. To

3. To this effect the learned Biſhop of *Cloyne* obſerves, "The vital flame is ſuppoſed to be the cauſe of all the motions in the body of man, whether natural or voluntary. And has not fire the ſame force to animate throughout, and actuate the whole ſyſtem of the world? Cheriſhing, heating, fermenting, diſſolving, ſhining, and operating in various manners, as various ſubjects offer, to employ, or to determine its force? It is preſent in all parts of the earth and firmament, tho' latent and unobſerved, 'till ſome accident produces it into act, and renders it viſible in its effects."

4. This great machine of the world requires ſome ſuch conſtant, active and powerful principle, conſtituted by its creator, to keep the heavenly bodies in their ſeveral courſes, and at the ſame time give ſupport, life and increaſe to the various inhabitants of the earth. Now as the heart of every animal is the engine which circulates the blood thro' the whole body, ſo the ſun, as the heart of the world, circulates this fire thro' the whole univerſe. And this element is not capable of any eſſential alteration, increaſe or diminution. It is a ſpecies by itſelf; and is of a nature totally diſtinct from that of all other bodies.

5. That this is abſolutely neceſſary both to feed common fire, and to ſuſtain the life of animals, it ſeems may be learn'd from an eaſy experiment. Place a cat, together with a lighted candle, in a cold oven: then lute the door cloſe, having fixt a glaſs in the middle of it: and if you look thro' this, you may obſerve, at one and the ſame inſtant, the candle goes out, and the animal dies. A plain proof, that the ſame fire is needful to ſuſtain both culinary fire and animal life: and a large quantity of it. Some doubtleſs pervades the oven door; but not enough to ſuſtain either flame or life. Indeed every animal is a kind of fire-engine. As ſoon as the lungs inſpire the air,

air, the fire mingled with it is inſtantly diſperſed through the pulmonary veſſels into the blood: thence it is diffuſed through every part of the body, even the moſt minute arteries, veins and nerves. In the mean time the lungs inſpire more air and fire, and ſo provide a conſtant ſupply.

6. The air ſeems to be univerſally impregnated with this fire, but ſo diluted, as not to hurt the animal in reſpiration. So a ſmall quantity of a liquor dropt in water, may be friendly to an human body, though a few drops of the ſame liquor, given by themſelves, would have occaſioned certain death. And yet you cannot conceive one particle of the water, without a particle of the medicine. 'Tis not impoſſible, this may be one great uſe of air, by adhering ſo cloſely to the elementary fire, to temper and render ſalutary to the body, what would otherwiſe be fatal to it.

7. To put it beyond diſpute, that this fire is largely mixt with the air, you may make the following experiment. Take a round lump of iron, and heat it to a degree called a *welding* heat: Take it out of the fire, and with a pair of bellows blow cold air upon it. The iron will then as effectually melt, as if it were in the hotteſt fire. Now when taken out of the forge, it had not fire enough in it to conquer the coheſion of its parts: But when this fire is joined with that which was mixt with the air, it is ſufficient to do it. On the ſame principle we account for the increaſe of a coal or wood fire by blowing it.

8. And let none wonder that fire ſhould be ſo connected with air, as hardly to be ſeparated. As ſubtle as fire is, we may even by art attach it to other bodies; yea and keep it priſoner for many years: and that either in a ſolid or a fluid form. An inſtance of the firſt we have in ſteel: which is made ſuch, only by impacting a large quantity of fire into bars of iron. In like manner we im-

impact a great quantity of fire into ſtone, to make lime. An inſtance of the ſecond kind we have in ſpirits, wherein fire is impriſoned in a fluid form. Hence common ſpirits will burn all away. And if you throw into the air ſpirits rectified to the higheſt degree, not one drop will come down again, but the univerſal fire will take hold of and abſorb it all.

9. That this fire ſubſiſts both in air, earth and water; that it is diffuſed through all and every part of the univerſe, was *ſuſpected* by many of the antient naturaliſts, and *believed* by the great Sir *Iſaac Newton*. But of late years it has been fully demonſtrated: particularly, by Mr. *Stephen Gray*, a Penſioner at the *Charter-houſe*; who ſome years ſince preſented to the Royal Society, an account of many experiments he had made, whereby this ſubtle fluid become clearly perceptible both to the ſight and feeling. Becauſe the glaſs tube, by means of which thoſe experiments were made, was obſerved when rubbed to attract ſtraws and other light bodies (a known property of amber, called in *Latin Electrum*) *theſe* experiments were termed *electrical*: a word which was ſoon affixt to that ſubtle fluid itſelf, and every thing pertaining to it. But improperly enough: ſeeing the attracting (or ſeeming to attract) ſtraws and feathers, is one of the moſt inconſiderable of all the effects, wrought by this powerful and univerſal cauſe.

10. It was afterwards found, that a glaſs globe was on ſome accounts preferable to a glaſs tube: particularly, as it was leſs labour to turn the one for ſome hours together, by means of a ſmall wheel, in the mean time rubbing it with a dry hand, or a little cuſhion, than to rub the tube for ſo long a time. It was likewiſe obſerved, that a greater quantity of ethereal fire might be *collected* by this means than by the other.

I ſay

I ſay *collected*; for that fire is no more *created* by rubbing, than water is by pumping. The grand reſervoir thereof is the earth, from which it is diffuſed thro' all the other parts of common matter. Accordingly in theſe experiments, the globe rubbing againſt the cuſhion, collects fire from it. The cuſhion receives it from the frame of the machine; the frame of the machine from the floor. But if you cut off the communication with the floor, no fire can be *produced*, becauſe none can be *collected*.

11. In the year 1746, Mr. de *Muſchenbroek*, profeſſor of natural Philoſophy at *Leyden*, was led by a caſual experiment, into many new diſcoveries. Theſe were chiefly made by means of a large but thin glaſs phial. The beſt way to prepare which is, to coat it with thin lead; to line it on the inſide with leaf-gold, to within two inches of the top, and to faſten ſome tinſel fringe to the bottom, (or to the end of the wire within the phial) ſo as to touch the gold lining. By this wire going thro' the cork, the phial is hung on any metallic body, which communicates by a wire, with the globe or tube. This metallic body has been term'd, *the prime conductor*, as it conducts or conveys the fire collected by the tube or globe, either into the phial, or into any other body communicating therewith.

12. But all bodies are not capable of receivin it. There is in this reſpect an amazing difference between them. The excrements of nature, as wax, ſilk, hair, will not receive the ethereal fire, neither convey it to other bodies: ſo that whenever in circulating it comes to any of theſe, it is at a full ſtop. Air itſelf is a body of this kind; with great difficulty either receiving or conveying this fire to other bodies: ſo are pitch and roſin excrements, as it were, of trees.) To

these we may add glass, amber, brimstone, dry earth, and a few other bodies. These have been frequently stiled *Electrics per se*; as if they alone contained the *electric fire*: an eminently improper title, founded on a palpable mistake. From the same mistake, all other bodies, which easily receive and readily convey it, were termed *non-electrics*; on a supposition, that they contained no *electric fire*: the contrary of which is now allowed by all.

13. That this fire is inconceivably subtle, appears from its permeating even the densest metals, and that with such ease, as to receive no perceptible resistance. If any one doubt, whether it pass thro' the substance, or only along the surface of bodies, a strong shock taken thro' his own body, will prevent his doubting any longer. It differs from all other matter in this, that the particles of it repell, not attract, each other. And hence is the manifest divergency in a stream of electrical effluvia. But tho' the particles of it repell each other, yet are they attracted by all other matter. And from these three, the extreme subtlety of this fire, the mutual repulsion of its parts, and the strong attraction of them by other matter, arises this effect, that if a quantity of electric fire be applied to a mass of common matter of any bigness or length, (which has not already got its quantity) it is immediately diffused thro' the whole,

14. It seems, this globe of earth and water, with its plants, animals, buildings, have diffused thro' their whole substance, just as much of this fire as they will contain. And this we may term their *natural quantity*. This is not the same in all kinds of matter: neither in the same kind of matter in all circumstances. A solid foot of one kind of matter (as glass) contains more of it than a solid

a ſolid foot of another kind. And a pound weight of the ſame kind of matter, when rarefied, contains more than it did before.

15. We know that this fire is *in* common matter, becauſe we can pump it *out*, by the globe or tube: we know that common matter has near as much of it as it can contain, becauſe if we add a little more to any portion of it, the additional quantity does not enter, but forms a kind of atmoſphere round it. On the other hand we know that common matter has not more of it than it can contain. Otherwiſe all looſe portions of it would repel each other; as they conſtantly do, when they have ſuch atmoſpheres. Had the earth, for inſtance, as much electric fire in proportion, as we can give to a globe of iron or wood, the particles of duſt and other light matter, would not only repel each other, but be continually repelled from the earth. Hence the air being conſtantly loaded therewith, would be unfit for reſpiration. Here we ſee another occaſion to adore that wiſdom, which has made all things by weight and meaſure.

16. The form of every electric atmoſphere, is that of the body which it ſurrounds: becauſe it is attracted by every part of the ſurface, tho' it cannot enter the ſubſtance already replete. Without this attraction, it would not remain round the body but diſſipate into the air.

17. The atmoſphere of an electrified ſphere, is not more eaſily drawn off, from any one part of it than from the other, becauſe it is equally attracted by every part. But it is not ſo with bodies of other figures. From a cube it is more eaſily drawn off at the corners than at the ſides: and ſo from the corners of bodies of any other form, and moſt eaſily from the ſharpeſt corners. For the force with which an electrified body re-

tains its atmoſphere, is proportioned to the ſurface on which that atmoſphere reſts. So a ſurface four inches ſquare retains its atmoſphere, with ſixteen times the force that one of an inch ſquare does. And as in pulling the hairs from a horſe's tail, a force inſufficient to pull off a handful at once, could eaſily pull it off hair by hair: ſo tho' a blunt body can't draw off all the atmoſphere at once, a pointed one can eaſily draw it off, particle by particle.

18. If you would have a ſenſible proof, how wonderfully pointed bodies draw off the electric fire, place an iron ſhot of four inches diameter on the mouth of a dry bottle. Suſpend over it a ſmall cork-ball by a ſilken thread, juſt ſo as to reſt againſt the ſide of the ſhot. Electrify the ſhot, and the ball with be repelled four or five inches from it. Then preſent to the ſhot ſix or eight inches off, the point of a ſharp bodkin. The fire is inſtantly drawn off; ſo the repulſion ceaſes, and the ball flies to the ſhot. But a blunt body will not produce this effect, till it is brought within an inch of the ſhot. If you preſent the point of the bodkin in the dark, you may ſee ſometimes at a foot diſtance, a light gather upon it like a glow-worm, which is manifeſtly the fire it extracts from the ſhot. The leſs ſharp the point is, the nearer it muſt be brought before you can ſee the light. And at whatever diſtance you ſee the light, you may draw off the electric fire.

19. To be convinced that pointed bodies *throw* off, as well as *draw* off the fire, you may lay a long ſharp needle on the ſhot. It cannot then be electrified, ſo as to repel the ball, becauſe the fire thrown upon it, continually runs off at the point of the needle: from which in the dark you may ſee ſuch a ſtream of light, as in the preceeding inſtance.

20. While

20. While the electric fire, which is in all bodies, is left to itself, undisturbed by any external violence, it is more or less dense, according to the nature of the body which it is in. In dense bodies it is more rare: in rare bodies it is more dense. Accordingly every body contains such a quantity of it, rare or dense, as is suitable to its nature. And there is some resistance to every endeavour of altering its density, in the whole of any body, or in any part of it. For all bodies resist either the increase or diminution of their natural quantity. And on the other hand, when it has been either increased or diminished, there is a resistance to it's return to it's natural state.

21. With regard to the different resistance made by different bodies, in either of these cases, it is an invariable rule, that glass, wax, rosin, brimstone, silk, hair, and such like bodies, resist the most: and next to these, the air, provided it be dry, and in a sufficient quantity. That this resistance is least in metals, minerals, water, quicksilver, animals and vegetables; which we may rank together, because the difference in their resistance is very inconsiderable; and that in these bodies the resistance is greater, when their surfaces are polished, and extended in length, than when their surfaces are rough and short, or end in sharp points.

