

Mac Cormack (M. J.)

CHOLERA :

ITS

CAUSES, NON-CONTAGIOUSNESS, PREVENTION,

AND

TREATMENT ;

*Showing the Effect of Electricity on the Animal Economy,  
as Productive of Epidemics generally.*

BY

M. J. MAC CORMACK, A.B., M.B., T.C.D., M.R.C.S.L.,

*Medical Officer of Health to the Vestry of Lambeth.*

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SECOND EDITION.

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CHOLERA

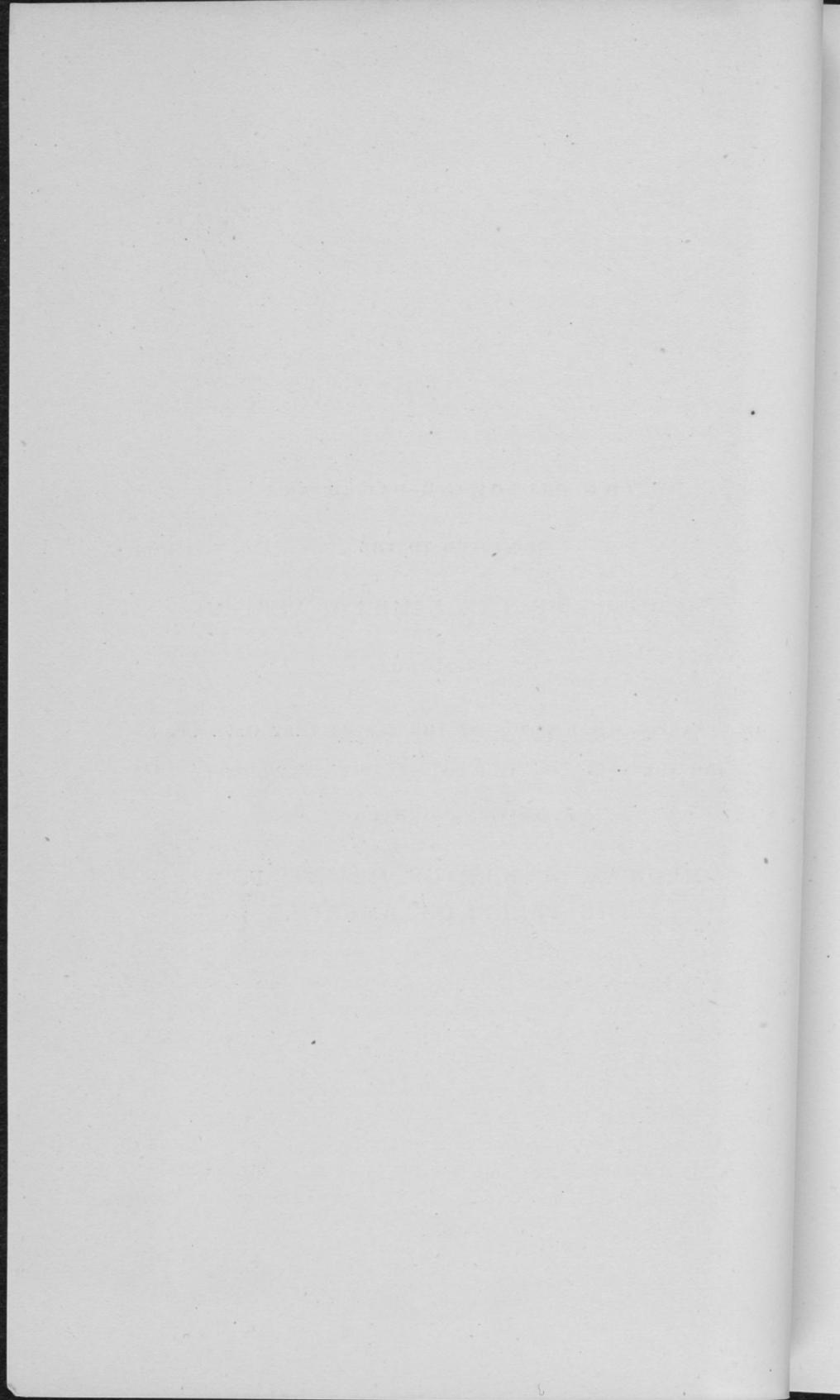
PREVENTIVE MEASURES

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THE FOLLOWING PAGES ARE  
DEDICATED TO THE  
MEMBERS OF THE LAMBETH VESTRY  
BY THE AUTHOR,  
IN GRATEFUL RECOGNITION OF THE CLAIMS THEY HAVE UPON  
HIM FOR SELECTING HIM TO OCCUPY SO RESPONSIBLE  
A POSITION AS THAT OF  
MEDICAL OFFICER OF HEALTH FOR  
THE PARISH OF LAMBETH.



## PREFACE TO SECOND EDITION.

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TWENTY years have elapsed since I propounded the views contained in this pamphlet, and having had the further experience of three epidemics of Cholera, I am more than ever satisfied that to electrical disturbances, and a deficiency of the same, we must attribute the invasion and spread of Cholera, diarrhœa, influenza and such like diseases.

I carefully noted at the commencement, and during the progress of each of the last three epidemics, the electrical condition of the atmosphere, as reported in the Registrar General's Returns, and was struck with the almost invariable increase of the attacks and the number of deaths, on those days, when there was either no electricity present, or when it was negative.

I had many opportunities afforded me during the epidemic of 1866, as Medical Officer of Health of Southampton, for tracing the rise, progress, and decline of the disease; suffice it to say, that the condition of the atmosphere as regards its electricity invariably coincided with the increase or otherwise of the epidemic: whenever there was a deficiency of electricity, we had the greatest number of cases and the greatest mortality; there were also several severe thunderstorms during the four months the disease prevailed. Its outbreak for a short period in the autumn of the previous year (1865) was also marked by similar electric conditions. The blue mist, as described by Mr. Glaisher, and which was almost always present on the days when electricity was absent, or negative, was, to say the least, an extraordinary coincidence, and confirmatory of that gentleman's views as to the causes which gave rise to this mist. This subject has engaged the attention of others besides myself, since the period I first wrote, and I am happy to find that there are many more inquirers into this mysterious agent as producing epidemic diseases than when the 1st Edition of this pamphlet was published. The more this matter is investigated, the more

I am satisfied will the theory of contagion as regards cholera disappear, and the views which I have endeavoured, however feebly, to enunciate, be found to be the true and scientific explanation as to the origin and predisposing cause of this and other similar diseases.

Among the many valuable contributions that have appeared corroborative of my views have been one from the pen of Mr. T. Harvey, now a member of the Lambeth Vestry, and another from Dr. Shrimpton of Paris, a name well known both in France and this country. Both these gentlemen have given strong corroborative facts as to the influences which electricity exerts upon the animal economy; and it is a remarkable fact, that neither of them were aware, at the time of publishing their contributions, that, I had preceded them. Dr. Shrimpton, in his account of the epidemic of 1866, in Paris, has given many facts in every way similar to those I published in 1852. On seeing a review of his work I communicated with him as an old acquaintance, and hailed him as a very valuable ally to the views I had been advocating; to my surprise, he had never seen a copy of my pamphlet, and had been congratulating himself on being, as it were, the first to adopt the electrical theory as productive of cholera. His pamphlet is a very valuable one, and contains most convincing proofs of the truth of the views I have so long been the advocate of.

My object in republishing this pamphlet is the hope that, as cholera has been now for some time past slowly but steadily advancing towards our shores, many others may be induced to investigate, and, if they can do so, adopt the views herein contained. The extraordinary electrical disturbances during the past summer, the almost simultaneous and universal outbreak of the potato disease following such disturbances, and which latter circumstance has almost always preceded an invasion of cholera, are to my mind strong ground for our reasonably anticipating an outbreak of this disease some time in the spring of the coming year, if not sooner, and should be an inducement for a proper investigation into the truth or otherwise of the theory put forward in these pages.—M. J. MAC C.

# CHOLERA :

ITS CAUSES, NON-CONTAGIOUSNESS, PREVENTION, AND  
TREATMENT.

