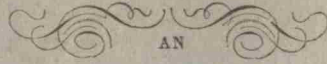


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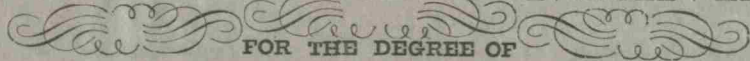
ON

Electricity

SUBMITTED TO THE

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ell DOCTOR OF MEDICINE. *er*

BY

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OF

Lectures on Truncus



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There is no science, in the early history of which, the unlettered mind met with more of profound mystery or dark and foreboding superstition, than in that of Electricity. While at the same time, there is none other claiming in the history of its exhibitions or phenomena, as exhibited at the present day, so much of remarkable beauty, or contending with so great show of success for the palm of victory, when contrasted with it, in the race for utility. Nor are there many departments of science, which can lay a more just claim, or speak with more just pride of its benefits, than that of Medicine.

In order, though, that we may even get at the true present position and

must of the subject, it will be necessary to sketch hastily some points connected with its early history.

The ancient Greek philosophers were acquainted with the primary truth, that Amber when subjected to friction, gave forth a peculiar set of phenomena, which from the Greek word ἤλεκτρον for Amber, ~~from which~~ our name Electricity is derived. Speaking of Amber and its sources, Tacitus remarks that the ancient inhabitants of Germania, from whom the Romans procured it - *itae quae natura, quaevis ratio quaevis, ut barbaris, quantum conopostumum. Inducunt tamen arborum esse intelligas quia terrena quaedam atque stiam volueria animalia plerumque intoluerunt quae, implicata humore, mox,*

diversae materiae, eluctantur 70"

These first observations, recorded by Thales of Miletus, were soon followed by the observation that a stone called Sincurium as well as excited Amber possessed the power to attract to it certain substances. With a few theories added to these facts, the knowledge of the ancients ended.

From this period, the history of Electricity claims no exemplum from the charge of dull animosity, until the beginning of the sixteenth century; in the close of which, existence was given by Otto Guericke to the first Electrical machine. It was though in the eighteenth century, that the science was divested of its mystery and brought to some useful use in the acting of human affairs. When Poy of

England, Du Fay of France and to
his pride Franklin of America, entered
first into a practical investigation of
all its exhibitions, and then upon abso-
lute knowledge of fundamental facts, built
up theories which have ever since divided,
at the same time they have claimed the
admiration of the world.

The first general propositions upheld by
numerous facts, were that this electric
principle, fluid, or whatever it might be,
dwelt in every particle of matter, and
was produced alike in all by friction, it
being exhibited more in one than in a-
nother, on account of the different conduc-
ting powers of bodies. At the same time
these bodies were divided into two classes,
producing different kinds of Electricity, and
receiving the name of positive and negative,

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or vitrious and visinuous, as one or the other theories of the states in which it exists, was secured, The hypothesis being at last admitted, that the phenomena connected with electricity, arose to be attributed to the existence of a fluid, the philosophic world was then divided by another difficulty. Franklin and DuRoi each promulgated theories with reference to the cause of its diverse actions, the former asserting the existence of one fluid, the superabundance, or absence of which was enough to account for these differences, while the latter contended for the existence of two fluids, possessing contrary qualities. As space will forbid us entering into the reasons ascribed by each for his opinions, we will be compelled to pass them by. Get a proper understanding

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of the subject under investigation, will
compel us to notice the necessity for the
formation of these theories. To be as suc-
cinct as possible about this necessity, we
merely state the fact, that "bodies electrified
in ~~the~~ different ways, attract, and in the
same way, repel each other. This fact was
one developing itself, early in the history
of the science; for we find in the earliest
frictional attempts, the fact recognized, that
in the body rubbed, and in the rubber, two
entirely different states of force produced, or
developed.

Of these investigations, much too nume-
rous to be even glanced at here, authorized
finally the including under this general
term, the principle, giving to the load
stone its peculiar properties; that which
affords the thunder storm its peculiar

attributes, as well as that recognized in
the hitherto inexplicable effects produced by
the actions of several animals. The sub-
ject thus occupying so much complica-
ted and extended territory, for purpose of
a philosophic investigation may well
be divided into five heads or subdivisions.
First, Magnetism; second Frictional
Electricity; third, Chemical action or
Galvanism; fourth, Thermo-Electricity; &
fifth, Animal Electricity.

The two classes to which we will be called
on to confine ourselves principally, if not
entirely, are Chemical and Animal
Electricity. The latter requiring nearly
first a patient investigation at our hands
connected with which, will naturally
follow the share of notice which the
former demands, at least as related to

the end of the present ³ treatise. In making this division and proposed separation, between Chemical & Animal Electricity, we are perfectly aware of the fact, that we tread upon dubious ground, and propose a distinction, which many may positively deny. Let us search for truth, and then hold to it.