22. When a body has more electric fire forced into it, than it has naturally, it is said to be electrified *positively*. When part of the natural quantity is taken away, it is said to be electrified *negatively*. Now when an iron bar is *negatively* electrified, the fire drawn out, does not go in again as soon as the experiment is over, but forms an atmosphere round it, because of the resistance it finds in its endeavour to dilate itself, either into the air or into the bar. And when it is electrified *positively*,

the ſame kind of atmoſphere is form'd by the fire accumulated upon it. Whether therefore bodies are electrified negatively or poſitively, and remain ſo when the experiment is over, there are ſimilar atmoſpheres, ſurrounding them, which will produce ſimilar effects.

23. But we can electrify no body beyond a certain degree: becauſe when any is electrified to that point, it has an atmoſphere round it ſufficiently ſtrong to ballance any power that endeavours to electrify it farther. Nor is the electric fire either from the tube or the globe, able to force its way thro' this.

24. And in the ordinary courſe of nature, the ſubtle, active fluid, which not only ſurrounds every groſs body, but every component particle of each, where it is not in abſolute contact with its neighbouring particle, can never be idle, but is ever in action, tho' that action be imperceptible to our ſenſes. It is ever varying its condition, tho' imperceptibly, in all parts of all bodies whatever; and electrifying them more or leſs, tho' not ſo forcibly as to give ſenſible ſigns of it. All bodies then, and all their component particles, when in their natural ſituation, have round their ſurfaces, where they are not in abſolute contact with other ſurfaces, an imperceptible atmoſphere ſufficient to ballance the ſmaller force with which they are attacked, every way ſimilar to the perceptible atmoſphere of bodies forcibly electrified. In theſe imperceptible atmoſpheres is placed the power which reſiſts their being electrified to a higher degree than they are naturally. And this power lies in the elaſticity of the ſubtle fluid, every where diſperſed both round all bodies and in them.

25. Glaſs is very difficultly electrified, which ſeems to prove it has a very denſe electric atmoſphere.

Metals

Metals are eaſily electrified. Conſequently they have rare and therefore weakly-reſiſting atmoſpheres. But as heat rarefies all bodies, ſo if glaſs be heated to a certain degree, even below melting, it will give as free a paſſage to the electric fire, as braſs or iron does: the atmoſphere round it being then rendered as rare as that of metals. Nay, when melted, it makes no more reſiſtance than water. But its reſiſtance increaſes, as it cools. And when it is quite cold, it reſiſts as forcibly as ever. Smoothly-poliſh'd wax reſiſts as much as glaſs. But even the ſmall heat raiſed by rubbing, will render its atmoſphere as rare as that of metals, and ſo intirely deſtroys its reſiſtance. The ſame is true of roſin and brimſtone. Even the heat ariſing from friction, deſtroys the reſiſtance which they naturally make to being electrified: a ſtrong proof, that the reſiſtance of all bodies thereto, is exerted at their ſurfaces, and cauſed by an electric atmoſphere of different denſities, according to different circumſtances.

26. Moſt experiments will ſucceed as well with a globe of brimſtone, as with one of glaſs. Yet there is a conſiderable difference in their nature. What glaſs repells, brimſtone (as alſo roſin) attracts. Rubbed glaſs emits the electric fire: Hence if a glaſs globe be turned at one end of a prime conductor, and a brimſtone one at the other, not a ſpark of fire can be obtained; one receiving it in, as faſt as it is given out by the other. Hence alſo if a phial be ſuſpended on the prime conductor, with a chain from its coating to the table, and only one globe turned, it will be electrified, (or *charged*, as they term it) by twenty turns of the wheel: after which it may be *diſcharged*, that is, unelectrified, by twenty turns of the other wheel.

27. The

27. The difference between *Non Electrics* (vulgarly speaking) and *Electrics per se*, is chiefly this. 1. A *Non Electric* eaſily ſuffers a change, in the quantity of fire it contains. Its whole quantity may be leſſened by drawing out a part, which it will afterwards reſume. But you can only leſſen the quantity contain'd in one of the ſurfaces of an *Electric*: and not that, but by adding at the ſame time an equal quantity to the other ſurface. So that the whole glaſs will always have the ſame quantity in its two ſurfaces. And even this can only be done in glaſs that is thin: beyond a certain thickneſs we know no power that can make this change. 2. The ethereal fire freely moves from place to place, in and through the ſubſtance of a *Non Electric*. But through the ſubſtance of an Electric it will by no means paſs. It freely enters an iron-rod, and moves from one end to another, where the overplus is diſcharged. But it will not enter, or move through a glaſs-rod. Neither will the thinneſt glaſs which can be made, ſuffer any particle of it entering one of its ſurfaces to paſs through to the other.

28. Indeed it is only metals and liquids, that perfectly *conduct* (or tranſmit) this fire. Other bodies ſeem to conduct it, only ſo far as they contain a mixture of theſe; accordingly, moiſt air will conduct it, in proportion to its moiſtneſs. But dry air will not conduct it at all: on the contrary, it is the main inſtrument, in confining any electric atmoſphere, to the body which it ſurrounds. Dry air prevents its diſſipating (which it does preſently when *in vacuo*) or paſſing from body to body. A clear bottle full of air, inſtead of water, cannot be electrified. But exhauſted of air, it is electrified as effectually as if it was full of water. Yet an electrical atmoſphere and air, do not exclude one another. For we breathe in it freely, and

and dry air, will blow through it, without altering it at all.

29. When a glaſs phial is electrified, whatever quantity of fire is accumulated on the inner ſurface, an equal quantity is taken from the outer. Suppoſe, before the operation begins, the quantity of fire contained in each ſurface, is equal to twenty grains: ſuppoſe at every turn of the globe, one grain is thrown in: then after the firſt ſtroke there are twenty one within, nineteen only without: after the ſecond, the inner ſurface will have twenty-two, the outer but eighteen: and ſo on, till after twenty ſtrokes, the inner will have forty, the outer none. And the operation ends: for no power or art of man can throw any more on the inner ſurface, when no more can be taken from the outer. If you attempt to throw more in, it is thrown back through the wire, or flies out in cracks through the ſides of the phial. The equilibrium cannot be reſtored in this phial, but by a communication formed between the inner and outer ſurface, by ſomething external, touching both the outer, and the wire which communicates with the inner ſurface. If you touch theſe by turns, it is reſtored by degrees: if both at once, it is reſtored inſtantly. But then there is a ſhock occaſioned by the ſudden paſſing of the fire through the body, in its way from the inner to the outer ſurface. For it moves from the wire to the finger, (not from the finger to the wire, as is commonly ſuppoſed.) Thence it paſſes through the body to the other hand, and ſo to the outer ſurface.

30. The force with which this ſhock may be given, is far greater than one would conceive. It will kill rats, hens, or even turkeys in a moment: others, that are not quite killed, it ſtrikes blind. It will give polarity to a fine needle, making

ing it point north and ſouth, as if touched by a loadſtone. It will invert the polarity of a compaſs, and make the north point turn to the ſouth. At the ſame time the ends of the needles are finely blued like the ſpring of a watch. It will melt off the heads and points of pins and needles: and ſometimes the whole ſurface of the needle is run and appears as it were bliſtered, when examined by a magnifying glaſs. It will melt thin gold or ſilver, when held tight between two panes of glaſs, together with the ſurface of the glaſs itſelf, and incorporate them in a fine enamel. Yea a ſtrong ſpark from an electrified phial, makes a fair hole through a quire of paper doubled: which is thought good armour againſt the puſh of a ſword, or even a piſtol bullet. And 'tis amazing to obſerve in how ſmall a portion of glaſs, a great electrical force may be. A thin glaſs bubble, about an inch diameter, being half filled with water, partly gilt on the outſide, when electrified, gives as ſtrong a ſhock as a man can well bear: allowing then that it contains no more fire after charging than before, how much fire muſt there be in this ſmall glaſs! It ſeems to be a part of its very ſubſtance. Perhaps if that fire could be ſeparated from it, it would be no longer glaſs. It might in loſing this, loſe its moſt eſſential properties, its tranſparency, brittleneſs, and elaſticity.

31. Some have not improperly ſuppoſed, that all *Electric* bodies, ſo called, are by their original conſtitution, throughly ſaturated with electric fire: that it remains fixt in them, (unleſs while the texture of thoſe bodies is quite alter'd by liquefaction) that fire fixt in a body conſtitutes an *Electric*, and all bodies where it is not fixt are *Non-Electrics*. Agreeably to which they ſuppoſe, that in all *Non Electrics*, the original fire, looſely inhering, is eaſily driven on by the new collected fire, which then

then poſſeſſes its place: but that in *Electrics*, the original fire being impacted into their ſubſtance, and therefore more firmly inhering, will not give way to, or be driven on by the new collected fire. Such is air in particular; with the particles of which the original fire is cloſely incorporated. Dry air ſeems to be ſo fully ſaturated with it, that it is ſcarce capable of receiving any more: whereas all new-collected fire is continually endeavouring to return into the earth. Let wires be electrified ever ſo ſtrongly, yet the moment any part of them is touched by a perſon ſtanding on the floor, they are electrified no longer; all the fire eſcaping through him into the earth.

32. Upon the principles of electricity, we may give a more rational account, of many appearances in nature, than has yet been done: of thunder and lightning in particular. In order to which we may obſerve, all electrified bodies retain the fire thrown into them, till ſome non-electric approaches: to which it is then communicated with a ſnap, and becomes equally divided. Electric fire is ſtrongly attracted by water, and readily mixes with it. And water being electrified, the vapours ariſing from it, are equally electrified. As theſe float in the air, they retain the additional fire, till they meet with clouds not ſo much electrified. Then they communicate it with a ſhock.

33. The ocean is compounded of water, and ſalt; one an electric, the other not. When there is a friction among the parts near its ſurface, the fire is collected from the parts below. It is then plainly viſible in the night, at the ſtern of every ſailing veſſel. It appears from every daſh of an oar: in ſtorms the whole ſea ſeems on fire. The particles of water then repelled from the electrified ſurface, continually carry off the fire as it is collected. They riſe and form clouds which are highly

ly electrified, and retain the fire till they have an opportunity of discharging it.

34. Particles of water rising in vapours, attach themselves to particles of air. One particle of air may be surrounded by twelve particles of water as large as itself, all touching it, and by more added to them. Particles of air thus loaded would be drawn nearer together by the mutual attraction of the particles of water, did not the fire, common or electric, included therein, assist their mutual repulsion. Hence they continue suspended. But if air thus loaded, be compressed by adverse winds, or by being driven against mountains, or if it be condensed by the loss of its fire, it will continue suspended no longer, but will descend in dew. And if the water surrounding one particle of air comes into contact with that surrounding another, they naturally coalesce into a drop, and so descend in rain.

35. The sun supplies common fire to all vapours, rising either from sea or land, vapours, having both this and electric fire, are better supported than those which have this only. For when vapours rise into the coldest region, the common fire may fall. But the cold will not diminish the electric: this is always the same. Hence clouds raised from fresh waters, from moist earth, or growing vegetables, more easily descend and deposite their waters, as having but little electric fire, to keep the particles separate from each other. So that the greatest part of the water raised from the land, falls on the land again. But clouds raised from the sea, having both fires, and much of the electric, support their water far more strongly, and being assisted by winds, may bring it from the middle of the widest ocean to the middle of the broadest continent. And yet a way is provided whereby these also are readily brought to depo-

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poſite their water. For whenever they are driven againſt mountains by the winds, thoſe mountains take away their electric fire: and being cold, the common alſo: hence the particles immediately cloſe. If the air was not much loaded, the water falls in dew on the top and the ſides of the mountain. If it was, the electric fire being taken at once from the whole cloud, it flaſhes brightly, and cracks loudly. And the particles inſtantly coaleſcing for want of that fire, fall in a heavy ſhower.