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THE rapid approach of Asiatic Cholera to the shores of Great Britain, and even while I write, (July, 1852) its actual invasion, is the motive that actuates me in publishing the views contained in the following pages ; in doing so, I lay no claim to originality, either as regards the causes which, in my mind, give rise to this desolating and mysterious disease, or its treatment ; but if anything I may state will be the means of exciting enquiry, and thus lead to a more successful mode of combating and arresting its ravages, I shall feel myself amply repaid for the trouble I have taken, and the time I have expended in this investigation. The views I now propound are by no means new or singular, as the greatest portion of this pamphlet constituted the subject-matter of a lecture delivered to a Literary Institution, as far back as 1849, during the last epidemic of cholera ; and even thirty years ago similar views were held and published by Sir James Murray, M.D., and others, from whose writings I freely quote, and to whom I am indebted for all I know and believe on this matter. Before entering upon my subject, I propose dividing it under the following heads :—

I. A brief description of what is meant by Electricity ; its sources and properties.

II. Its distribution throughout our globe, the effect it has on the temperament, and the influence which climate exerts upon our physical and mental faculties.

III. The different diseases produced by different degrees of electricity existing in the air in different countries.

IV. What evidence we have to prove its being the immediate and exciting cause of epidemics, such as cholera, yellow fever, influenza, &c.

V. What are the best remedial and preventive measures we can employ to arrest, avert, and remove such epidemics ?

Let us now proceed to the consideration of the first of these divisions.

The question very naturally arises, What is Electricity? and Who can define this subtle agent? This particular branch of science appears to have derived its name from the first substance in which any of its properties were discovered; this was Amber, the Greek name of which is *Hlectron*, evidently derived from the word *Hlectora*, a name by which Homer designates the sun; but whatever may be the etymology of the word, it is now used to designate that science which investigates the attraction and repulsion, the emissions of light and explosions, which are produced, not only by the friction of vitreous, resinous, and metallic surfaces, but by the heating, cooling, evaporation, and mutual contact of a vast number of substances. Professor Oersted having discovered that electricity and magnetism are identical, I shall often make use of either term alike to express one and the same agent; and his observations have gone far to prove that electricity, magnetism, heat, light, and what is called nervous influence, are one and the same agent, differently modified, and often mutually convertible. Many experiments have been made for the purpose of ascertaining whether the nervous force is electrical. Professor Matteucci has observed a deviation of the galvanometer (an instrument used for the detection of slight currents of electricity) amounting to 15 or 20 deg., when the liver and stomach of a rabbit were connected with the ends of the apparatus, an action which was not due to the different chemical properties of the secretions, as it ceased with death. Many other experiments which tend to confirm the identity of nervousness and electricity may be cited. Dr. Prevost, of Geneva, has succeeded in magnetizing very delicate soft iron needles, by placing them near the nerves. Vausseur and Berande have likewise succeeded in rendering needles magnetic by passing them through the nerves of a living animal, while division of this cord, they say, destroys this property.

As a power, its existence has been known from the earliest ages. It is the fifth element of the Hindoos. As the vital principle of nature, it was worshipped as a god, in the earliest ages of mankind, the Greeks deriving their word expressive of

God (*Theos*) from *Theoami*, "I contemplate an unknown cause." In the mythology of the Romans it was deified under the title of Jupiter Tonans, the two hands of nature, whereby she chiefly worketh. Heat and cold of Lord Verulam, the plastic nature of Cudworth, the spirit of nature of Dr. Henry Moore, and the ether of Sir Isaac Newton, are all conceptions of that principle which modern science recognizes under the term electricity.

One of the principal properties of this agent is the tendency it has to assume a polarized position; it is in this condition we find it in the magnetic needle, the atmosphere, and the terrestrial globe. When we come to consider it as a pathological agent, we shall find that this is the condition it assumes in man.

As it is not my intention to enter at any length into the source from which electricity arises, except so far as it bears on our present subject, I shall but briefly consider some of its principal sources.

It has long been an established fact, that electricity and heat are identical. From this circumstance I purpose accounting for the phenomenon of animal temperature; and it is quite evident that if this is lowered, it can only be from the body receiving a deficient supply of electricity or parting with the same.

Electricity is elicited by chemical decomposition, and as chemical decomposition of the food occurs immediately it is received into the stomach, in the process of digestion, there is every reason to suppose that the purpose that a bulk of food is destined to serve, is to afford, by its own decomposition, a sufficient supply of animal electricity, and this seems to be, in a great measure, borne out by observation. Food is very varied in its nature; spirits afford a large amount of heat while burning, a proof that this chemical decomposition (or combustion, according to the celebrated Liebig) in the stomach, affords a large amount of heat, or electricity. Meat, and all kinds of stimulating animal food, afford a much greater supply of this agent than does a bread or vegetable diet. This accounts for the poorer classes being always the first victims of disease,

especially such a one as cholera, where the stage of collapse is the result of the rapid passing off of the animal heat, or electricity. Hence it is we find that a great drinker is but a little eater—and why? He supplies a sufficiency of electricity from spiritous liquors, and he therefore only requires a small amount of solid food to answer the purpose of nutrition. But, from this very cause, he is the first to fall an easy prey to the slightest attack of a prevailing epidemic, inasmuch as the moment he becomes inebriated, and, of course, incapable of swallowing any more, his body begins rapidly to lose all its heat, or electricity; and, if in that state he is seized with such a disease as cholera, he soon falls into the stage of collapse, and becomes an easy victim.

We have the stomach, then, as the laboratory where the vital agent is eliminated; and we must view the brain—not with Dr. Arnott, in the light of a galvanic battery—but merely as a receptacle, or reservoir, in which it is received and dispensed, by the medium of the nerves arising from it. This view will readily explain to us why a state of collapse, or a deficiency of nervous agency, should be occasioned by a blow upon the stomach, as, also, that unpleasant sensation, termed head-ache, be produced in the brain, when, by means of spirits, or highly-seasoned food received into the stomach, too great a quantity of electricity, or the vital agent, has been directed to it. A question will very naturally arise, Where does the heat come from in fevers, when we know that no food is taken into the stomach for several days? The answer is simply this: that, though the stomach, in a healthy state, is the chief source of supply, still there are other channels by which this agent can be received into the system—the pointed fibres of the hair, for instance—thus explaining the good effects of shaving the head, and insulating it by an oil-skin cap; and the use of evaporating lotions, which all prove such servicable remedies in the severe forms of febrile affections.

Now, if nervous influence is the source of heat, mental emotions, which produce such sudden changes in the nervous system, should, and does exert an influence over the tempera-

ture of the body ; and we find that a sudden flush, of a death-like chilliness, are the effects of the exciting or depressing passions. For instance, in a case of extreme fright, there is generally a loss of heat, accompanied with contractions of the muscles, and a bristling sensation of the hair. Painters, in depicting this emotion, have invariably done so by these characteristics ; and Shakspeare, especially alludes to this :—

“ I could a tale unfold, whose lightest word  
Would harrow up thy soul, freeze thy young blood,  
And make \_\_\_\_\_  
Each individual hair to stand on end  
Like quills upon the fretful porcupine ! ”

Now, in this bristling sensation, the veriest tyro in electrical science cannot fail to observe an electric phenomenon—the escape of electricity by the pointed fibres of the hair, whilst the loss of heat indicates the loss of electricity, and the contractions of the muscles indicates its passage.

This, too, affords a convincing proof that the mental and physical agents are the same. Here mental emotions produce physical disturbance. In that physical disturbance we recognize electricity, and therefore we must arrive at the conclusion, that this agent is productive alike of our mental and corporeal faculties, that the human mind is mysteriously connected with it, and, in short, that electricity is the vital agent.