The great question to be decided in the commencement is, what part does Electricity play in the affairs of the Animal Economy. Does it, upon the whole, simply sustain as in many objects of nature, existence in an actious equilibrium? A word or two with reference to those animals, in which electricity is exhibited in the most tangible form — The Torpedo, The Gymnotus, and the Silurus electricus. That the phenomena seen in these animals are

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the effect of a principle, identical with that denominated by us, when proceeding from other sources, Electricity, may now be considered a demonstrated fact. Since two of the most prominent features distinguishing Electricity - the shock to the animal frame, and the spark, have been completely and satisfactorily made out. As to whether these phenomena are consequent upon Chemical action or frictional activity of the peculiar organs, immediately connected with them, is a question, which for the present, we choose to pass by without special discussion - As also the question, whether the organs superadded to these animals are for the generation, or the mere accumulation of Electricity. It may be added also with reference to the proofs of the

identity of this, with ¹⁵ electricity in general,
that it has been found capable of produ-
cing the same chemical decompositions
and unions. It has been long admitted
that electricity serves an important part
as one of the four vital Stimuli, both in
the growth and development of plants
and animals.

It will probably be left to future experi-
ments to determine whether it does or does
not perform some higher office in the
animal economy; yet there can be no
objection urged against citing here, the
results of several experiments already
made. The attention of electricians was
first directed to the connexion of this sub-
ject with the animal Kingdom, from the
accidental discovery of the effect of an
electric machine upon the muscles of

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a frog's leg. It being known that the movement of these muscles, being voluntary, were solely dependent upon the stimulus given them by the nerves, the question immediately arose in the mind, as to the identity of this fluid with the nervous fluid. This led to other experiments, the result of which, point even more strongly to an identity. Animals have been at various times fed on food appropriate to their digestive organs, and then after the lapse of several hours, the ^{vagus} ~~7th~~ or eighth pair of nerves, have been severed, and the result was that the animals died, and examinations showed the food in an undigested condition.

On the contrary when, after the severing of the nerve, electricity was brought to bear upon the end of the nerve, an

examinations disclosed the digestion, and proper appropriation of the whole mass of ingesta. Nor have the experiments in aid with such transient results as these.

The nerves supplying various limbs have been divided, and the member kept in its proper relation to the other parts of the body, by the passage of a current of electricity through the distal extremity of the cut nerve, and the same result has been attained, with reference to the nerves of sensation, as has just been shown in connection with those of motion. We have now by means of this so called fluid, satisfied the demands of the two sets of nerves, which perform such an important office in the animal economy. We ought have alluded here, and not without utility too, to the effect of

the passage of an Electrical current through a growing plant; the adaptation of the negative form to particular plants, and of the positive to others, with the probable analogy to the afferent and efferent arrangement and action in the nervous system. The fact has long ago been found out, that the rapid motion of any muscle in the animal frame, was the cause of the evolution of Electricity; though the manner of accounting for it, has been to make the muscle itself entirely accountable for it.

With these facts we leave the imagination to inquire whether the cause may not be complicated. The luminosity as well as the sounds occurring in the animal frame, strikingly similar to the same exhibitions of electricity, are,

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probably, as yet, too obscurely made out,
to justify us in setting them down as un-
mistakeable evidences of identity. Yet we
have upon record at least one case, in
which sparks were constantly ^{passing} ~~emitted~~ ^{under} ~~from~~ ^{unfavorable} ~~circumstances~~ ^{from} the body: where
neither the motion of the muscles, nor
friction of the clothes of the patient was
competent to account for the occurrence.

One other point of similarity, as our
means of investigation are capable of reveal-
ing, it may not be improper to briefly all-
ude to, — the time of the passage of the
two fluids. In neither case has any re-
finement of art been sufficient to dis-
cover that their influence, no matter how
great the distance, is not instantaneous.

The enumeration of these combined
facts, unless some counterbalancing evi-

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ance can be brought forward to rebut them, would, to say the least possible, excite in the mind a strong suspicion of identity, between electricity and animal fluid. Justice, though, requires that the difficulties in the case should be allowed their appropriate bearing.

In reference to muscular contractions, it has been contended, that their sole cause resided in the opposite electrical states, excited in different parts of the muscle. The means operant of this action it might cause more trouble to satisfactorily explain, consistently with the known principles of induction, than might appear, at first view of the subject. But this objection is totally silenced by the second fact stated.

The opposite electrical state of the

different portions of the nerves might be made to account for the contraction of the muscles, but never, for the supply of the required nervous impulse in the digestion and appropriation of nourishment.