36. When a ridge of mountains ſtops the clouds, and draws the electric fire from the cloud firſt approaching it, the next when it comes near the firſt, now deprived of its fire, flaſhes into it, and depoſites its own water. The third cloud approaching, and all that ſucceed, act in the ſame manner; as far back as they extend, which may be for ſeveral hundred miles. Hence the continual ſtorms of thunder, lightning and rain, on the eaſt ſide of thoſe vaſt mountains, the *Andes*, which running north and ſouth, intercept all the clouds brought againſt them from the *Atlantick* ocean. In a plain country, there are other means to make them drop their water. For if an electrified cloud coming from the ſea, meets in the air a cloud coming from the land, and therefore not electrified, the firſt will give its flaſh into the latter, and thereby both will be made to depoſite their water. The concuſſion of the air contributes alſo to ſhake down the water, not only from thoſe two clouds, but from others near them. When the ſea and land clouds would paſs at too great a diſtance from each other, they are mutually attracted till within the diſtance. For the ſphere of electrical attraction is far beyond the flaſhing diſtance. And yet where a cloud contains much fire, it may ſtrike at a conſiderable diſtance. When a con-

ductor has but little fire in it, you muſt approach very near before you can draw a ſpark. Throw into it a greater quantity of fire, and it will give a ſpark at a greater diſtance. But if a gun barrel, when electrified, will ſtrike and make a noiſe, at the diſtance of an inch, at what a diſtance, and with how great a noiſe, may ten thouſand acres of electrified cloud ſtrike? No wonder that this ſhould melt metals (which our artificial flaſh does in ſome degree) tho' perhaps not ſo properly by its heat, as by inſinuating into the pores, and creating a violent repulſion between the particles of the metal it paſſes thro'. This overcomes the attraction whereby they cohere, and ſo melts the metallic body. And this accounts for its melting a ſword in the ſcabbard, or gold in the pocket, without burning either.

37. But thunder-clouds do not always contain more than their natural quantity of electric fire. Very frequently they contain leſs. And when this is the caſe, when they are negatively electrified, altho' the effects and appearances are nearly the ſame, yet the manner of operation is different. For in this caſe, it is really the fire from the mountains, or other parts of the earth which ſtrikes into the cloud; and not, as we imagine, fire from the cloud which ſtrikes into the earth. And we may eaſily conceive, how a cloud may be negatively electrified. When a portion of water is rarefied into a thin vapour, the fire it contains is rarefied too. Conſequently it has then leſs than its natural quantity of fire. Such a cloud therefore coming within a due diſtance of the earth, will receive from it a flaſh of electric fire; which flaſh, to ſupply a great extent of cloud, muſt often contain a great quantity of fire. Such a cloud alſo paſſing over woods of tall trees, may ſilently receive ſome ſupply, either from the points of the boughs,

boughs, or from the ſharp ends and edges of the leaves. The cloud thus ſupplied, flaſhes into other clouds that have not been ſo ſupplied; and thoſe into others, till an equilibrium is produced, among all that are within a ſtriking diſtance of each other. And hence are repeated ſtrokes and flaſhes, till they deſcend in ſhowers to the earth, their original. Rain, eſpecially when in large drops, generally brings down the electric fire: falling ſnow often: ſummer hail, always, tho' ſilently. Conſequently, any of theſe may prevent thunder and lightning; or at leaſt, abate its violence. Rain is helpful in another reſpect likewiſe. By wetting men or beaſts, it ſaves many lives. For if your clothes are throughly wet, and a flaſh of lightning ſtrikes the top of your head, it will run in the water over the ſurface of your body into the ground: whereas if your cloaths were not wet, it would go thro' your body. Hence a wet chicken cannot be killed by a ſtroke from the phial: whereas a dry one is killed in an inſtant. See here alſo the wiſdom and goodneſs of him, *who ſendeth forth lightnings with the rain*! It ſhould likewiſe be obſerved, that wherever electrified clouds paſs, ſpires, towers, chimneys, and high trees, as ſo many points, draw the electric fire, and the whole cloud frequently diſcharges there. Therefore it is highly dangerous in ſuch a ſtorm, to take ſhelter under a tree.

38. Common fire (if it be any thing more, than a different modification of the ſame element) is more or leſs in all bodies, as well as electrical. If there be a ſufficient quantity of either in any body, it is inflamed. But when the quantity of common fire therein is ſmall, there needs more electric fire to inflame it. Where the quantity of common fire is greater, leſs of the electric will ſuffice. So if ſpirits are heated, a ſmall ſpark in-

flames them. If they are not, the ſpark muſt be greater. Sulphureous vapours, whether riſing from the earth, or from ſtacks of moiſt hay or corn, or any other heated and reeking vegetable, contain abundance of common fire. A ſmall addition of electric then will inflame them. Therefore they are eaſily kindled by lightning.

39. Any who would be clearly convinced of the nature of lightning, may make the following experiment. Make a ſmall croſs of two thin ſtrips of wood, the arms being juſt ſo long, as to reach the four corners of a large, thin ſilk handkerchief when extended. Tie the corners of this to the extremities of the croſs: and ſo you have the body of a kite; Add to this a proper tail, loop and ſtring, and it will riſe in the air like one made with paper: but this is fitter to bear the wind and wet in a ſtorm without tearing. To the top of the croſs fix a ſharp pointed wire, riſing a foot above it. Tie a ſilk ribbon to the end of the twine next the hand: and where the ſilk and twine join, faſten a key. Raiſe this kite when a thunder-ſtorm is coming on: but he that holds the ſtring, muſt ſtand in a porch, or under ſome other covering, that the ribbon may not be wet. He muſt likewiſe take particular care, that the twine do not touch the top or ſide of the porch. As ſoon as the thunder cloud comes over the kite, the pointed wire draws the electric fire from it. The kite and all the twine are then electrified, as plainly appears by this, that the looſe filaments of the twine ſtand out every way, and are attracted by an approaching finger. And when the kite and twine being wet, conduct the fire freely, it will ſtream from the key, on the approach of the knuckle. By this key the phial may be charged, and all other experiments made, as by the globe. And this is a demonſtration, that

that the electric fire thereby obtain'd, is the very ſame with that of lightning.

40. May not the knowledge of this power in pointed bodies, of drawing off the fire contain'd in theſe clouds, ſuggeſt to us a very probable method, of preſerving houſes, churches, ſhips from the ſtroke of lightning? Might we not fix on the higheſt part of them, upright rods of iron made ſharp as needles, and gilt, to prevent ruſting, which otherwiſe would hinder their free conveyance of the electric fire? From the foot of thoſe rods (which need not be above half an inch diameter) a wire may paſs down the outſide of the building into the ground; or down round one of the ſhrouds of a ſhip, and down her ſide, till it reaches the water. Would not theſe rods ſilently draw off the electric fire, before the cloud was nigh enough to ſtrike? And thereby in a good meaſure ſecure us from that moſt ſudden and terrible miſchief! Let it not be objected, that the uſing this probable means of preventing a threatning danger, would imply any denial of, or diſtruſt in, Divine Providence. Not at all: we know the Creator of the univerſe, is likewiſe the governor of all things therein. But we know likewiſe, that he governs by ſecond cauſes; and that accordingly it is his will, we ſhould uſe all the probable means he has given us, to attain every lawful end. It is therefore no more an impeachment of his providence, when we foreſee a ſtorm of lightning and rain, to ſhelter our houſe (as far as we are able) from the one, than to ſhelter ourſelves in that houſe from the other. Is it not juſt as innocent (if it be poſſible) to keep our rooms tight from lightning, as from wind and water?

41. It may not be improper to add one or two obſervations, before we proceed to what is of more importance. Scarce any phenomenon in nature

has been eſteem'd more difficult to be accounted for than thoſe luminous appearances in the ſky, term'd *Aurora Borealis*, or *Northern Lights*. But theſe alſo may be rationally explain'd, upon the principles of electricity. We often ſee clouds at different heights, paſſing different ways, north and ſouth at the ſame time. This manifeſtly proves different currents of air, one of them under the other. Now as the air between the tropics is rarefied by the ſun, it riſes; the denſer air preſſing into its place. The air ſo raiſed, moves north and ſouth, and if it has no opportunity before, muſt deſcend in the polar regions. When this air with its vapours deſcends into contact with the vapours ariſing there, the electric fire which it brought begins to be communicated, and is ſeen in clear nights; being firſt viſible where it is firſt in motion, namely in the moſt northern parts. But from thence the ſtreams of light ſeem to ſhoot ſoutherly, even to the zenith of northern countries.

42. Another phenomenon of a totally different kind, may be accounted for on the ſame principles, altho' Mr. *Prior* ſuppoſes *Solomon* himſelf to aſk, as a queſtion which he could not anſwer,

"Whence does it happen, that the plant which well
We name the *ſenſitive*, ſhould move and feel?
Whence know her leaves to anſwer her command,
And with quick horror fly the neighbouring hand?"

Allowing for poetical amplification, the plain fact is this. The ſenſitive plant, as it were, ſhrinks away, as ſoon as your hand approaches it. And from a turgid and vivid appearance, inſtantly droops and hangs its leaves. Now ſuppoſe this plant to contain more electric fire than any other plant or animal,

animal, it muſt of courſe communicate that fire, to any other that touches it. And if ſo, its leaves and branches muſt be in a languid ſtate, till they have recovered their natural quantity. To illuſtrate this, ſet any ſmall tree in a pot on a cake of brimſtone. Electrify it and it grows extremely turgid, ſo as to erect its leaves. But the moment you touch one of them, the whole tree droops, and hangs all its leaves and branches.

To throw all the light I can on the ſubject, I ſubjoin a few extracts from ſeveral other writers.

An Extract from Mr. Watſon's *Experiments and Obſervations.*

1. When two plates, the one electrified, the other not, were brought near each other, the flaſhes of *bright flame* were ſo large, that in a dark room, I could diſtinctly ſee the faces of 13 perſons. P. 6.

2. A piece of large blunt wire was hung to the conductor. To the end of this when electrified, a black ſurface not electrified being brought near, (though not near enough to cauſe a ſnap) a bruſh of *blue flame*, quite different from the former, iſſued of more than an inch long, and an inch thick. P. 7.

3. If a perſon ſtrongly electrified lays his hand on the cloaths of one that is not, eſpecially if they are thin woollen or ſilk, they both feel as it were *many pins pricking* them, as long as the globe is in motion.

4. If oil of turpentine be ſet on fire in a veſſel held by one electrified, *the ſmoke* ariſing therefrom, received againſt a plate held at a foot diſtance from the flame, by one ſtanding on roſin, will enable him to fire warm ſpirits of wine. The electric ſtrokes have been likewiſe felt upon touching the ſecond man, when the plate he held

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in the ſmoke has been between ſeven and eight feet above the flame. P. 8.

5. Take burning ſpirits of wine inſtead of oil of turpentine: and if the ſecond man hold the end of an iron rod at the top of the *flame*, he may kindle other warm ſpirits held near his finger. Hence we find that either ſmoke or flame conducts the electric fire, and does not preceptibly diminiſh its force. P. 9.

6. If the wire of the phial be not touched, the electrified water or ſteel duſt will retain its force many hours, may be conveyed ſeveral miles, and will afterward exert its force upon touching the wire. P. 16.

7. If an egg is hung on the conductor, and a perſon graſping the electrified phial with one hand, brings the palm of his other near the bottom of the egg, he receives a ſmart ſtroke on the hand, as with a ferula, and his hand ſeems full of a more red fire than is uſually obſerved. P. 24.

8. Any number of perſons communicating with each other, the firſt of whom graſps the phial, and the laſt touches the conductor, receives the ſame ſhock as if it was one only. P. 25.

9. The electric force always deſcribes a circuit, and moves in the ſtraiteſt line it can, between the conductor and phial. P. 26.

10. To prove this, while the machine ſtood on wax, I ſtood upon the floor; and putting one hand on the machine, touched the gun barrel with the other. Upon this fire iſſued, and the ſnapping continued as long as I held my hand on the machine, but no longer. This ſhew'd at once, that the electric fire paſſed from the floor through my body to the machine. P. 36.