I know no place more opportune than this to impress upon the minds of my readers the danger and folly of giving way to this depressing and disease-producing agent, fear. There is no one more exciting cause of the disease to which this pamphlet more particularly refers than the above ; and there is no circumstance so calculated to give rise to it than the foolish doctrine of contagion, and which is one, I regret to say, that has possessed (on every return of the epidemic) the minds, not only of the public, but of a great number of the profession. Feeling as I do, a perfect conviction of the utter untenableness of this doctrine, and how futile it renders all our plans of sanitary reform and modes of treatment, I have, on several occasions, through the medium of the press, endeavoured to

remove these erroneous impressions. Time and space would not permit me here to enter fully into the question of contagion or non-contagion; I intend, shortly, embodying in another pamphlet my views upon the subject, the result of many years careful study and observation of the disease, both in this country and in the East. I shall content myself, for the present, with quoting a short extract from a lecture, delivered at St. George's Hospital, London, by the most eminent physician of the day, Dr. Chambers, in which he dealt a great blow and discouragement to the contagionists. It is as follows:—

“The causes of cholera the exciting causes, remain to be adverted to; and it is a portion of our subject, the consideration of which is attended with difficulties of no ordinary character. The sources of the disease have been sought for by physical philosophers of every class; the votaries of chemistry and meteorology, botany and zoology, have been equally unsuccessful in attaining this object. This want of success is, as appears to me, the reason why the opinion of its propagation by contagion have been so willingly adopted by the public, and by a large portion of the profession, for the believers of this *fascinating* doctrine are obviously absolved from all laborious investigation of the precise nature of the malady. They have no inducement to endeavour to ascertain whether any peculiarity in the state of the atmosphere, any miasm, or effluvium from the ground, any particular vicissitudes of temperature, any phenomena connected with the electric state of the air, or the currents of terrestrial magnetism, may probably be the agents of its production. They have only to occupy themselves in the operation of tracing it from the individual who is suffering to another who has already suffered, with whom he may have recently consorted, or may have reported to have approached, and as soon as this is made out no further need exists for perplexing their minds with scientific disquisitions as to the nature of the morbid virus.”—*Lancet*, Feb. 17th, 1849.

We shall now proceed to consider the second division of my subject, namely, the manner in which electricity is distributed throughout the globe, the effect it has upon the temperament,

and the influence climate exerts upon our physical and mental faculties.

It is proved by experiments instituted for this purpose, that electricity is collected within the tropics, from which it is polarized in a horizontal direction. There is a vertical polarization of the terrestrial electricity, the vertical direction being from the surface of the earth upwards, while the horizontal direction extends from the equator to the poles. With these preliminary remarks, we will proceed to consider this agent more especially with reference to the physiology and diseases of man. Regarding, then, electricity as the vital agent, I purpose to call that state of the body characterized by energy of the vital power (for instance, fever), the electric, in contradistinction to that state, in which the power is torpid, as in collapse, to which I apply the term magnetic.

The Temperament may be divided into four classes, viz.—the Electric, Electro-Magnetic, Magnetic, and Magneto-Electric.

The Electric temperament is that in which electric action is in excess, and is characterised by a dark complexion, dark hair, and in large growth, warmth and energy of the various passions, and muscular and constitutional strength.

The Electro-Magnetic temperament is that in which electricity slightly preponderates; and is known by the same characteristics less evidently marked.

The Magneto-Electric temperament is an approximation to the magnetic, which latter is characterized by a fair and delicate complexion, timidity and reserve, want of energy, and a degree of distance or coldness.

The Magnetic state is strikingly marked in the latter stages of consumption, a disease to which this temperament is especially subject, which can be a matter of no astonishment, if, as I believe the cause to be, the negative, or deficient state of electricity existing in these persons, induced by the small amount of nourishment which they are generally capable of partaking; and the rapid and constant evolution of electricity, both from their bodies and their respiratory organs, for it is a well-established fact that electricity is evolved during the act

of respiration ; and in no disease, especially in the last stages, have we such hurried respiration as in consumption.

Matteucci, in a course of lectures delivered some years ago, on the physical phenomena of living bodies, has ably demonstrated the fact, that they not only produce heat, but on many occasions gave out light also. Now, it is allowed that animal heat is produced by electricity acting upon the blood, through the organs of respiration ; the phenomenon of phosphorescence, or the evolution of light from the human body, can only be accounted for as arising from the electricity of the body passing off either from its surface or from the respiration. Several interesting cases have been recorded of this phosphoric light being visible, emanating from the bodies and from the breath of persons dying of consumption. Sir Henry Marsh, M.D., physician to the Queen in Ireland, was one of the first in this country who published a detailed account of this appearance. Those who may feel a curiosity in reading his cases, will find them recorded in "Transactions of the College of Physicians (Ireland)." Dr. Stokes has also recorded some similar cases, and the late Professor McCartney, in an essay entitled, "Theory of Evolution of light from animals," has related several instances of the kind ; Dr. Donovan of Skibereen, Cork, five or six years ago, published a very interesting case of this nature in the Dublin Medical Press.

The evolution of light has also been remarked as emanating from the bodies of persons in the collapse stage of cholera, which, to my mind, is a proof that this disease is dependent on the rapid evolution of electricity, or animal heat, from the body. This was first observed during the epidemic of 1832, and so highly phosphorescent was the patient's body in many instances in the collapse stage, that it was even possible to draw sparks from it, as you would from a Leyden jar, by merely applying the knuckles to the patient's body ; and, lest this statement should be doubted, I have thought it desirable to give the extract in full from the work in which it is stated. It is from the pen of a gentleman of high standing in the profession, and of scientific attainments of no ordinary character, and who

has written more especially on the effects which electricity produces on the animal economy,—viz., J. C. Atkinson, M.D., London.

“I am desirous at the present moment of directing the attention of your numerous scientific readers to a very interesting phenomenon, more or less present in the collapse stage of cholera, which seems to have hitherto escaped the observation of medical men—an animal electricity, or phosphorescence of the human body. My attention was attracted to the subject during the former visitation of that fearful disease, in the metropolis in 1832. It was, indeed, singular to notice the quantity of electric fluid which continually discharged itself on the approach of any conducting body to the surface of the skin of a patient labouring under the collapse stage, more particularly if the patient had been previously enveloped in blankets. *Streams of Electricity*, many averaging *one inch and a half* in length, could be easily educted by the knuckle of the hand when directed to any part of the body, and these appeared in colour, effect, crackling noise, and luminous character, similar to that which we are all accustomed to observe when touching a charged Leyden jar. I may remark the coincidence, that simultaneously with the heat of the body passing off, the electricity was evolved and, I am therefore led to ask the question: Are not heat, electric and galvanic fluids one and the same thing? does not the fact of the passing off of both imponderable substances at one and the same time strengthen the conclusion? Again, are not the whole of what we call *vital* phenomena produced by certain modifications of the electric, galvanic and magnetic matter and motions? and do not we find that these *vital* phenomena are continuously affected by the relative state of the surrounding electric medium? To what can we attribute the present fluctuating condition of the barometer, if not to it?”—*Lancet*, November 4th, 1848.

The temperature of climate, too, is especially deserving of attention. Contrast the warmth and energy of the inhabitants of the southerly portions of the globe, where electricity is more abundantly diffused, with the coldness and reserve which

characterise the inhabitants of more northerly latitudes ; certainly it is evident that a deficiency of electricity seems, in cold climates, attended with a deficiency of the fire and vigour which influence the human passions. All the sciences of the passions, such as music, painting, poetry, &c., claim a southerly zone as their birth-place, whilst the calm and calculating coolness of philosophy finds a more genial home in the less exciting latitudes of our own country. The civilization of the southern portions of Europe brought sculpture, painting, and poetry to perfection, yet produced but few mechanicians. In more modern times these latitudes have been the cradle and nursery of music, while the genius of the mechanician and the logic of the metaphysician shine more conspicuously in the temperate regions of the north. These facts, I conceive, admit of the following explanation :—

Electricity or magnetism in excess acts like a sedative. For instance, if a stream of electricity be long continued to any part of the human or animal structures it will produce paralysis ; but, in moderate quantities, both these agents (or rather both these states of the same agent) act as a stimulus. Witness the exhilarating influence of alcoholic liquors, and the bracing effects of a frost.