Again it has been said that the tying of a nerve, as effectually destroys its utility, as the separation or division of it. This it will be admitted, in accordance with the course of Electricity outside of the animal frame, ought not to be so. Yet how can we tell, what peculiar molecular conformation the passage of the current here is dependent upon, or what changes the simple ligature may cause to transpire. The same course of reasoning is equally applicable to the objection, that Electricity can never

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restoration to the nerves their power, after it has been once lost in death. Yet we think experiments show that it accomplishes little short of this. Objections arising from diseases, to which the nervous system is subject, in the present state of our knowledge, prove to be of little more avail than shooting straws against the wind.

We are perfectly aware that in leaving this subject here at this point, there are remaining to be investigated fields totally unexplored by us. We are further conscious that the facts presented, might, in their legitimate ramifications, have been not only much more fully carried out, but at the same time much more scientifically treated of, especially as related to the nomenclature and technicalities

of Physiologg.

In passing from animal to chemical Electricity, we do not claim to pass to a division, in its productions essentially, or even at all varying from the primary production of the department of the subject already treated of. Two objects have prompted this division, ^{first}, an acknowledgement of ignorance with reference to the absolute generator of animal Electricity, rather than a wish to assert any particular Theory or Belief. Second, a wish to place the Therapeutical effects of this agent in the most convenient form to be treated of. It is true that electricity derived from the machine, exerts the same identical influence, as a seminal agent, in the multifarious diseases of the animal constitution, as Galvanism.

And the only reason for confining our investigations to this one source, arises from its being the one most conveniently resorted to by the medical man, and in fact the one in which is to be found the greatest number of apparatuses prepared for his use.

It will be entirely useless and unnecessary for us to enter into any description of the many complicated machines in use for the production of the Galvanic or Voltaic current. The primary law upon which the construction of the whole of them is founded, is that, "Whenever any two dissimilar metals are brought in contact, as copper, silver or Platinum, with zinc or iron, in an acid or saline fluid, a Voltaic circuit or current is immedi-

ately established.

To the Physiologist and scientific Pathologist, the statement of the principles already referred to, would be sufficient to settle in his mind at once, the character of disease to which this agent is properly applicable. And indeed it would indicate but a poor adductive power in the brain of any man, who would not see at once the propriety of its use in certain forms of disease, even though he had never heard of its application to any of the numerous affections to which human nature is heir. Thus, while it has been used as a penance, the destructive effects of it have not been rare, nor of a ~~transient~~ trivial nature. Yet the refusal of the scientific medical man to use it, on this account,

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alone, regards him in point of phi-
losophical observations, and some judi-
cious application, to a level with the
contemptible quack, who is willing to
rush his remedies into all sorts of
diseases, totally unaware of their na-
ture or strict requisirement. In truth
by such conduct as this, the professedly
regular practitioner often converts
himself into the mere quack. For it
is the strict adherence to the princi-
ples of reason, as guided by scientific
observations and experiments, and not
an over scrupulous following of ancient
formula and prescription which makes
the regular physician.

Of experiment has proved the capability
of electricity to supply in any degree,
even one of the multifarious departments

of the nervous fluid, then to this point must the mind of the intelligent practitioner be at once directed, with the expectation of rendering it available to his art. How much more than would this duty be demanded, yea imperiously demanded at his hands, when not only one, but a plurality of its offices are clearly demonstrated to be amply filled, and their demands satisfied, in its use.

Any disease dependent on nervous weakness, comes then directly and properly under the remedial effects of this agent: Such affections too, as are essential to the enjoyment and prolonging of life, in their requirements for relief or removal. Among which are to be numbered almost all those symptomatic diseases, consequent upon a functional,

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in contrast with, and organic derangement of the important organs of life; that is, if our understanding of functional derangement be correct, such as dyspepsia, indigestion, certain kind of torpid liver, ~~and~~ probably some species of failure of action in the heart, and loss of any of the senses from want of nervous activity. Nor can we see any want of philosophy in the application of this agent to cases poisoned by opium; all Pathologists agreeing, so far as we are aware, that it is by a cessation of the vital organs to perform their appropriate offices, rather than any positively poisonous effects of the article administered, which causes death.

Such cases as Palsy, epilepsy &c, come under the general rule mentioned, of course.

It is well worthy of note that the most of the diseases mentioned, are but slightly under the remedial control of agents usually employed by the profession.

The escharotic power of this agent, well established as it is, is worthy of record.

Having been in possession of no treatise bearing directly upon this subject, our ideas have necessarily been crude, and to a great extent ill digested; yet while we feel that the subject demands a much higher stage of investigation, we are at the same time persuaded that the facts mentioned may not be inapplicable to the points discussed.

It will be observed that our division of animal electricity, has been in many parts, entirely different from what that department has

been usually made to embrace, and that we have paid no attention to misnomers, an important ingenuity in it. We have done this more for the convenience of the arrangement of our desultory ideas on the subject, than because we held it to be strictly scientific, or proper in any work which might be intended to be instructive upon the subject.

The glories of this science are but yet concealed in the bud. Future investigations are yet to startle, by their splendor, the profession from its apathy, with reference to it.