11. If the electric fire is not ſtopt, no ſign of its preſence is obſervable in the bodies ſuſpended to the globe. Tho' it throws ever ſo much of this fire

fire upon them, it paſſes from them to the floor whence it came. But if it is ſtopt, it is then accumulated in or upon theſe bodies; although this can be done only to a certain degree, after which it continually diſperſes. If when it is accumulated, a man ſtanding on the floor touches thoſe bodies, the ſnap is felt, and the fire is ſeen. But this ſnapping is not, when the fire paſſes off continually, as from a piece of blunt wire hung to the barrel, and a hand brought near it. Then it appears like a blue cone of flame, with its point towards the wire. When the hand is held at a proper diſtance, there is a blaſt therefrom, as of cold air. If you do not determine the electric fire to a point, it is diſperſed from all parts of the electrified body: but if you do, by thus holding your hand near the fire, you ſee how it paſſes to the floor, and ſo into the earth. The globe therefore only circulates this fire, which is collected by its friction againſt the hand or cuſhion, and which is conſtantly ſupplied to theſe from the earth. And accordingly the ingreſs of it, as well as the egreſs is viſible. For, if while any unelectrified body touches the barrel, you bring your finger near the wood-work of the machine, you will ſee the bruſh of blue flame ſet in from it to the wood-work. And this flame paſſes diverging into the machine, and continues as long as the barrel is touched. P. 44.

12. That the electric atmoſphere which ſurrounds all electrified bodies, extends to a conſiderable diſtance, appears from their attracting a fine thread, at the diſtance of ſome feet. If no unelectrified body is near, this atmoſphere ſeems to be equally ſpread over that which is electrified. But if one unelectrified is brought near, the greateſt part of it is determined that way; whence the attraction of the other parts of the electrified body

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is conſiderably diminiſhed. This is the cauſe of electric repulſion, which does not operate, till the electric ether is ſufficiently accumulated. This repulſion is ſtrongeſt in thoſe parts of the electrified body, where unelectrified bodies are brought near it. For by theſe the electric blaſt, which otherwiſe is general, is particularly determined. P. 46.

13. When the machine is placed upon roſin, if a man ſtanding likewiſe on roſin, touches the barrel while the globe is turning, he will receive a ſnap or two, and no more. But if he touch the wood-work of the machine with one hand, and the barrel with the other, he receives ſnaps again, which continue as long as he touches the machine, and no longer. Here the man by touching the machine with one hand, becomes a part thereof; and by turning the globe, part of the electric fire inherent in his body, is tranſmitted to the barrel; but it is reſtored to him, on his touching the barrel with his other hand. If inſtead of touching the machine or barrel, he holds his finger near either, or both, you ſee the fire go out and return. P. 64.

14. May we not gather from the preceeding experiments, 1. That the attraction and repulſion of electrified bodies, is owing to the flux of electric ether? 2. That this ether is no other than pure fire? 3. That this fire appears in different forms, according to its different modifications? When brought towards a point is it not a lambent flame? When nearer ſtill, may we not both hear and feel it? And does not its lighting up ſpirits demonſtrate, that it is real fire? 4. That this fire is intimately connected with all bodies, tho' leaſt of all with pure, dry air? We have extracted it from water, flame, ſmoke, red hot iron; and from a mixture 30 degrees colder than the

the freezing point. 5. That it is extremely ſubtle and highly elaſtic? 6. That the electric machine may as properly be termed a *Fire-pump*, as Mr. *Boyle's* machine, an *Air-pump*? And laſtly, that fire is not mechanically producible from other bodies, but is an original, diſtinct principle?

An Extract from Mr. Wilſon's *Diſſertation on* Electricity.

Prop. 1. When two bodies equally replete with electric matter approach each other, no flame or ſnap will enſue. P. 5.

Prop. 2. Two bodies equally electrified repel each other. P. 6.

Prop. 3. An electric body interpoſed between a perſon and the earth, prevents his exciting electricity in another body by friction. P. 11.

Prop. 4. If there is originally a certain quantity of electric matter in a body of a given magnitude and denſity; and that matter be equally diſtributed therein, by its elaſtic force, according to the denſity of the parts: upon increaſing the quantity of matter by adding other bodies of the ſame kind, the quantity of electric matter will be increaſed in the ſame proportion. P. 14.

Prop. 5. As electric bodies act on light bodies that are not electrified, ſo unelectrified bodies act on the electric matter contained in electrified bodies. P. 16.

Let a wire be electrified in the dark, and if you hold any unelectrified body 7 or 8 inches from the end of it, a ſtream of fire will iſſue from it, which will diverge to that body. But the divergency will leſſen as it approaches it, till the rays become parallel. If the body be held not directly before the end of the wire, but wide of it at about two inches diſtance, the fire will deſcribe curvilinear rays towards that body. P. 17.

Hence

Hence it appears, that unelectrified bodies act in like manner with electrified: Only the acting force of the one, being increased by friction, is greater than that of the other.

Prop. 6. When two equally electric atmospheres are brought so near as to touch, they repell each other with a force equal to their densities. P. 19.

Prop. 7. If while a fluid surrounds a globe which is electrified and turned round an axis passing thro' its center, an unelectrified body be held near the equator of it, the fluid will rise successively towards that body, as it turns round, in like manner as the sea is affected by the moon. P. 23.

The shock given by the phial is in proportion to the size of it, the thinness of the glass, and the number of points in contact with its surface. P. 25.

An Extract from Mr. Martin's *Essay on Electricity.*

1. The *Electric Matter* is emitted from some sort of bodies when rubbed, which are called *Electrics*. P. 9.

2 By other sort of bodies, therefore termed *Non-Electrics*, it is not emitted.

3. It will run off to all *Non-Electrics*, but is restrained by all Electrics.

4. It shines like a *flame*, and is emitted with a *snap*: If towards a *Non-Electric*, the fire is condensed, less or more, and so appears of a bluish, purple, yellow, or white colour.

When the electric fire is not so much condensed as to explode, as in thunder and lightning, it goes off in a dilated stream of purple flame, greatly resembling that part of the *Aurora Borealis*, which appears in streams of light.

When

When it is little condenſed, it appears *bluiſh*, as all other faint lights do: when a little denſer, it appears *purple*: when denſer ſtill, it looks *yellow*, like candle light: when highly condenſed, it is clear and *white*, like the light of the ſun. So the white lightning is of all others moſt fierce. So Phoſphorus rubb'd a little, ſpends itſelf in an harmleſs blue flame: but upon a greater attrition, kindles into a white flame, and burns with an outrageous and unquenchable fire. p. 17.

And as lightning pervades ſoft ſubſtances unhurt, but diſſolves hard and compact bodies, ſo electric fire pervades the ſoft, muſcular parts of the body, but violently ſtrikes the bones and tendons. Again, as thoſe denſer parts of lightning which we call thunder bolts, ſtriking againſt hard bodies, glance by reflection to different parts, ſo this fire ſtriking againſt the elbow, is reflected from thence acroſs the breaſt, to the other elbow. p. 18.

Indeed different perſons are affected thereby in a very different manner. Some are extremely capable of it, ſome not: and ſome are not ſuſceptible of it at all: a perſon, for inſtance, who has the ſmall-pox, cannot be electrified by any means whatever. p. 20.

Experiment 1. On the axis, in the center of my globe, is fixt a circular ſtring of threads. When the globe is at reſt, they all hang down: when it is in motion, they all extend themſelves from the center, ſtrait toward the inner ſurface of the globe (like the ſpokes of a coach-wheel) which they nearly touch. Thus they continue till the electric virtue ceaſes, and then gradually fall down, as at firſt. p. 22.

Exp. 2. While they are extended, if you move your hand toward the ſurface of the globe, they move every way toward the hand. Hence we ſee

the amazing subtlety of this fire, which pervades glass as readily as if nothing were in the way.

Exp. 3. Place a hoop of fine threads round the globe in motion, and all of them will stand perpendicular to the surface. Hence we learn that the electric power acts equally, both within and without the globe, and in directions perpendicular to its surface.

Exp. 4. If the room be then darken'd, the ends of the threads on the outside, will be all tipt with fire. But those within are not, which shews that this power acts only *ab intra* outwardly. p. 23.

Exp. 5. An iron rod being hung on silken strings, with one end about a quarter of an inch from the globe, will at the other end (which terminates in a conical point) emit a purple flame! diverging every way. Hold your finger within a quarter of an inch, and the fire will issue more largely. p. 24.

Exp. 6. Hold your finger still nearer, and the rays will be so condensed as to run to it in a stream of yellow flame; which is also sensible to the feeling, as a gentle wind, and smells like the fire of phosphorus.

Exp. 7. If you put your finger on the rod, the flame instantly disappears, the fire all running off upon the finger. But take it off, and the flame appears again.

Exp. 8. Apply your finger near a tin tube so suspended, and you may see the fire, and both hear and feel the snap. p. 25.

Exp. 14. Under an electrified plate, put some leaf-gold or other light substances on another plate unelectrified: and it will be attracted and repell'd alternately, between the two plates. For, each time it touches the lower plate, it discharges the electric fire, and so becomes again attractable. p. 28.

Exp.

Exp. 18. If to a gun barrel you adapt a ſmall tin cup, and pour in water; a perſon holding his finger perpendicular over the water, within a quarter of an inch of its ſurface, will find the water riſe in form of a cone to meet his finger, and from the top of it, a ſtream of fire will iſſue to the finger and ſnap as uſual. p. 30.

Exp. 19. A dry ſponge is an *electric*. But if it be dipt in water, and then hung on the barrel, put your finger near it, and the fire iſſues out, and the drops which before fell very ſlowly, will now fall very faſt. If the room be darkened, they will appear as drops of fire. p. 31.

Exp. 20. A ſyphon hung on the cup, drops very gently till it is electrified; but then the water runs in a ſtream, which in the dark is like a ſtream of fire.

Exp. 21. Open a vein in a perſon ſtanding on the Roſin, and the Blood will fly out to a certain diſtance. But let him be electrified, and it will ſpin out with a much greater force, and to a far greater diſtance.

Exp. 24. If mercury be put for water, the electric force is ſomething greater, but in no proportion to its denſity.

Exp. 25. When the mercury is ſaturated, the electric ſtreams will iſſue thro' the wire more copiouſly than from the phial of water, and will ſnap of themſelves, which the ſtreams iſſuing from the water ever do.

Exp. 27. The electrified phial will not retain the fire very long: but if you hold it up in a dark room, it will be ſeen to go off from the point of the wire, in a ſmall white flame. p. 34.

Exp. 30. A cup of water held by an electrified perſon will emit fire more forcibly than his body. p. 35.

Exp. 32. A perſon ſtanding on the ground, cannot eaſily kiſs an electrified perſon ſtanding on the roſin. p. 36.

Exp. 38. If a ſquare piece of leaf gold be placed between two plates, about two inches aſunder, one of them electrified, the other not, at firſt it will be attracted, and repell'd alternately, till in a while it will loſe its motion, and remain ſuſpended between them. p. 39.

Exp. 42. If the globe be exhauſted of air, and then turn'd, the electric fire will act wholly within the globe, where it will appear (in a dark room) as a reddiſh or purple flame, filling the whole globe. But this, as the air is re-admitted into it, will gradually diſappear. In this caſe the electric fire is confined within, by the elaſtic air on the outſide. p. 40.

An extract from Mr. Watkins's *account of electrical experiments.*

When the machine is to be uſed, the globe ſhould be wiped clean, with a clean, dry, warm flannel, its pivots oiled, and the cuſhion and phial warmed. In damp weather, there ſhould be a fire in the room. p. 4.

Exp. 4. Let an unelectrify'd plate, with ſcouring ſand upon it, be held 5 or 6 inches under an electrify'd plate, and the ſand will be ſo attracted and repell'd, as to reſemble a ſtormy ſhower. p. 16.

Exp. 7. If a glaſs ball, of 4 or 5 inches diameter, be hung by a wire to the gun-barrel, and a ball of $\frac{3}{4}$ of an inch diameter, exceeding thin, placed on a ſmooth plate, be brought near it, this will not only be attracted by the large ball, but will perform continual revolutions round it, exactly as the planets do round the ſun. p. 22.

Exp. 9. Hang a loadſtone on the barrel, and a key on the armature of it: And if you bring your

your finger near the key, it will snap and emit fire. A plain proof that the electric and magnetic power no way hinder each other. p. 25.

Exp. 35. A sparrow killed by the electric shock, was found livid without, as if killed with a flash of lightning, and most of the blood vessels within were burst. Animals shock'd on the head, if not killed, are commonly struck blind. p. 55.