Now, I conceive that the functions of our bodies, both mental and corporeal, are dependent on the electricity contained in the brain and spinal marrow, and this electricity is affected by climate in two ways, viz. as to its quantity, and as to its polarity, the first occasioned by the horizontal polarization, by far the most important ; and it is owing to this that electricity is in excess in the torrid, and so deficient in the frigid zone, and in consequence of this excess and deficiency, the inhabitants of these zones stand very low in the scale of civilization ; a literary negro or Esquimaux would be looked upon as a phenomenon. Approaching from the torrid zone towards the poles, we arrive at a latitude (Italy, Greece, the south of France, and Turkey may be included in this zone) in which a vertical polarity becomes evident, and here we find a degree of activity in the intellectual and physical faculties, the vertical polarity, how-

ever, being slight, the intellectual is almost on a par with the physical, and this tends to develop the passions rather than the judgment; approaching further north, we find this activity increased, and the greater vertical polarity of these latitudes occasions a determination of electricity to the upper or intellectual portions of the brain; hence the rapid progress of civilization in these zones, when once the intellect was cultivated, and mankind taught to rely rather on their mental than their physical powers; it is in these regions, and our own country is happily situated in this zone, that the intellectual man makes his nearest approach towards perfection; for the quantity of electricity, as regulated by the horizontal polarization, is the best adapted for the exercise of the animal functions, whilst the vertical polarization by causing the cerebrum (or true brain) to be more active than the cerebellum and spinal marrow, renders the passions more acute;—a striking proof in corroboration of these remarks may be found in the fact, that all our finest works of art are executed by southern artists, whilst the inhabitants of southern climes are compelled to have recourse to the superior skill and talent of the northern engineer. These peculiarities of climate are evinced in the variableness of our own country: we well know that when suffering from intense cold, or oppressive heat, our intellects seem to have deserted us; in the one case, we express our ideas as being frozen, and in the other as being melted. I question whether an advocate could do justice to a cause, if compelled to plead in an atmosphere of twenty below zero, or one hundred above it; these effects would be but temporary, but they serve to illustrate the effects of climate upon the mental faculties. A question may naturally arise, as to whether climate will produce its characteristic effects upon strangers; that is, whether, on removing to another latitude, the electricity present in the brain and spinal marrow will assume the same polarity as exists in that latitude: this, I think, may be answered in the affirmative; though an extent of time may be required for this purpose; the removal of a Newton to the warmer regions of the south would, in all probability, have deprived the world of his incomparable

“Principia;” while the depth of passion exhibited in the poetry of Byron may be traced to the very cause which would have ruined a Newton. Mr. Dalton, in his recent remarks on a disease peculiar to warm climates, called Elephantiasis or Barbadoes leg, corroborates this opinion. He says, “individuals coming to live in a country where this disease is prevalent do not become attacked with it at an early period of their residence; it seems to require a certain amount of seasoning to render the constitution liable to its influence.” Causes which affect the body affect the mind also, the one being intimately connected with the other. The fact, then, of climate exerting its influence upon our physical condition is a convincing proof of its affecting the mental faculties also; to discuss as fully as I might wish the peculiar influence of climate upon the physical condition of man would extend this pamphlet beyond reasonable limit; I must, therefore, pass on to consider the third division of our subject, namely, the different diseases which different degrees of electricity existing in the air give rise to in various climates.

That there is a current of electricity passing round the world from West to East has long been proved by the researches of Professor Faraday. Electricity is, therefore, positive or in excess on the Western; and negative, or deficient, on the Eastern coasts of the world. I have already asserted, that where electricity is negative vitality is depressed, where it is positive, it is excited: this is capable of proof; for instance, the hand placed in the negative current of an electric machine becomes cold; in the positive, warm; and many practitioners in India have remarked, that there are peculiar diseases in connection with peculiar electric states of locality; that there is a remarkable difference in the biliary secretion; the liver is excited where electricity is positive, depressed or suspended where it is negative; for instance, in diseases of the West coast of Africa we find that practitioners complain of an excess of the secretion of the bile, giving rise to that fearful form of fever called Bilious Remittent. In the diseases of the East Indies, and especially of China, there is little or no bile secreted, and,

mark, this difference occurs exactly in the same degrees of latitude ; we find that there is also a marked difference in the physical characteristics of the inhabitants of the Eastern and Western Hemispheres ; and for which we can account in no other way than from the different degrees of electricity existing in those countries, though under the same latitudes ; for instance, on the Eastern coast, the face is fair, and where protected from the sun they are of a waxy white complexion. You are, no doubt, all familiar with the peculiar colour and features of the Chinese ; on the other hand, the African on the West coast of that continent is almost jet black in the same latitude that the Chinaman is deadly pale, his hair being black and curled ; whereas in the other it is straight, and, generally speaking, light coloured. Very nearly similar differences are found among the inhabitants of our East coast ; it is proverbial how pale and unhealthy looking those are whose lot is cast along the coast of Essex, Suffolk, &c. ; and to how great an extent scrofulous diseases prevail, which are diseases of debility, the result of negative or deficient electricity. If, according to a late learned writer, the more or less activity of the biliary organs is the cause of the dark or fair complexion, the biliary secretions are certainly deficient on the whole Eastern coast of a continent, and in excess on the Western ; where electricity, therefore, is positive, we find the vital powers liable to diseases of excess, as fever, &c. ; and where it is negative, vitality is depressed, marked by collapse and debility ; we find even in the vegetable kingdom that the same agent acts as in the animal ; it is a common prejudice among farmers to sow their seed in the dark quarter of the moon ; and they are right, though perhaps not able to account for it on any scientific principle ; the reason is this, that it has been shown by Faraday, that the earth is 15 degrees warmer at that time than in the 1st quarter or full moon ; and this increase of heat arises solely because of the excess of electricity at that period. I believe that we can find no other rational explanation for the disease which has attacked the potatoe crop all over the world, than the fact, that to supply the deficiency of electricity which

has existed in the atmosphere all over the globe, during the last twenty years, vegetables as well as animals are and have been parting with their electricity; the very circumstance of not being able to arrest the progress of that disease by all the means that have been recommended, and more especially the one of pulling up the haulm, shews us that the disease commences, not as is generally believed, in the stalk and then passes downwards to the root, but the reverse; for no matter how early these may be plucked up, you still find the root itself decayed, but not, I confess, to the same extent as it would be were not this (the only feasible) precaution used, and the reason, in my mind, that it arrests the progress of the rot is, that we remove that which has been acting as a conductor, to carry away the electricity, or vital principle of the plant; and it is from the same cause that the system, recommended and practised by some, of insulating the plant, by means of upright iron rods connected by copper wire, has been found so successful. That this agent (electricity) exerts its influence even at home, in our own latitudes, has been fully proved by a series of very interesting experiments made during a period of nearly thirty years, by Sir James Murray, M.D., both in this country and on the Continent of Europe, and also by other medical men who have taken the same view of the existing cause of epidemics, and I freely acknowledge that I have drawn very largely from his works, and those of others. I could enumerate several who have studied and investigated this subject; the chief names are Faraday, Lake, Oersted, O'Saughnessy, and Atkinson, of London: this latter gentleman erected a very ingenious Electro-meter, which was connected by wires to a lightning conductor, at St. Paul's Cathedral. He kept a registry of the quantity of electricity shown by it as existing in the atmosphere, during several years; and also another registry, or classification of the different epidemics and diseases in and about London during that period. Sir James Murray, who was a member of the General Board of Health, at Dublin, during the epidemic of 1832-33, and who at that time held the electrical view of the origin of the disease, devoted

much time and research in a series of similar experiments, for the purpose of discovering whether his view was correct: and he has, in a very praiseworthy manner, continued them up to the present time; and, in the year 1848, published a series of very able and valuable papers in the *Lancet*, in which he has, I think, very clearly shown that what has been considered (under the term Malaria or Marsh Miasm) to be the exciting, or predisposing cause of epidemics, is not correct, but that they depend on disturbed electro galvanic currents and accumulations, sometimes positive and sometimes negative, causing a want of electrical equilibrium in human bodies: he has invented a similar apparatus, or Electro-meter, to the one I before mentioned, on which is marked a graduated scale of different degrees of positive and negative electricity, and, according as this agent is in excess or otherwise, he has shown that certain diseases are at those periods most prevalent; the epidemics which are excited by a positive state of electricity are (according to him and Atkinson) acute rheumatism, inflammatory fevers, acute bronchitis, acute ophthalmia, and inflammations of the serous membranes; while, on the other hand, the epidemics caused by the negative state of the same agent are influenza, diarrhœa, dysentery typhus fever, cholera, ague, &c. It would be quite impossible, in this place, to enter fully into the details of the experiments instituted by these gentlemen: those who may be desirous of further information on these points will find themselves amply repaid by consulting the original papers as they appeared in the *Lancet*, 1849. Suffice it to say, that they have been so extensive and satisfactory, that I have no doubt in my mind, that all the ills which have been placed to impure air, malaria, or marsh miasm, must be more justly acknowledged to arise from deranged electric currents; for we find those very diseases which, from time immemorial, have been considered as arising from the exhalations from marshes and fens, are now found to exist in places where none of these agents are present: for instance, ague prevails to as great an extent in the Island of Ascension, which is of volcanic origin, and devoid of marshes or fens, as it does in the marshy districts of England, or the Pontine Marshes of Italy.