Exp. 41. Ice held by an electrify'd person, will fire warm spirits of wine. p. 61.

Exp. 43. Mr. *Watson* put an ounce of oil of vitriol, an ounce of iron filings and four ounces of water, into a flask. An ebullition ensued. An electrify'd person applied his finger to the mouth of the flask. The vapour took fire, and burnt out of the neck a long time. p. 63.

From an experiment made by Mr. *Watson*, and others, it appeared, that the electric fire circulated, without interruption, from the *Surry* side of the *Thames* over *Westminster* Bridge, to the *Westminster* side, and thence thro' the river to the *Surry* side again, which is upwards of 800 yards. Spirits of wine also were fired at the same distance.

From this, and several other experiments, it appeared, that distance, simply considered, did little, if at all, impair the force of the electric shock.

They afterwards conveyed this shock thro' a circuit of four miles, and found the motion of the electric fire to be nearly, if not quite, instantaneous.

II. I have been hitherto endeavouring to make electricity plain: I shall endeavour, in the second place, to make it useful.

1. This ethereal fire, in its unmixt state, seems too violent an agent for the human body to bear. Therefore the wise author of nature has provided the air to temper and adapt it to our use. So tempered, it is the grand instrument of life: "it

gives and preſerves," ſays biſhop *Berkeley*, "a proper tone to the veſſels. It promotes all ſecretions, keeping every part in motion: it pervades the whole animal ſyſtem, producing great variety of effects, various vibrations in the ſolids, and ferments in the fluids." Indeed from many experiments we know, it communicates activity and motion to fluids in general, and particularly accelerates the motion of the blood in an human body. This is quickened three or four pulſes in half a minute, by a perſon only ſtanding on glaſs, and being electrified. And it is certain many bodily diſorders may be removed, even by this ſafe and eaſy operation.

2. But becauſe plain matters of fact weigh more than nice ſpeculative reaſoning with all who do not obſtinately ſteel themſelves againſt conviction, I ſhall, firſt, briefly ſpecify ſeveral diſorders wherein electrification has been found eminently uſeful, and then ſubjoin a few particular inſtances.

3. The diſorders in which it has been of unqueſtionable uſe, are,

Agues,
St. Anthony's fire,
Blindneſs, even from a Gutta Serena,
Blood extravaſated,
Bronchocele,
Chloroſis,
Coldneſs in the feet,
Conſumption,
Contractions of the limbs,
Cramp,
Deafneſs, Dropſy,
Epilepſy,
Feet violently diſorder'd,
Felons,
Fiſtula Lacrymalis,
Fits, Ganglions, Gout,
Gravel,
Head-Ach,
Hyſterics,
Inflammations,
King's Evil,
Knots in the fleſh,
Lameneſs, Leproſy,
Mortification,
Pain in the back, in the Stomach,
Palpitation of the heart,
Palſy, Pleuriſy,
Rheumatiſm,

Ring-

Ringworms,	Swellings of all kinds
Sciatica,	Throat ſore,
Shingles,	Toe hurt,
Sprain,	Tooth-ach,
Surfeit,	Wen.

It will be eaſily obſerved, that a great part of theſe are of the nervous kind; and perhaps there is no nervous diſtemper whatever, which would not yield to a ſteady uſe of this remedy. It ſeems therefore to be the grand *Deſideratum* in phyſic, from which we may expect relief when all other reliefs fail, even in many of the moſt painful and ſtubborn diſorders to which the human frame is liable.

I have ſcarce known an inſtance wherein a few ſhocks all over the body, have failed to cure either a *Quotidian* or *Tertian Ague*.

Anne Heathcote, daughter of Mr. *Heathcote*, braſier, in *Long Alley*, *Moorfields*, was ſeized, in *May* laſt, with what is commonly called an *ague in the head*, having a violent pain in her head, face, and teeth. After trying abundance of remedies, to no purpoſe, ſhe was, in *Auguſt*, electrified through the head. Immediately the pain fixed in her teeth. She was electrified four times more, and has felt nothing of it ſince.

4. "Having obſerved," ſays Mr. *Lovet*, "the great efficacy of electrical æther, in ſoon relieving moſt kinds of *inflammations*, I was inclined to think the ſame efficacy would appear when it was applied to *St. Anthony's Fire*. But when a caſe offered, the inflammation was ſo great, that at firſt I almoſt deſpair'd of ſucceſs. About noon I made the firſt trial, by drawing off ſparks while the perſon was electrified, on the roſin. Before night, the angry ſwelling was much appeaſed, and in a few days quite cured."

5. A boy about ſeven years old (ſays *Mr. Floyer*, a Surgeon in *Dorcheſter*) was taken blind ſuddenly in both his eyes, without any previous pain or fever. Three or four days after, he was brought to me. He was as blind, as if his eyes had been cut out. Taking the caſe to be a perfect *Gutta Serena* in both eyes, I told his parents, it was my opinion he would never ſee again. However I determined to try the electric ſhock: and the next morning, faſtening a wire coming from the phial to his legs, and another round his head, I brought the latter near the conductor, and gave him four ſhocks ſucceſſively. That day he was put to bed, and continued there, ſweating profuſely, till the next morning, when he agreeably alarmed his father by crying out, he could ſee the window. When he was brought to me the ſecond time, he could ſee when I put my hand between his eyes and the light of the ſun. This gave me encouragement to repeat what we had done the day before. The next day he could a little contract and dilate his eyes; the third day he could diſtinguiſh objects; the fourth, colours. The fifth day, after repeating the experiment, his ſight was perfectly reſtored, and the eyes, in every reſpect, as well as if no diſorder had happened to them.

6. From a gentleman in *Newcaſtle upon Tyne*, I have the following account. Laſt week a poor man in *Sandgate*, that had been blind twenty-four years, was lead to the machine. I ſet him upon the electrical board, and drew ſparks for about twenty minutes from the pupil of his eye. After he had reſted himſelf a little, and was able to look up, he told us he could ſee *Sidgate*, which he had not ſeen for many years before. He could alſo diſtinguiſh objects in the room, and was able to walk home without a guide. He came a ſecond

cond time, and was ſo much better, that I imagine he did not think it neceſſary to come any more.

7. He adds, about the time I wrote laſt, a young woman was cured of a fourteen years blindneſs. She was able, before ſhe went home, to diſtinguiſh one letter from another.

8. From the ſame perſon, a few days afterwards, I received the following lines.

"The cure of the blind man of *Newcaſtle*, has ſpread thro' all the country; in conſequence of which, I am, much againſt my will, become an oculiſt.

"I have had ſeveral in hand, and among the reſt a girl, about ſeventeen, has been with me about three weeks. Her caſe is owing to a film, or ſkin, grown over her eyes. It came by the ſmall-pox about twelve years ago. Her friends have had all the advice, and uſed all the means in their power, but to no purpoſe; except that ſhe has loſt her left eye irrecoverably by one of the perſons they applied to.

"When ſhe came to me, the *Iris* of the right eye alſo was very near covered with a very thick ſkin, ſo that ſhe could do very little more than diſtinguiſh day from night. It was grown much worſe this winter, and was ſo blood-ſhot and angry, that I told her mother I could do nothing for her. However ſhe made ſuch a lamentation complaint, that I conſented to try.

"The method I have taken, is drawing ſparks from her eye, and ſometimes giving ſhocks from her head or neck, down her arm, to carry off the frequent complaints of pain and dizzineſs in her head; which never fails of ſucceeding in about ten minutes. We have electrified her about half an hour twice every day. The ſkin waſtes gradually, and grows thinner and leſs every day;

ſo

ſo that now the colour of the eye appears through it, except in the middle, and towards the noſe, where the film at firſt ſeemed twice as thick as the reſt. The other day, as I had her under hand, ſhe ſaw the buttons of my ſhirt ſleeve, and of my coat; and yeſterday ſaw the teeth of one of her companions that was laughing at her. But her eye is ſo weak, that I adviſed her to make very little uſe of it yet."

"A perſon having a dark, livid ſpot under his eye from a blow three days before, it was, in leſs than a quarter of an hour, quite taken away, by drawing the ſparks from the parts." Mr. L.

Here *extravaſated blood* was manifeſtly diſſolved and reſorbed into the veſſels. I have lately known an inſtance of this kind. One, whoſe eyes, were almoſt beat out, as they term it, by the ſame operation, loſt all the ſwelling, and the blackneſs too, in twelve minutes.

10. "A woman troubled with a *Bronchocele* the moſt obſtinate of all ſwellings, whoſe neck was eighteen inches and half about, is already ſo far relieved, that the largeſt part of her neck is but fifteen inches and a half about, the ſmalleſt not thirteen. And the ſwelling now waſtes ſo faſt, that there is hopes of a perfect cure." Mr. L.

"She applies the wire from the phial to one ſide of the ſwelling, and laying one end of another wire to the other ſide of it, then guides the other end of that wire to the electrical apparatus."

11. *William Jones*, a plaiſterer, living at Mr. *Frazer*'s, in *King-ſtreet*, *Seven Dials*, fell from a ſcaffold on *Thurſday*, *Feb.* 15 laſt. He was grievouſly *bruiſed*, both outwardly and inwardly, and lay in violent pain, utterly helpleſs till *Saturday* in the afternoon, when he was brought (carried) by two men

men to be electrified. After a few minutes he walked home alone, and on *Monday* went to work.

Mary Osgathorp had her foot *bruised* by a stone falling on it, which occasioned a running sore. It continued, tho' frequently healed for a time, upwards of eight years: but was entirely healed a month ago by electrifying, and has never broke out since.

12. A number of moderate shocks daily repeated for some time, effectually cure *coldness in the feet*. It does not fail.

13. *Angus M'Innon*, of *Fuller's-rents* in *Holborn*, was afflicted with a violent cough, till his strength wasted away, and he had all the symptoms of a true *consumption*. He was electrified three times about eighteen months ago, and restored to perfect health.

Elizabeth Collis, a child of twelve years old, living with Mrs. *Wragg*, in *Windmill-street*, was so far gone in a genuine *consumption*, that she was judged to be quite past recovery. This summer she was electrified four times, and has been quite well ever since.

14. A man at *Upsal* in *Sweden*, whose knee-joint had been *contracted* above five years, (originally from an ill-cur'd rheumatism) was quite restor'd by drawing off sparks for a few weeks.

15. "Mrs. *M*—— *D*——, of *Worcester*, was long afflicted with a most violent *cramp* in her legs. This disorder seized her before she was twenty years of age, and continued till she was upwards of seventy. This was most violent when she was in bed; at which time she was forced to tumble out on the floor, sometimes twice or thrice in the same night. It was attended with exquisite pain, bursting the small blood-vessels, which afterwards appeared of a livid hue for a considerable time.

"She

" She was intirely cured in a few days, by being electrified once a day, thus. Having taken off her shoes, she put one foot on the end of the chain, which came from the charged phial, putting the lower end of a wire to the other foot; so that this being touched, both legs might receive the shock at once." Mr. L. I never once knew it fail in this disorder.

16. *Deafness* rising from hardened wax, or following a fever, is cured by only drawing off sparks. This was frequently tried at *Upsal*. At *Stockholm*, a gentleman of distinction, who had been almost *deaf* a considerable time with a singing in his ears, was perfectly cured in three or four minutes.

A young man, who had almost lost his *hearing* for six months, by violent vomitings, which forced blood out of his ears, was perfectly cured in a few minutes.

Samuel Jones, gardener, at *Lambeth Marsh*, in the year of the great frost, leaped into the *Thames* to save a man from drowning. Hereby he became so deaf of both ears, that he could not hear any sound at all, were it ever so near, or ever so loud. In *February* last, after being once electrified, he could hear the noise of a coach at some distance. After the third time, he could hear the sound of the machine. He came no more; so it is supposed he is well.

A man, fifty-seven years old, who had been deaf for thirty-two years, was so far relieved in a few days, as to hear tolerably well.

A girl of seven, born deaf, (who consequently could not speak) began presently to hear words which were spoken very loud in her ear, and could repeat some of them in a few days.

I have known hearing hereby given to a man born deaf.

17. " In

17. "In May 1748, came to me one *Mary Smargins*, born in the iſland of *Nevis* in the *Weſt-Indies*, 28 years old. She had been ſo *deaf* (from a cold at firſt) for ſeventeen years, as not to hear any one, unleſs they were very near and ſpoke loud. Her deafneſs had no intervals. She always heard the leaſt with the left ear. On Saturday *May* 28, the phial being electrified by two turns of the wheel only, I applied one wire to the left temple, juſt above the ear, the other to the oppoſite temple. She felt a ſmall warmth in her head, chiefly from ear to ear. I repeated it four times, a little ſtronger each time. The warmth increaſed at each ſhock, and tho' I ſtruck her at each ear alternately, ſhe always felt moſt warmth at the deafeſt ear. At laſt ſhe complained of ſmall twitchings in her ears, chiefly in that ear, and croſs her head. No other part of her body felt the ſhocks. The warmth increaſed all day with twitching at intervals. The next morning I repeated the experiment, which then affected her arms and body alſo. The twitchings were more violent; the warmth greater round the ears, chiefly the deafer ear. Theſe effects continued all the day, and ſhe heard conſiderably better. But toward evening, by ſitting in an open window, ſhe catched cold; on which the warmth left her, and ſhe felt very chill all over her body. On Monday ſhe was extremely ill, with pains all over her. On Tueſday ſhe was much better, and felt the ſame kind of warmth round each ear again. On Wedneſday the noiſe and beating in her head, which ſhe had had from the firſt of her deafneſs, much abated. In the evening a violent ſhooting went acroſs her head, from the left to the right ear. On Thurſday I repeated the experiment. Some minutes after, blowing her noſe, there iſſued corrupted matter with a ſmall quantity of clotted

blood. From this time ſhe had little noiſe or beating in her head, and heard perfectly well.

She had a great cold, and her eyes were much inflamed, when I began the experiment. But after the firſt day's experiment the inflammation decreaſed, and after the ſecond, was wholly removed.

I was able at firſt to bear the ſtrongeſt ſhocks. But after repeating them ſome weeks, I could hardly bear a ſmall ſhock: and a ſtrong one occaſioned a violent convulſion of the muſcles of my arm and body.

Upon rubbing with my hand a globe, while turning, I have ſeveral times felt a violent headach. But it always went off upon diſcontinuing the rubbing. I have known many perſons, who found an unuſual pain for ſome days after receiving the ſhock." Thus far Mr. *Wilſon*.

I am ſurprized at this. For I never yet knew any perſon, man, woman, or child, ſick or well, who found any ſuch inconvenience. Only I have known rheumatic pains increaſe on the firſt or ſecond trial, which were afterwards perfectly cured.

Mary Baker, chairwoman, aged 27, living at Mrs. *Hunt's*, in *Neal's Yard*, near the *Seven Dials*, having been long ill of a *Dropſy*, was admitted laſt year into St. *George's hoſpital*. But on *Nov.* 28. ſhe was diſcharged out of it as incurable, as ſhe was alſo from the *Weſtminſter Infirmary*. In ſpring laſt ſhe was electrified, and ſoon after parted with ſeveral gallons of water. After being twice more electrified ſhe was well, and able again to earn her living.

18. It is of great uſe in the *Epilepſy* or *falling ſickneſs*; unleſs it be hereditary, and then it does at leaſt no harm.

The

The following case seems to have been of the *epileptic* kind. *E*—— *T*—— of *Worcester* was troubled with a very uncommon disorder, for ten or eleven years. The contraction usually began under her left breast, and darted thence to her right, and back again to her left breast and shoulder. It then struck down to her elbow, wrist and fingers, which were instantly so contracted, that if she had not time to catch up some thing in her hand, the nail of the fore-finger would so wound the thumb, as to make the blood run down. The contraction likewise twisted and drew her hand behind her, turning it up again to the shoulder. The intervals of this terrible disorder were uncertain: sometimes she had ease for a month; sometimes she was taken twice in a day. It would yield to no medicine, but was by this method entirely cured in a few weeks. She stood on the wire, coming from the phial, and then touched the apparatus with a finger of the hand affected. By this means the fire circulated the nearest way, through the body to the arm and fingers. This was several times repeated to each finger. Mr. *L.*

19. *Sarah Bettesworth*, aged 22, then living in *Cow-Lane*, was some years since seized with so violent fits, that five or six men were scarce able to hold her. In Autumn 1756, while she was in one of them, the Apothecary being asked by her master if he should electrify her? made light of it. However he did so, applying the bottle to one shoulder, as she lay on the ground, and the wire to the other. On the first shock her struggling ceased, and she lay still. At the second her senses returned. After two or three more, she rose in good health. Some months after she relapsed, and was electrified again, and again entirely cured. Last Easter she fell into a fit again, through a

fright, but by a few ſhocks was cured and reſtored to health.

William Matthews, ſchoolmaſter, aged thirty-two, living at the *Foundery*, near *Moorfields*, had *Epileptic* fits (ſuppoſed to be hereditary) from his birth, till he was ſix years old. Thence he was free till thirteen. They then returned on occaſion of a fright, and continued ſo to do twice or thrice in a year, till he was ſeventeen. From that time they came almoſt every month, till the year 1753: ſince then they uſually returned about once in ten or eleven weeks. In the middle of *March* laſt he began to be electrified, both through the head, and from head to foot. *April* 4. He had a ſlight fit, but from that time to this, *Nov.* 2, has had none at all. Can all *England* afford ſuch a cure as this, wrought by a courſe of medicines?

20. "*John Webb* of *Worceſter*, ſeventy years of age, was much *diſordered in his feet* for ten or twelve years. The pain reſembled that of the gout: and ſuch a *coldneſs* attended it as was ſcarce ſupportable. If he warmed them by the fire, they raged ſtill more, as alſo when they began to be warm in bed. The nails of his toes very frequently dropt off: the toes in general appeared livid; and frequently large black or bluiſh ſpots were formed, at the end of them, or on the top and ſides of his feet. Theſe, when they firſt came, were exceedingly painful; but after a time grew dry and hard. His heels likewiſe were generally puffed up like blown bladders."

All theſe complaints gradually decreaſed, till they totally went away, by his being electrified once a day for ſome time, and afterwards twice a week. At firſt only ſparks were drawn. Afterwards the chain was brought from the phial to the part affected of one foot; then one end of a wire

wire was laid to the part affected of the other foot, and the other end of it brought to the conductor." Mr. *L.*

21. *Felons* are speedily cured by drawing sparks. If any disorder be superficial this operation suffices: but if it lie deeper, then the giving of shocks is found to be more effectual.

22. "*Ann T*—— had a *fistula* near the inner corner of her eye, which healed and broke again seven times. The last time it healed, it continued well for some time. After which it began with a small swelling, till it was as big as a filbird. From the time she was electrified, by drawing off sparks, it gradually decreased, till it was entirely dissipated." Mr. *L.*

Eliz. Johnson, daughter of Mr. *Johnson*, gunmaker in the *Tower*, was taken on *New years-day* last, with sharp pains in her bowels, which soon threw her into *convulsion fits*. These returned five or six times a day, for ten or eleven days. She was electrified all over, and had no fit for eight months. She was then frighted into a fit. She was again electrified, and continues well.

23. "A young lady had been affected with *fits* near seven years, which seized her without any warning, and threw her flat on her face, quite insensible. These frequently returned twice in a day. This was attended with almost a continual *coldness* in her feet. Her stomach also was much affected. She stood upon a wire coming from the coat of the phial, and to complete the circuit, another wire was laid upon her head, by which means the fire was conveyed to that part. By this means both the *fits* and *coldness* were gradually removed, and a complete cure effected." Mr. *L.*

24. " *Elizabeth B*——, near the *Old Hills*, a few miles from *Worceſter*, had for fifty years been afflicted with ſevere *fits*. They threw her down to the ground, quite inſenſible, ſometimes twice or thrice a day. She had tried many remedies, but to no purpoſe. From the latter end of the year 1752, ſhe received ſeveral ſhocks. An inveterate head-ach, which attended her, quickly decreaſed, and in ſome months her fits too totally ceaſed." Mr. *L.*

25. Electricity was tried at *Upſal* in three caſes of a *Ganglion*, which it perfectly diſperſed.

26. Slight attacks of the *gout* are ſuddenly and effectually removed, by drawing ſparks from the part affected.

" A perſon, who within the ſpace of two or three years, had had ſeveral attacks of the *gout* ſince the firſt of which, he had always a *ſtiffneſs* and *pain* in the joint of one of his great toes, and for a conſiderable time in both, was quite cured, by ſetting him on roſin, while one on the floor drew ſparks from the diſeaſed parts." Mr. *L.*

William Sinnock, cabinet-maker, in *Lombard-Court, Seven Dials*, was in *Feb.* 1758, ſeized with ſharp pains in his feet, which continued three months, and for ſix weeks diſabled him from doing any work. They returned in *February* laſt. He was electrified twice, and has felt no pain ſince.

Thomas Willis, chair-maker, aged 44, was for many years afflicted with the *gravel* in the kidneys. In *July* laſt he was electrified twice. After the ſecond time he parted with a large quantity of gravel. He was electrified twice more, and has not found the leaſt complaint ſince.

27. In very bad fits of the *Head-ach*, I have often, ſays Mr. *L.* uſed this remedy with ſurprizing ſucceſs.

" A

" A man of *Bromſgrove*, afflicted for near a fortnight with a violent and conſtant *head-ach*, was twice electrified by a few light ſhocks, with half an hour's interval, and entirely cured." Mr. *L.*

A—— *T*—— of *White-Chappel* had a violent head-ach, which continued for ſeven or eight weeks. After ſhe was electrified the pain increaſed for three hours. It then gradually decreaſed, till ſhe was quite well. This proves that it may remove even a diſorder, which at firſt it ſeems to increaſe.

28. *Samuel Rennee*, aged ſeven, the ſon of *Richard Rennee*, weaver, living in *York-ſtreet*, by taking cold, was ſeized with a violent *head-ach*, which continued with ſhort intermiſſions for above a year. Tueſday, *March* 8, 1757, he was moderately electrified all over. The pain left him from that hour.

22. " A man who had a fixed pain juſt above his eye-brow for ſeveral days, was by little ſhocks at the part, cured in a few minutes: ſo was Mr. *Higgins* of *Worceſter*, of a *periodical head-ach*, which commonly began at five or ſix in the evening, and affected him from the top of his right temple to his ear, till he went to bed. This was cured only by drawing ſparks." Mr. *L.*

" *M*——*t D*——*s* was afflicted with an almoſt conſtant, as well as violent pain in the *hinder part* of her *head* for near three quarters of a year; eſpecially when ſhe lay down in bed, being then ſo intolerable, ſhe could not forbear ſhrieking. Having uſed many other means with no effect, ſhe was electrified once a day. This preſently relieved (ſometimes by ſparks, ſometimes light ſhocks) and in ſome weeks perfectly cured her." Mr. *L.*

" *E—T*— was troubled for eleven years with a ſevere *head-ach*, which baffled all the efforts of me-

medicine. By moderate ſhocks applied to her head, ſhe was cured in a few weeks." Mr. L.

30. *Abigail Brown*, aged 22, then living in *Red-Croſs-ſtreet*, was from a child frequently afflicted with a violent *head-ach*. In *October* 1757, ſhe was electrified five days ſucceſſively, having one wire applied to the fore part, another to the hinder part of the head, and receiving ſeven or eight ſhocks each time. Hereby ſhe was entirely cured, nor has found any pain in her head ſince, unleſs occaſionally for want of ſleep.

Sarah Webb, wife of Mr. *Webb*, Tallow-chandler in *Grub-ſtreet*, aged 46, was from 20 years old ſubject to a violent pain on the top of her *head*. This frequently obliged her to keep her bed; nor could any remedy for it be found. In *December* laſt ſhe received gentle ſhocks from temple to temple, and from the fore-head to the back of the head. This was done three days ſucceſſively, and ſhe was entirely cured.

31. *Richard Outen*, rope-maker, aged 22, living in *Bunhill-row*, was troubled with a violent *Head-ach* over the eyes, before he was ten years old, ariſing from a blow on the head. He was ſcarce free from it a month together for above 12 years. It uſed to throb and ſhoot thro' the head, ſo that often he was almoſt diſtracted. In *December* 1756, he was electrified once, receiving three ſhocks, by one wire, applied to the forehead, and another to the back of the head. He was worſe than ever for ſome hours, till he went to bed, but awaked in the morning perfectly well: and has continued ſo ever ſince.