It is also now generally considered that influenza, a disease presenting in many points a marked resemblance to cholera, depends on a peculiar state of the atmosphere as regards its electricity. Dr. Peacock, of London, who published a valuable work on the epidemic influenza of 1847, and whose opinion is one deserving of great weight, says, speaking of the weather before and after the epidemic, "the chief points of interest seem to have been the small amount of electricity in the atmosphere, and the sudden alterations of temperature which occurred." How very descriptive this is of the state of our atmosphere during the passing year.

A very extraordinary similarity has been found to exist with respect to the two previous epidemics of cholera, and the present, 1852, namely that they have been preceded by an epidemic of influenza and a deficiency of electricity in the atmosphere. The influenza also pursued the same course on each occasion as the cholera, and the similarity between the two diseases is very marked, inasmuch as they are both diseases of debility, both affect the mucous membranes, and attack, as it were simultaneously, large numbers of people. One corroborating circumstance I would here mention, as bearing upon my subject, viz., that when cholera was first beginning to develop itself in London, in the year 1848, a report was published in the *Lancet* 16th of December, of that year (which I shall quote presently) detailing the number of cases which occurred from the 23rd of September to the 9th of December, and the electrical condition of the atmosphere during that period; and you will perceive from its perusal that the greatest number of cases occurred on those days when there was either no electricity shown, or when it was negative. The extract is headed "Electrical origin of Cholera," and is as follows: "We propose to call attention to the relation between cholera and electricity as shown during the recent epidemic. This relation appears so marked, that it must be considered something more than a curious coincidence. We subjoin a table, compiled from the reports of the Registrar General, showing the number of cases of cholera in a series of successive weeks, with the electrical state of the atmosphere during the same period.

Sept. 23rd. Seven cases, *none* shown, except on two occasions ; one negative, the other positive.

„ 30th. Four cases, *none* shown, except on two occasions ; both positive.

Oct. 7th. Three cases ; the same, but the duration longer.

„ 14th. Thirty cases, *none* shown, except positive on two occasions, negative on one.

„ 21st. Forty-five cases, *none* shown, except positive on one occasion, negative in the other.

„ 28th. Thirty-four cases, nothing shown.

Nov. 4. Sixty-five cases, *none* shown, except positive once.

„ 11th. Sixty-two cases, nothing shown.

„ 18th. Fifty-four cases, nothing shown.

„ 25th. Thirty-four cases, nothing shown.

Dec. 2nd. Twenty cases, nothing shown.

„ 9th. Twenty-one cases, nothing shown, except negative once.”—*Lancet*, 16th December, 1848.

That electricity exercises its influence over other than the animal economy is familiar to every one ; we all know how anxious the careful housekeeper is during a thunder storm, especially if she has the care of a dairy, or the rearing of poultry, lest the milk should be spoiled or the chick be blighted. Some years ago there occurred a striking illustration of the bad results which may occur from a thunder storm. In Paris, after the last revolution, and when the hospitals were crowded with the wounded, a very severe thunder storm was experienced. The mortality was found to be greater in all the hospitals on the night of the storm than on any subsequent or previous occasion.

I must now proceed to consider the fourth division of my subject, viz. : “What evidence we have to prove that electricity

is the immediate and exciting cause of epidemics generally, such as cholera, influenza, yellow fever, &c.

From the experiments already alluded to, we have sufficient evidence, I think, to prove the electrical origin of many diseases. The evidence derivable from these are, however, more of the nature of what may be termed negative proofs. Let us now for a brief space consider some of a more positive character. The first, then, which I will adduce is the now well known and acknowledged fact, that, during the former epidemics of cholera and influenza, the break in the electrical balance of the atmosphere was greater than at any other period. What may be the case at present I am unable to say, as the disease has been so short a time in the country, and of course the result of any experiments that are being made are not yet before the public. Another proof is, that on both occasions of the prevalence of cholera and influenza in this and other countries, there was visible a more than usual quantity of meteoric signs. Now it has been proved by the experiments of Faraday and Arago that the Aurora Borealis is due to the escape of electricity from an excited cloud, enveloped by an atmosphere in a state of relative dryness. It is also admitted that the Aurora is a powerful source of magnetism, and that the South pole of the magnetic needle has a distinct connection with it. It has been proved by Arago, that the Aurora which exists at St. Petersburg, in Siberia, and in North America, actually disturbs the magnetic needle at Paris; he could even predict the appearance of these meteors, by the disturbances of the needle, ten or twelve hours before the Aurora could be seen in the North. Now if the magnetic needle could be so sensibly affected by these meteors, it is not going, I think, beyond the bounds of legitimate reasoning if we allow the same influence to have some power over the animal economy; and that it has and does exercise this power is proved by the experiments of Sir James Murray, M.D., the result of many years careful investigation. The following is a short extract from his writings:

“I noticed,” he says, “that during some weeks, when nocturnal lightnings flashed in the horizon, almost all the poor applicants for

advice were affected by one uniform train of disorder, such as *diarrhæa*. Then an interval of health occurred in the district for a time. *Soon after the appearance of meteors in the air, a general attack of catarrhal diseases of a parallel character invaded the people; and once more a period of comparative healthiness ensued.*"

Now, though we have not as yet had any published accounts of the state of electricity in the atmosphere since the outbreak of cholera in this country, there has appeared in some of the French Medical Jouruals, a statement which, to a certain degree, tends to confirm the views above stated, that the presence of meteoric signs influences the animal economy. It was to the effect, that the great heat of the past month was produced by our globe passing at that period through a space in the heavens largely filled with meteroic bodies, numbers of these having been visible during that time. If therefore, the theory be correct, that these influences are productive of certain diseases, we cannot but acknowledge the coincidence between their appearance and the spread of epidemic cholera during the present year. Every one is familiar with the ordinary phenomenon of a magnetic needle freely suspended, and with its tendency to assume a position more or less approaching to parallelism to the earth's axis; that is to say, all over the world a magnetic needle points nearly North and South. Most persons, also, are also acquainted with the phenomenon termed "dip," or inclination of the magnetic needle; thus in the latitude of London, a needle exactly poised and freely suspended, instead of assuming a horizontal position will settle to an angle of 70 degrees, the North pole being downwards. It has been proved that the needle did not obey these natural attractions in Russia, during the late awful visitation of cholera; and it was also found that the magnet which ought to sustain a weight equal to seventy five pounds to the square inch gradually lost this power as the disease increased, until at last, when the disease was at its height, it had only the sustaining power of fifteen pounds; as the disease decreased, it regained itself, until it sustained its proper weight; the same circumstance was remarked in Ireland, during the epidemic of 1849, and was published in the

medical journals of that period, by (I think) the late Dr. Griffin of Limerick. That cholera has, on more than one occasion, succeeded a severe thunderstorm, is a fact that has been remarked by many authors, and I myself have repeatedly found such to be the case, especially in India, and at those periods of the year when the disease was not epidemic. Whilst in Calcutta I was often struck with the number of cases that presented themselves immediately after the setting in of the North-east monsoon, which is invariably preceded by thunder and lightning. The following is a short extract from the pen of Dr. Thoms, surgeon to H. M.'s 86th regiment, relative to the outbreak of Cholera at Kurrachee-Scinde, in June 1846. "Sunday the 14th inst., the enemy first assailed us; the day had been strangely hot; during prayers a hurricane arose, bringing columns of dust which swept through and hung about the church. \* \* \* We have had much thunder, accompanied with heavy and frequent falls of rain." *Lancet*, 1846.

I will quote another extract from the same journal, even at the risk of being thought egotistical; it is from a report of my own in the month of July, 1846, detailing two cases of Asiatic cholera I met at the same time that similar cases were occurring in London; and my object in referring to them now is, that I then put forward the same views I hold at present.