32. In deep *Hyſterical* caſes, the perſon ought to ſit on the roſin at leaſt half an hour every morning and evening. At firſt ſparks may be drawn off; and afterwards ſhocks given, more or leſs, as the diſorder requires. This would ſeldom

fail

fail of the desired effect, as may well be supposed from the following instances.

A young gentlewoman, about 10 miles from *Worcester*, sometime after she recovered from a fever, was seized with violent *hysterics*, which soon deprived her both of memory and understanding. The fire was conducted thro' her head by sparks and shocks several times a day, during the week she stayed at *Worcester*: in which time not only her memory, but her understanding was perfectly restored.

Mrs. *Higgins* of *Worcester* was troubled for above ten years with an *hysterical* disorder, and a *coldness in her feet*. From thence that coldness moved gradually up to her head, in half a minute's time, which then seemed a palsy in the head. Soon after her teeth would chatter as in a violent, ague. Thence the shaking proceeded to her arms, and whole body, and was so violent, (as hysterics mimic most distempers) as to resemble St. *Vitus's Dance*.

Sometimes sparks were drawn, sometimes shocks were given; and she stood near half an hour daily on the rosin. In less than a fortnight the fits went entirely off: and in a while after, the coldness of her feet. Mr. *L.*

33. A person had rigid *knots* in the thigh like what appear in violent cramps, but not so hard or painful. These were entirely dissipated in a minute or two, only by drawing sparks.

34. One at *Upsal* who had *lost the use of his limbs* from *cold*, for several years, was in some weeks quite restored.

One at *Stockholm*, who had used crutches for seven years, could walk without them in thirteen days.

Eliz. Buttle, nurse, aged 31, living in *Feather-stone-street*, in *May* last, felt such a pain round her ankle.

ankle-bone, than she could scarce set her foot to the ground. This grew worse and worse for about a month. In June she was electrified seven times round the ankle, and thrice upon the knee. Immediately her *lameness* ceased, with the pain that occasioned it.

35. *Mary Lallo*, aged 25, then living in St. *Thomas the Apostle's*, when she was a child, was taken with a pain in the bone of the left leg from the knee to the bottom of the foot, which then felt as if a great weight had been fastened to it. This continued by intervals for many years. Frequently she could not walk without holding some one, and then in great agony. In *February* 1757, she received several small shocks on the knee, within four or five minutes. The pain instantly ceased. She walked home quite well, and has continued so ever since.

A girl also of 13, who after the small pox had been *lame* from four years old, having been electrified about twenty times, walked without a staff.

" A young lady from a strain in the knee-joint, or rather the crural ligament, was quite disabled from walking. About three quarters of a year after, when she came to me, the muscular part of the leg was much fallen away, and a continual *coldness* attended the foot."

" I ordered her to sit on the rosin at least half an hour daily, and to receive several shocks thro' the disordered part of the knee. The first month there was little effect. In the next there was a visible alteration for the better; the third, she could walk a few steps without any crutch or staff. In the following month, she seemed quite well, and left off electrifying: but after a time relapsed. After the relapse, the progress of the cure was more tedious, and it was four or five months

months before she could leave her remedy quite off." She was then totally cured. Mr. L.

36. "A young woman drinking at a cold spring when very hot, was seized with a kind of fever for a quarter of a year. Many red spots then appeared on her arms, and soon after a thin dry crusty substance which appeared rather as scales than scabs, from her elbows down to her fingers. This *leprous* disorder (which many call a *surfeit* continued near three years. Indeed it lessened the first and second winter; but the third was the same as in summer."

"By drawing sparks once a day from the parts affected, in three weeks or a month all the scales disappeared." Mr. L.

37. "A gentleman in *Worcester* had a *mortification*, which began in his toe, and in spite of all the means used, gradually increased. He was *shocked*, and the mortification stopped: but on his neglecting this, it began again: and increased so far that the case seemed desperate. Yet on his being *shocked* again thro' the mortified part, such a change appeared as astonished the surgeon, who owned it had done more good in two days than had been done in six weeks before." Mr. L.

38. A clergyman near *London* had from a child almost a constant *pain* in the lower part of his left side. He was once electrified by standing with his left foot on the chain, and has never felt the pain since.

James Kitely, of *Lambeth*, had a sharp *pain* in his left side about three years. After being electrified three or four times, the pain left him and came no more.

Mary Burgis living at the *Tun* in *Knaves-Acre*, had a *pain in her side* for seven years. In *May* last, she was entirely cured the first time of electrifying.

Michael

Michael Hayes, of *King-ſtreet, Weſtminſter*, aged 86, had a violent pain in his left ankle for near four years. This ſometimes diſabled him from walking, which otherwiſe he could do without any difficulty. He was electrified thro' the part, and perfectly cured before he left the room.

39. *Eleanor Story*, living in *Clerkenwell Church-Yard*, catching cold, was ſeized with *pain* and weakneſs in the ſmall of her *back*, as if it had been broke. By following the preſcriptions of Dr. *L.* the pain after a fortnight ſettled in her ſhoulder. There it continued ſo violent, that often ſhe had ſcarce any uſe of her arm. She afterward uſed abundance of remedies for above two years, but all to no effect. On Tueſday *March* 21, 1757, ſhe received two ſtrong ſhocks on each ſhoulder, which made the ſkin red and ſore. That night ſhe was in more pain than uſual, trembled all over, and could get little ſleep. The next morning ſhe received ſeveral ſhocks all over, and ſo on Thurſday morning and evening. After the ſecond time her pain was gone, and ſhe had the full uſe of both her arms.

John Reed, Cabinet-maker in *Warder-ſtreet*, was for ſix years afflicted with violent *pains* in the back of his neck. In ſpring 1758, he was electrified above thrice a week for a month, and quite cured.

40. *Joſeph Jones* was taken about *March* 12. 1757, with a violent *pain in the ſtomach*. He received the ſame day a few gentle ſhocks. The pain went off, and returned no more.

Mary Peltecree, warper, living in *Primroſe-ſtreet*, was troubled ſix months with a *pain in her ſtomach and back*, accompanied with extreme weakneſs and faintneſs, which made her incapable of her work. By the advice of a phyſician, ſhe took many medicines, but with no effect.

Five

five weeks ago she was electrified, receiving the shock through the stomach. This was done for five days successively. She has been perfectly well ever since.

H—— W——, throwster, aged 23, living in *Fleet street, Bednal Green*, not being regular, was taken a year ago with a violent *pain in her stomach*. She had the advice of a physician, and took many medicines; but to no purpose. At length she was electrified, nine or ten days, and is in perfect health.

Ann Wild, of *Round Court*, by taking cold in childbirth, contracted a violent *pain in her stomach*. After it had continued four years, she was perfectly cured by twice electrifying.

Mrs. *Edwards*, living in *Nottingham Court, Short's-Gardens*, was ill of a *pain in her stomach* for eight years. It often took away her rest, as well as appetite, and brought her to the gates of death. By once electrifying she was cured.

Eleanor Taylor, mantua maker, aged 48, living in *King-street, Oldstreet-square*, was taken in *September* 1758, with a violent *disorder in her stomach*, which felt as if it was ready to burst, and often made her sweat to her finger's ends. This continued for upwards of four months, and gave her little rest, day or night. In *February* following she was seized with the Rheumatism, throughout the left side. For this, having quite lost the use of her left arm, she came to be electrified. She felt the shock chiefly in her stomach, and her disorder there was cured. After three days she was electrified again, and cured of the Rheumatism also.

A gentlewoman in *London* had an almost continual *pain in her stomach*, more or less for eight years. She received one shock on her stomach, and was well from that moment.

41. *Silas Told*, ſchoolmaſter, aged 48, living in *Chriſtopher's Alley, Moorfields*, in the year 1741, had a Pleuritic pain, for which he loſt an unuſually large quantity of blood. Immediately he was ſeized with a ſtrong *Palpitation of the heart*, which continued, more or leſs, without the intermiſſion of one day, for more than ſixteen years. In *February* 1757 while I was electriſying for a *Pain in my ſtomach* (which was wholly removed by one ſhock) he came in and ſaid, "My heart is very bad, and I think I will try it too." He did ſo, receiving a ſhock through the breaſt, and has been ever ſince perfectly well.

42. A citizen of *Upſal*, who was thoroughly *Paralytic*, was perfectly cured only by drawing ſparks.

April 18th, 1756, a remarkable caſe happened at *Edinburgh*. *Robert Moubray*, in the beginning of *January* was ſtruck with a *Palſy of the tongue*, and ſoon after entirely loſt the uſe of his ſpeech. Laſt week he began being electrified, and by Saturday he was able to put out his tongue, which before was dead and motionleſs. On Monday he could ſpeak a little, and on Tueſday he could ſpeak as well as ever.

Thomas Dobſon, leatherpipe-maker, aged 27, living in *Barnabyſtreet*, was ſeized with a *Palſy in the tongue*, on *July* 24th laſt. It grew worſe and worſe till Saturday 28, and then quite deprived him of his ſpeech. He was electrified for five days, by drawing ſparks from the tongue, and ſhocking him all over. And hereby not only his palſy was cured, but convulſions alſo, which he had had for four years.

"Mr. *P.* had a year or two ago a ſlight touch of a *Palſy*. On a ſudden his arm dropped down, quite without ſtrength; and tho' after chafing it well, he recovered the uſe of the upper and middle

dle joint, yet the lower part was ſtill ſo weak, that he could by no means write his name But by a few ſhocks in the arm he was effectually relieved.

"The ſame perſon had lately a much worſe ſtroke. All his right ſide was ſo affected, that he could not walk without two to ſupport him. After he had been electrified three times, he could walk with the ſupport of one only, and in a ſhort time he was perfectly well." He uſed to ſtand on the chain with the right foot, and touch the apparatus with his right hand." Mr. L.

I have not yet known any inſtance of this kind. Many *Paralytics* have been helped: but, I think, ſcarce any *Palſy* of a year ſtanding has been thoroughly cured.

43. A gentlewoman in *London*, who for ſeveral years was never long together without ſharp pains in her knee, which ſeemed chiefly *Rheumatical*, was freed from them in a moment by one ſingle ſhock.

John Ramſay, cabinet-maker, living in the *Strand*, by being very wet, catched a violent cold, in the latter end of *June* 1756. This occaſioned a *Rheumatic Pain*, which fixed in his left knee. From this he was ſeldom free for a week together till *November*. He was then very ill-till *February*, being ſeldom able to do above half a day's work, ſometimes none for a week together. He was for ten weeks an out-patient of *St. George's Hoſpital*: but received no benefit. On Monday 21ſt *March* he was electrified through the knee, and four times more within ſeven days. The pain was removed, and his ſleep, which had been long loſt returned, as before he was firſt taken.

Ann Walter, ſervant, aged 22, then living in *Brick-Lane, Spittlefields*, was cured entirely of a

violent *Rheumatiſm* in her left arm, by being electrified five times.

A ſtone-cutter at *Stockholm*, whoſe knees and joints of his toes had been rendered ſtiff, and his fingers crooked by a mixture of Gout and *Rheumatiſm*, after being electrified a few days, was able to go to work. It has been found to remove or greatly abate all *Rheumatic* pains.

Ann Cambell, living in *Queenſtreet, Seven Dials*, had a ſevere *Rheumatiſm* fourteen weeks. For nine weeks ſhe could not dreſs herſelf, nor get out of bed without help. She had the advice of ſeveral phyſicians, but in vain. In ſpring, 1758, ſhe was electrified five times, and thereby reſtored to full health.

William Tyler, living at the *Sun* in *Long-lane, Smithfield*, was on *March* 9th laſt, about three in the morning, ſeized with *Rheumatic pains*, chiefly on his right ſide, ſo violently, that he was as helpleſs as an infant, and was frequently conſtrained to ſhriek out, like a woman in labour. I came before nine. After the ſecond ſhock he felt ſome change: after the third he was able to raiſe himſelf a little. After two more he roſe and walked about the room, and before noon he was quite eaſy and well.

Sarah Guildford, aged 37, living on *Saffron-hill*, was for upwards of ſeven years ſo afflicted with the *Rheumatiſm* in her right ſide, that the knee and ankle were waſted exceedingly. *January* 2d laſt ſhe was electrified, and perfectly cured in one day. But it threw her into a profuſe ſweat particularly from thoſe parts which had been moſt affected.

Ann Cardiff, ſervant, at the *Golden Head, Iſlington*, aged 40, about ſixteen years ago, was taken with a violent Rheumatiſm, by catching cold in lying in. It returned every year, and the laſt win-

winter took away the uſe of her limbs. She followed the advice of ſeveral phyſicians, till they pronounced her incurable. October 15 laſt ſhe was electrified firſt by general ſhocks, then thro' the parts moſt affected. The firſt and the ſecond time it made her extremely weak and faint. The third time ſhe was better, and after nine times all her weakneſs and pains were gone.

Margaret Virgin, ſilk-winder, aged 39, living in *White-horſe-Yard, Seethin-Lane*, was troubled with the *Rheumatiſm* before ſhe was ten years old, and more and more till when ſhe was about twelve ſhe was confined to her bed for near 21 weeks. From that time ſhe was ſeldom free from it, ſo that many times ſhe was quite incapable of buſineſs. Laſt winter ſhe was ſo ill as to be forced to quit her work, not being able to lift an arm to her head. In *January* ſhe was electrified twice: the firſt time all over: the ſecond time thro' the left arm. The uſe of her arm was immediately reſtored. Her pains entirely left her, and ever ſince ſhe has been more capable of any kind of work than ſhe had been for twenty years.

Mary Trumbel, of *White Croſs ſtreet*, aged 49, began to be afflicted with the *Rheumatiſm* before ſhe was 30 years of age. It returned in her ſhoulders or head every winter: and for three winters laſt paſt ſo increaſed, that ſhe could by no means turn either arm behind her, and was extremely painful. Laſt winter it was worſe than ever. A little before Chriſtmas ſhe received five or ſix ſmall ſhocks. Immediately ſhe was eaſy, recovered the full uſe of both arms, and has retained it ever ſince.

William G. of the *Little Minories, London*, had been violently afflicted with the Rheumatiſm for many years. For ſeveral winters he was not able

to work. But after having received a few shocks in a quarter of an hour, all his complaints vanished away, and he was afterwards as well in winter as in summer.

44. Almost all kind of *Inflammations*, *Ringworms*, *Tetters*, *Shingles*, as well as most kinds of *Swellings* may be totally cured by drawing sparks only.

45. A lad at *Stockholm*, who had a severe *Sciatica* in the right hip, so as not to bear being touched, was cured in a few days.

John Ellison, then an officer of excise, living in *Hunt-street*, *Spittlefields*, was upon catching cold, seized with a violent *Sciatica*, which held him several months without intermission, and frequently almost took away the use of his limb. In *August* 1754 he was electrified, receiving two shocks. His pain raged the more for four or five hours; but afterwards entirely ceased. And from that time to this he has been perfectly well, without the least relapse

"Mr. *R*—— *S*—— of *Worcester*, troubled with a *Sciatica* for some years, was cured at once by shocks conveyed to the parts affected. Mr. *L*.

Mary Butler, aged 86, living in *Eagle-street*, *Redlion-square*, having been afflicted with the *Sciatica* for more than twenty years, was last month electrified ten or twelve times, and has been easy ever since.

It seems the electric fire in cases of this and of many other kinds, dilates the minute vessels, and capillary-passages, as well as separates the clogging particles of the stagnating fluids. By accelerating likewise the motion of the blood, it removes many obstructions.

46. *Thomas Nevil*, weaver, aged 26, living at the bottom of *Vine-Court*, *Spittlefields*; when about 10 years of age, *sprained* his loins so violently, that

that from that time he found a continual weakneſs, frequent pains and an inability to do any hard work. On Thurſday, *March* 10th, 1757, he was electrified, receiving five or ſix ſhocks thro' the parts affected. When he went home he felt no pain, but much foreneſs on the part, on which a red ſpot appeared, like a ſmall pin's head. But the next morning he was perfectly well, and has been ever ſince ſtronger than before the firſt hurt.

Francis Halfpenny, Taylor, aged 30, living in *Red-Croſs-ſtreet, Southwark*, when about 18 years old had a fall from a tree. By this he received ſuch a ſprain, that he could not walk twenty yards, unleſs exceeding ſlow, without a gnawing, aking pain down his thigh. About the middle of *September* laſt he was electrified thro' the upper part of the thigh. This was repeated at five or ſix different times. The firſt ſhock removed the pain down to the knee. At the third electrifying it went quite away. And ſince that time he has been full as well as he was before his fall.

47. "*E—H—*, of *Tedny*, had a very painful *ſwelling* in the ball of her great toe for ſome years. Having made uſe of many other means in vain, ſhe was at length electrified. After the firſt operation (by drawing ſparks) the pain was much abated; and in a ſhort time the ſwelling diſappeared and the pain left her."

"Mr. *Joſhua W—*, of *Perſhore*, was troubled for ſeven or eight years with a pain in his ſecond toe. Tho' nothing was to be ſeen, it was as tender as a boil, and the pain was ſo great, particularly in walking, that he at length determined to have it cut off. By drawing ſparks he was cured in an hour."

"A gentleman of *Worceſter* ran a bodkin into the ſide of his hand, near the fore and middle fingers

gers. The wound was no more than a prick of a large pin, yet in three or four days a *ſwelling* came both in the palm and on the back of the hand.

"The fifth day a ſurgeon was called, who for three months dreſſed both the inſide and the outſide of the hand to no purpoſe. A cauſtic was then applied: but with no more ſucceſs than all the other means.

"Finding no alteration, nor likelihood of any, he was electrified twice (by drawing off ſparks) on the inſide of his hand, at the bottom of the middle-finger. In four days it broke, and in about three weeks healed. Mr. *L.*

Jane Daviſon, Quilter, aged 26, living in *Quaker-ſtreet*, had about ſix years ago a violent tooth-ach, which occaſioned a *ſwelling* in her right cheek. This continued gradually increaſing on the inſide of the cheek, till it grew into an hard fleſhy lump. Deſpairing of any help, ſhe let it alone, till laſt month ſhe was perſuaded to be electrified. She received ſeveral ſtrong ſhocks thro' the part. After this was done the firſt time, the ſwelling not only increaſed exceedingly, but was violently painful. The next day, the other cheek likewiſe ſwelled, and that ſwelling ſpread thro' the upper lip, acroſs the mouth. Nevertheleſs ſhe was electrified again. Two or three days after it broke, and for two days together, diſcharged abundance of purulent matter mixt with blood. But in a few days the wound was entirely healed, and all the ſwelling gone.

48. "*E*— *T*—, taking cold, was ſeized with a *ſore throat*, which grew worſe and worſe for ſix days. She then could not ſwallow even a bit of bread ſoaked in tea. The ſame morning ſhe was electrified, ſo as to direct the ſhock in a right line thro' the part affected. By the time ſhe got home

ſhe

ſhe could eat any thing. Two ſhocks more made a perfect cure."

49. "The *tooth-ach*, if proceeding from a ſcorbutic habit, from hollow teeth, or from a defluxion of rheum, is preſently aſſuaged or totally removed by this remedy.

"This may frequently be done by drawing ſparks from the tooth or cheek: in more ſtubborn caſes, by moderate ſhocks. The ſooner you touch the phial, the weaker the ſhock: ſo that you may leſſen or increaſe it at pleaſure.

"In giving the ſhock the moſt effectual way, is, to bring one wire under the chin and tooth, (if it be on the under ſide) and lay the end of the other wire on the top of the tooth. If it be on the upper ſide, bring one wire to the top of the head over the tooth, and apply the other to the bottom of it. Mr. *L.*

Sarah Elliſon, the wife of *John Elliſon* above-mentioned, catched cold in lying in, which fixed a ſharp pain in her *teeth*, and the ſide of her face. She uſed all manner of means to remove this for upwards of ſix years. Among many others, ſhe had at ſeveral times three teeth drawn, and was fourteen times bliſtered, but without effect. In *July* 1754, ſhe received ſix ſhocks thro' her head. The pain ceaſed immediately, and returned no more.

50. "A perſon had a ſwelling, ſuppoſed to be a *wen*, between the neck and the ſhoulder-blade as big as an egg and nearly as hard, which had been growing to that ſize for ſeveral years. She had not been electrified many times (by drawing ſparks five or ſix minutes every day) before it began to ſoften. Soon after it diſcharged a thin humour thro' a ſmall orifice, and continued diſcharging and opening more and more till it was entirely diſſipated." Mr. *L.*

51. Who-

51. Whoever desires to see a more circumstantial account of many of the preceeding cases, with the names of most of the patients and their places of abode, may consult Mr. *Lovett's* treatise. It is wrote not only with admirable judgment, but with an excellent spirit. A principle of benevolence to human kind may be easily observed to breathe thro' the whole: nor can any lightly condemn it, but those whose interest naturally leads them to decry whatever would lessen their own gain.

52. After relating these cures, Mr. *L* himself adds, "I can't deny but I was almost astonished, at seeing such mighty things performed by electricity. But after having attentively considered the nature of electric ether, its great subtilty and power, its active and enlivening qualities, and its mighty tendency to accelerate the motion of the fluids in general, and of the blood in particular:" (I would add, and to pervade the finest arteries and nerves, to dilate their obstructed or contracted orifices; as well as to restore the tone of any muscle or fibre, which is either impaired or destroyed:) "I concluded that all those surprizing effects were no more than the necessary consequences of so powerful an agent, when thus determined, and directed. And the helping us in our bodily infirmities, was *one* great end it was ordained to serve," (probably *the* great end) "after it had been thus fully and plainly discovered to us."

53. It were greatly to be wished, that the gentlemen of the faculty would strictly examine the nature, properties, and effects of this sovereign remedy. For such it unquestionably is, particularly in nervous cases; even in those cases, which the common *Materia Medica* will in no wise reach. But it is not to be expected. They must not disoblige their good friends the apothecaries. Neither

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can it conſiſt with their own intereſt, to make (altho' not every man) yet ſo many men their own phyſicians, which would be the unavoidable conſequence, if a regular ſyſtem of practical rules were formed from a proceſs of experiments, whereby a ſenſible man might judge in what caſes it would cure, and in what not: and in what manner it might be moſt effectually applied in any caſe wherein it was proper.

In order to prevent any ill effect, theſe two cautions ſhould always be remembered. Firſt, let not the ſhock be too violent; rather let ſeveral ſmall ſhocks be given. Secondly, do not give a ſhock to the whole body, when only a particular part is affected. If it be given to the part affected only, little harm can follow even from a violent ſhock.

For inſtance. In a *palſy of the tongue*, the ſhock may be given to the tongue only by applying one wire to the hinder part of the neck, and another to the tongue. And if in any caſe there be danger of too great a ſhock, it may eaſily be prevented.

It is highly probable, a timely uſe of this means might prevent before they were thoroughly formed, and frequently even then remove ſome of the moſt painful and dangerous diſtempers: *cancers* and *ſcrophulous tumours* in particular; tho' they will yield to no other medicine yet diſcovered. It is certain, nothing is ſo likely, by accelerating the contained fluids, to dilate and open the paſſages, as well as divide the coagulated particles of the blood, that ſo the circulation may be again performed. And it is a doubt, whether it would not be of more uſe, even in *mortifications*, than either the bark or any other medicine.

Before I conclude, I would beg one thing (if it be not too great a favour from the gentlemen of the faculty, and indeed from all who deſire health

health and freedom from pain, either for themſelves or their neighbours. It is, That none of them would condemn they know not what: that they would hear the cauſe, before they paſs ſentence: that they would not peremptorily pronounce againſt electricity, while they know little or nothing about it. Rather let every candid man take a little pains, to underſtand the queſtion before he determines it. Let him for two or three weeks (at leaſt) try it himſelf in the above-named diſorders. And then his own ſenſes will ſhew him, whether it is a mere play-thing, or the nobleſt medicine yet known in the world.

FINIS.