"As to the causes which have given rise to the disease, I fully agree in the opinion of Dr. Basham, that atmospheric causes are of themselves capable of producing it in this or any other country, when it may not even be epidemic; that the same state of the atmosphere which produced the disease in London was its exciting cause here (Ireland) I have no doubt. The weather here for some time previous had been intensely hot, and for this country unusually so, and then suddenly changed to extreme cold with rain. This change was accompanied, or rather preceded, by a severe *thunder storm*, and the very next day my second case occurred. How far an electric state of the atmosphere may have influenced or developed this disease I confess my inability to answer, but a remarkable circumstance strikes me at this moment, that when the epidemic raged in

Ireland in 1832, its outbreak in the town of Sligo, where it spread with unparalleled severity, was preceded by a terrific storm of thunder and lightening; and this occurred also in several other districts throughout the country. Whether this was only a remarkable coincidence, or that the storm was really the agent which produced the disease, I am not prepared to assert."—*Lancet*, August 1st, 1846.

When I penned the above article, I had not studied as I have since done the effects producible by electricity on the animal economy; but even then I was struck with the often recurring identity between this disease and electric causes. Even now, whilst these pages are passing through the press (July, 1852), we find in the daily papers accounts of severe thunder storms, accompanied by destructive lightning, occurring in the very districts which are now the seat of epidemic cholera; and I was struck most forcibly with the (to say the least) extraordinary coincidence of its appearance in Manchester the day subsequent to one of these storms having been reported as raging around that locality.

Numerous diaries show that nearly all, or at least a great majority of persons assailed with cholera, both in this country and India, were attacked before *sunrise*; this was particularly observed to be the case during the epidemic of 1832. The question may then be asked, Why? and the answer is very simple. Because the earth is then cooler; or to speak more accurately, it is because negative electricity then prevails, which, as I remarked before, is the exciting or producing cause of collapse.

Another question may be asked, namely, that as free electricity very generally prevails in the air of most places, why it is that cholera in man, and blight in vegetables, do not commonly prevail at all times? To this I reply, that the integuments of even delicate human beings are not susceptible of ordinary or slight electric passes unless the part is moistened. The whole surface becomes moistened in hot climates by dew at night, and hence it is that cholera and ague invade people most at night, particularly towards morning. But were the cause, as

said to be, *miasm*, extricated from fens, by the heat of the sun, their violence would, on the contrary, assail all persons by day. As multitudes labour in the fields by day, many would fall by the poison; but we find that thousands escape, provided they do not sleep in the air, or on a ground floor at night; and thus it is, that in many fenny and marshy districts, especially in Italy, of those who remain by night in the fields, none escape fever or ague, except herds, or keepers who are clothed in skins of goats, or other hairy animals; these habiliments, presenting millions of bristly points exteriorly, are all good conductors when wet with dew. Such bristled garments recall to mind the protecting powers afforded by the gilded spikes on Solomon's Temple, which stood untouched by a single stroke of lightning for a thousand years, in a region of thunder; this edifice, as we find in Josephus, was studded over with gilded iron spikes; the object was to prevent the roofs from being the resting place of birds, &c. But another (and at that time) unknown purpose was fulfilled by these bristled roofs; the gilding prevented the spikes from oxidating, and rendered them adapted to ward off irregular quantities of electricity.

I must now proceed to the consideration of the fifth and last division of my subject; "What are the best remedial and preventive measures we can employ to avert, arrest, and remove epidemics generally, and more especially the present one?"

It is not my intention, nor do I think it quite the place, in the pages of a popular pamphlet such as this, to enter at any length into the medical treatment of cholera; or to discuss the hundred and one *specifics* lauded by medical men for this complaint: my object being simply to point out, in a few words, what the course should be that every one ought to pursue when attacked with the earliest symptoms of the disease; what these are I need hardly touch upon, as they are but too familiar to every one; I would merely remark that diarrhœa of a painless character almost always exists for a space of time varying from one to forty-eight hours; and it is in this stage alone that we can at all hope to obtain the smallest success as regards

remedies. The experience of more than twenty years which have elapsed since I first saw this disease enables me to assert with confidence that I have never known a single instance in which medicine has failed to check this premonitory symptom. And during the last visitation of cholera in 1849, the progress of the epidemic never received any check of consequence, until a plan of house visitation was originated, first in Edinburgh, by which means individuals were discovered suffering in this state, and relieved, when a few hours more would have placed them inevitably beyond human aid; for, like influenza when epidemic, we find almost every individual in the locality where it rages presenting symptoms of a greater or less degree, according to the constitution or temperament, not of genuine cholera, but what the French have graphically termed "chole-rine." If we hope, therefore, to arrest its progress, our energies must be directed to this point, and all measures which Boards of Health may propound will fail unless they are accompanied by a careful visitation of every house in the diseased locality, morning and evening; and we find that this practice is being followed out with great energy and success at Newcastle, Sunderland, and other places, now suffering from the disease. Should, however, any person neglect this warning and find himself attacked with the more decided and aggravated symptoms of cholera, the remedy I have found most to be relied on, is a full dose of laudanum (sixty drops for an adult), combined with ten or fifteen drops of tincture of capsicum or cayenne pepper. This I would recommend to be taken in about a wine-glassful of camphor mixture. The patient should not remain one moment out of bed, as the recumbent posture is one of the greatest adjuncts to the treatment,—a large mustard plaster should be placed over the stomach, hot water to the feet, and two or three extra blankets placed over him. As soon as this is done, or, indeed, simultaneously with the act, the nearest medical assistance should be procured, as, in giving these directions, I do not intend for one moment that any person should hope to cure himself; he is more likely to do the contrary. It is a true proverb, that "He who treats himself

is equally as foolish as he who makes his own will." The hints above given will, I have no hesitation in asserting, be the means, in the majority of instances, of placing the patient in the most favourable position towards recovery.

I would here remark, that all the remedies which experience proves as having been successful in this disease, act on this principle, namely, that of communicating electricity to the system. There are few more highly electric substances than calomel, which in all countries is allowed to be the sheet anchor in this disease, opium also, which is equal in efficacy to calomel, owes its remedial powers to the quantity of electricity it communicates to the system;—it is from this cause that it is sought after by the Chinese (whose bodies are deficient in electricity, as I showed in the first part of my paper), to excite them to a state approaching intoxication. Camphor, also, which, in the form of solution, has been extensively and most successfully used in the treatment of cholera, owes its salutary influence to the same cause. A very simple way of proving its electrical power, and one which is familiar to every school boy, is by rubbing sealing wax, which contains a large quantity of this substance, on the coat-sleeve, and attracting small pieces of paper to it; this is nothing more than an electrical phenomenon. Camphor is one of the most valuable *preventive* remedies that can be used during the prevalence of the epidemic, as also when influenza prevails, and in those countries where yellow fever rages, which disease I believe to be produced by the same cause as cholera, namely, a deficient or negative state of electricity in the atmosphere. This accounts for the statements we hear so often from residents in the West Indies, that the yellow fever, which has lately raged, and still prevails in those islands, will not cease until there has been a hurricane. No doubt this is true, and why? because such an occurrence will be the means of restoring the break in the electric state of the atmosphere, and cause it to become positive. A wine glass full of camphor mixture, (which can be easily made by every person at a very trifling expense) or of, what is a more elegant preparation, (Sir James Murray's fluid camphor) should be taken two or

three times a day, during the time that cholera is epidemic in the country. I have tested the efficiency of this agent in the last outbreak of cholera; and, though not only myself, but my family were constantly exposed to choleraic influences, (as I inhabited at that period a very badly drained house) yet we enjoyed complete immunity from the disease, which attacked individuals living at each side of us, except one of my servants who neglected taking this remedy regularly; and I found the same beneficial results in all those persons who followed this line of preventive treatment.\*

I have already explained how it is that different stimulants act by communicating electricity to the system, and it is from this circumstance that they are so generally used in the treatment of cholera. Among this class of remedies, we may enumerate sulphuric and chloric ether, strong spirits of ammonia, chloroform, &c. And the more closely we investigate this subject, the more convincing evidence shall we have

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\* My experience of the value of this medicine as a prophylactic or preventive, has been confirmed by its use in three more epidemics—in 1854, when quartered with my regiment at Berwick-on-Tweed, cholera in a very severe form broke out in the town, and although a number of our men (especially the married) were obliged from want of barrack accommodation to reside in very indifferent lodgings, there occurred only one case of cholera, though we had a good deal of “cholerine” and diarrhœa. I attribute this immunity entirely to the circumstance that every soldier, woman, and child were obliged twice a day to take a dose of camphor water. Bottles of the same were kept in each barrack and guard-room, and at the hospital, where it was served out to the married people. The only fatal case (in a strength of over 750), was the wife of the regimental school-master, who objected to take this medicine, alleging, as a reason, that she was nursing an infant. In the epidemic of 1866, at Southampton, I had again an opportunity of testing its value. Among all the staff of nurses in the Cholera Hospital, those engaged by the Local Board of Health as inspectors and disinfectors of houses, &c., there was not one single case of cholera. I compelled every one engaged to partake freely two or three times a day of camphor water, bottles of which were also freely supplied to all who wished to use it. The clerk, and others employed at the offices of the Board of Health, partook of the same freely, also every member of my family, and myself, during the four months the epidemic prevailed. Not one person so employed suffered from any attack more severe than diarrhœa. Several medical men and others to whom I recommended this remedy adopted it with marked success.

that all the remedies found so effectual in the treatment of this disease act on this principle.

Having thus briefly touched upon the remedial measures, let us consider what is of as great if not greater importance, namely, what are the best preventive measures as respects diet, clothing, and cleanliness, (both of person and houses) and what are the best sanitary measures to be taken by the authorities? There is no source from which this disease is more likely to be engendered than from wet floors, damp beds, filthy clothing, close rooms, moist cellars, and soiled integuments; because these all convey away natural electricity from the human body, as readily as it is conducted by the bell wires in our rooms. Hence little good can be expected, either in the way of prevention or cure, from any measures propounded by boards of health, or sanitary committees, unless *places and persons are kept perfectly clean and perfectly dry.*

The results of experiments demonstrate that sewers, drains, and cesspools, are all acting generators of galvanic disturbances; the open grates and gutters of our streets are constantly emitting filthy currents and vapours under our noses. It is absolutely requisite that this state of things should be altered, and that these disease-producing emanations should be dissipated *far above our roofs*, instead of allowing such miasms to be discharged into our apartments. As chimney flues are required to carry up smoke above our houses, and as ventilators are necessary to mines and tunnels, so they are also needful to tap pent-up gases, and to waft away unequal electric currents among the clouds, rather than introduce them into our halls, kitchens, and bed rooms. Within and around our cities and towns we contrive the most extensive batteries for extricating galvanism; we establish currents and counter-currents of the electric fluid, and its vehicles, viz., the noisome gases escaping up our drains. These foul airs rush up into our apartments, conducted by walls and floors, and carry up torrents of overpowering galvanic emanations. The walls and atmosphere of the rooms being generally positively charged induce negative passes from the human bodies within their range, and from the

moist earth below, attracting the electricity of the persons present, if of an opposite, and of repelling it, if of the same kind.

Instant and *efficient* means should be adopted by every Board of Health throughout the kingdom to tap and relieve the air and confined gases from our houses, drains, sewers, and cesspools.

Our towns should be *thoroughly* and properly drained, instead of permitting them to remain, as too many are, without any provision of this kind. A horizontal tube of zinc should be placed in each house drain; this again should be connected with two more upright conducting rods, to carry away excess of electricity outside the dwellings, and to prevent its passage up and down through the house, or through the bodies of its inmates. As regards *personal* cleanliness, this is also essential for prevention and treatment. Energetic friction of the skin with warm dry flannel will go very far to keep the body well charged with good vital atomic equivalents of electricity.

The vigorous exertion of active rubbing, during an hour, night and morning, contributes largely to the above electrical distribution. The dress ought, if possible, to consist of dry shoes, silk or woollen stockings, flannel or silk drawers, and waistcoats, and warm woollen or cotton clothing; gutta percha soles to the boots and shoes are most useful, acting as they do as non-conductors of electricity; that such is the case requires no other proof than the fact, that persons making use of them complain of the great heat of their feet, thus showing that the electricity of the body is prevented passing off by this channel.

Great care should be taken never to remain in wet clothes. I would strongly recommend the use of a broad flannel roller or swathe round the abdomen, *next the skin*. It has been remarked that those in India who accustom themselves to the use of flannel are rarely if ever attacked with cholera or dysentery; but it requires, I confess, a degree of fortitude which few possess to continue its use in tropical climates, from the excessive irritation it produces on the skin; but in this country, however, the same objection does not apply.

With respect to diet, this should be of a gently stimulating nature, avoiding those articles which, by experience, we know to be indigestible, and which disagree with the stomach. Animal and vegetable food, well cooked, may be taken once or twice a day; fish, if quite fresh, is not objectionable; ripe fruits may be taken in moderation, without the slightest mischief. I believe all kinds of shell fish to be decidedly objectionable. Chocolate, as being one of the most highly electrical substances known, might be taken in the place of tea. Excess of all kinds, both in eating and drinking, should be avoided; and above all fasting too long. The liberal and free use of common table salt is strongly recommended by Mr. Beaman, a surgeon in London, who has found it a most valuable *preventive* remedy, during a previous epidemic of cholera; it acts on the same principle as all the other articles, both of food and medicine, that are recommended, namely, communicating excess of electricity to the system. These are the chief precautionary measures (so far as individuals are concerned) which need be attended to.

But there are others of greater importance, and from which we alone can expect, not only to arrest, but altogether to prevent the recurrence of this or any other epidemic; these, however, are not within the power of single parties; they can only be put into force by the different public boards constituted for the purpose. I allude to the carrying out and vigorously enforcing the several clauses of the Disease Prevention Act. And in so doing I would earnestly impress upon those whose office it is to carry out such measures, that the greatest caution and prudence are required; that what they do from, no doubt, zealous and praiseworthy motives, may not prove the most likely means of producing the disease: any attempt (whenever we have the cholera actually located in the country) at cleaning out the sewers, drains, cesspools, is worse than useless, for in so doing the very state of atmosphere that, in accordance with my views, is the predisposing cause of cholera, will be produced; wherever such nuisances exist, it will be the safer course for our boards of health to let them remain till the epidemic influences are past, taking care, however, that they are

properly covered over, and no exhalation allowed to escape: and in those places where, from the construction of the drains, &c., this precaution cannot be adopted, large quantities of lime and other disinfecting agents should be used; and, whenever practicable, they should be well flushed *once a day* at least. The dangerous and abominable practice which exists in this neighbourhood of carting away manure, &c., in the middle of the day, should be at once stopped; and also the spreading out of the same in the fields and gardens in the vicinity of towns, for, as I before pointed out, all these act as so many *galvanic batteries*, disturbing the electric equilibrium. Pure and abundant supplies of water should be placed within easy access to all, especially to the poorer classes; and, in conjunction with this, they ought to have some facility given them of obtaining that most requisite article of domestic expenditure, coal, at a cheaper rate than they can at present; cold and damp, as I have before shown, being two of the predisposing causes of cholera. Whenever a locality may be found attacked with the disease, and if it be impossible to carry out the measures recommended, or only partially so, I would advise the immediate removal of all its inhabitants to open spaces, if there are any in the locality. That this and the daily visitation from house to house has, and will prove to be, the only effectual mode of arresting the spread of the disease, is now an established fact; on referring to the *Times* of September 21st, 1852, I find that this course is being pursued in Newcastle, Sunderland, and other affected localities. Tents have been provided by Government, and the result has been most successful. What more convincing evidence can anyone require than this of the non-contagious character of the disease, and its entire dependence on atmospheric influence? I cannot close my pamphlet without again endeavouring to convince my readers of the folly of fear, which itself *alone* (I can from personal experience assert) will produce the disease. This was exemplified in the year 1832, when a man was unfortunately tempted by a large sum being offered him, to occupy for a certain time a bed in which he was informed a cholera patient had died; and, although such had not been the case, he nevertheless, from pure fear,

was in a very short time seized with the symptoms of cholera, and died. No doubt many of my readers are conversant with the Eastern fable, of the person meeting the Plague going into a city, who asked him what he was going to do there; his reply was, "To kill three thousand persons." Some time after, the same person met him, and taxed him for the lie he told, inasmuch as thirty thousand had died. "True," said the Plague, "but I only killed three thousand, Fear killed the rest." Now, as the idea of contagion is most calculated to give rise to this emotion, I am anxious to dwell a little longer on this subject, and to give a few instances out of numbers in proof of the utter untenableness of this doctrine. In the *Times*, September 20th, we read that during the epidemic of 1849, in the small town of Mevagissey, in Cornwall, where the most abominable state of filth existed, the medical inspector, to avert the most disastrous consequences, advised the immediate removal of the population. Tents were provided, in which three hundred and sixty of the inhabitants were accommodated; besides these, six hundred others left the locality and dispersed themselves elsewhere. Among the people drafted into the tents not a single case occurred; while a hundred and twenty-six additional cases took place among those who remained in the houses. Can there be a stronger proof that *local atmospheric* causes, and not contagion, were the propagators, in this instance? Again, in the *Times* of September 21st, 1852, we find it stated, that at Copenhagen the same plan was pursued with equal success; out of one thousand persons removed from a most pestilential quarter of the city, but ten deaths took place after their removal; whilst the mortality among those who remained were in proportion of four to seven. Again in the *Times* of September 22nd, I find the following paragraph:—

"There is a considerable amount of diarrhœa in North Shields, but no cholera. This is remarkable, as North Shields is within twenty minutes' run of Newcastle by rail, and an immense number of persons pass between the towns during the course of each day. As I stated yesterday, the lower parts of the town are being swept with some thousands of tons of salt water daily, and ancient nuisances and stenches which have held their ground for the past quarter of a century have been swept away."

Here, in the last sentence, we find the secret of the immunity in this case; if contagion were the cause, surely nothing would be more natural, than that two towns so nearly and closely allied should equally suffer from the disease. Another strong instance of the impossibility of attributing its invasion to this cause was reported in the same paper, where a strict cordon was drawn round a town in Norway, and no communication permitted with infected places; but as nothing more was done in the way of sanitary measures, the disease broke out in a very short time, and that without one single tittle of evidence which could prove its importation. Again, we have the celebrated case of the army under the Marquis of Hastings, in the year 1816, or 17, being almost decimated with cholera, the number of deaths averaging upwards of a thousand a day. By the advice of his medical staff (who in the first instance had disapproved of the site of the camp) he moved about ten miles higher up the river, and though the line of march was covered with the dead and dying, not a single case occurred after he had taken up new ground. It would extend this paper beyond the limits intended were I to adduce even a third of the instances similar to the above. I will conclude this subject by giving one or two that have fallen under my own observation. A vessel arrived in the Hoogly, after a four months' voyage from England, having touched at *no place*; the crew, passengers, and troops were in perfect health, and in the most favourable state to resist disease: she dropped anchor off Saugor Island; no communication took place with the shore; the disease was not at the time epidemic: during the night I was called on to treat two or three cases of cholera, and they terminated fatally before we reached Calcutta. This occurred on board a crowded vessel: in the course of a few hours more all the passengers and troops were landed, and we heard no more of the disease. In this instance I traced the exciting cause to the dangerous habit of sleeping with the ports open, which, especially in the *Calcutta* river, is at particular points certain death. I remember one spot of the river, where, if a vessel be moored, she never escaped without the loss of eight or ten of her crew, or more; especially if her stay was at all protracted; in fact it was

looked upon as a *forlorn* hope to lie at anchor there. It was opposite the fort, where the sewers emptied themselves, and having once myself lain there, I remarked all our cases occurred among those who either neglected my orders of keeping their ports shut, or slept on deck during the night; and as the vessels all swing to the tide, I found that it was always among those of the crew, who slept at the side next to the shore, that the cases occurred; and especially those who persisted in keeping their port holes open. I remember, also, whilst lying in Madras Roads, at a time that cholera was not prevailing, and when the communication with the shore was impossible, in consequence of the heavy surf, the ship's crew were attacked with the disease, and, strange to say, it was only at one side of the vessel, and that was the one towards the shore. Surely if contagion were the exciting cause, we could not have any more favourable circumstance for its production than this, for every person knows how closely approximated sailors are when lying in their hammocks; in fact, touching each other.

I have dwelt longer on this point than I had intended, but feeling that it is one of paramount importance, and in which the public should be completely informed, I have done so even at the risk of being thought tiresome. Unless confidence be established, and fear removed from the minds, especially of the poorer classes, all our measures, both of relief and prevention, will be futile; if once a panic be created through the idea of contagion, the kindlier and better feelings of human nature will be dried up, and that sympathy and devoted attention of relatives, which alone can cheer the bed of the sick and dying, will cease; this in itself will be a calamity much to be deplored, but how much more when we reflect that fear can of itself alone produce and increase the disease. It is on this account I have raised my warning voice, and I sincerely trust that what I have written may be found useful in allaying this feeling in the public mind.

There is one preventive measure which I omitted to mention when on that subject, which I believe will be found to be the most effectual means of restoring the electrical balance of the atmosphere,—*the chief predisposing of cholera* and other

epidemics. I allude to the daily discharge of cannon, the burning of tar barrels, and other combustibles, especially in infected localities. I recommended this plan at the last outbreak of the disease in 1849, and I find several communications on the subject have appeared in the public journals. In New Orleans during the last fearful outbreak of yellow fever (a disease produced by the same causes as cholera), I find that this course was adopted, as many as four hundred pieces of cannon being discharged, daily, tar-barrels and large logs of wood being kept constantly burning in the diseased localities, which was attended with very happy results. This is also a common practice in India whenever the atmosphere is oppressively dense and lowering. The plague of London was no doubt checked by the outbreak of the great fire, not only burning down infected quarters, but also purifying the atmosphere. Whether the frequent discharge of cannon, &c., had anything to do with causing the great and marked immunity from cholera in the town of Portsmouth, during each outbreak of the epidemic, I am not prepared to say; but, from my knowledge of the place, as far as want of sanitary precautions and local influences were concerned, there could not have been a more favourable locality for the development of malignant cholera. But what do we find to be the real state of the case? I quote an extract from the *Times* of September 23rd, 1852, which, to say the least, is a curious coincidence, and certainly tends to confirm my views. It is from an article headed "Laws of Cholera," giving a statistical report of the mortality from this disease, during the two periods 1849 and 1832; and we find, that in Portsmouth, with a population in 1831 of 46,282, the deaths from cholera were only 86; whilst in Newcastle, with a population a fraction higher than the former, the deaths were 801. Again, in 1849, with a population in Portsmouth, almost double that of 1831, viz., 76,676, the deaths from cholera were only 568; whereas, in Merthyr Tydvil, with a population of exactly the same amount, the deaths from this disease were 1,682, or nearly three times as many as in Portsmouth.

To study man aright, we must consider him, not as a machine, complete and perfect in itself, but as a being connected

with external objects, and influenced by external causes; as a part of that creation, of which it is happily said, that—

“ One common soul  
Inspires, and feeds, and animates the whole.”

This is a view which a philosopher should take of creation before he can comprehend its mysteries; this is the only means by which he will be enabled to penetrate into the secret recesses of Nature; and although the possession of the Promethean fire must be ranked with the impossibilities of the elixir vitæ and the philosopher's stone; yet nature, viewed in this light, will open to us new themes of admiration, new themes for our amazement; and, as the scheme of creation becomes more and more unfolded to our view, we shall exclaim, in the impassioned language of Byron,

“ Are not the mountains, waves, and skies, a part  
Of me and of my soul, as I of them? ”

In the present instance, I have endeavoured, and I hope not in vain, to prove the connexion between man and the globe on which he treads; my object being to induce others, by investigating disease, in its relations to the vital or nervous agent,

“ Not merely to discern  
Things in their causes; but to trace the ways  
Of highest agents! ”

The path before us may be unfrequented, but it is not altogether untrodden; the suggestions here offered are but an extension of ideas that flitted in the speculative imaginations of our forefathers, and though each succeeding adventurer may progress a few steps beyond his predecessor; still, this is too trifling to be considered in comparison with the vast field which yet lies unexplored before us. As yet we are groping at the foundations; let those, then, who seek honour and distinction in Natural Science, gain it by erecting the superstructure—let them unfold to us the mysteries of that

“ Electric chain, wherewith we're darkly bound,”

And by practical demonstration realize Pope's sublime idea—

“ All are but parts of one stupendous whole,  
Whose body Nature is, and God the soul! ”

