Asiatic cholera : an inquiry into its nature, and how to deal with it.

ASIATIC CHOLERA:

AN INQUIRY INTO

ITS NATURE, AND HOW TO DEAL WITH IT.

A POPULAR EXPOSITION.

BY

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BIGGAR.

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TO

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AND THE

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This Lecture,

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THE AUTHOR.

BIGGAR, *April* 25, 1856.

PREFACE.

WHEN first requested to allow the following Lecture to be published, the Author felt exceedingly reluctant to comply. Being well aware, that a Lecture, hurriedly got up, in the bustle of a laborious country practice, cannot fail to be faulty in many respects; and feeling that it was something like an act of presumption for one, who occupies the humble sphere in the profession that he does, to come out on Cholera in the character of an author. Nevertheless, it was represented to him, by several of the most intelligent members of the Biggar Athenæum, that the medical views contained in it may possibly not be so generally known, as the interests of suffering man require. For, if correct, that they contain a loud call to many practitioners, especially in country districts, if they would hope to save their patients, or hold up their heads without a blush, in the presence of quackery, to amend their ways in the matter of treatment. Being conscientiously convinced of their general correctness, he put his manuscript into the hands of two most eminent medical men in Edinburgh, on whose judgment, candour, and sincere friendship, past experience enabled him to rely; and they, having not only sanctioned, but recommended its publication, it would have been a mere affectation of humility, to have declined any longer to face the light.

Should any Medical Journals think worthy of notice what professes to be a mere *popular exposition* of a few general principles, their indulgence is hoped for in behalf of an author, who has no experience of his own to guide him in his researches—one moreover who, acknowledging himself still a learner on the subject of Cholera, will be ready to retract whatever superior wisdom or experience may show to be amiss, and who is actuated by no other feeling (so far as he knows his own heart) than a wish to discover and diffuse the truth.

R. P.

Biggar, *April* 25, 1856.

ASIATIC CHOLERA;

AN INQUIRY INTO

ITS NATURE, AND HOW TO DEAL WITH IT.

In appearing before you this night, I have to claim your indulgence on two grounds. One of these refers to myself, the other to the subject I have taken in hand. In reference to myself, it is scarcely necessary to inform the most of you, that in consequence of a very unfortunate impediment of speech, which sometimes shuts my mouth when I least expect it, I never arise to address an audience, without feeling the same uneasy indescribable sensation, as one feels when about to mount a broken-kneed hack, for the purpose of taking a scamper across the fields. There being in such a case, an absolute certainty of a good deal of stumbling at the very best, and a great probability into the bargain, of a total break down before the end of the journey. I do hope, however, that with your indulgence, though we cannot expect to clear at one bound the *ditches* and the *drains*, and similar obstructions, which, on such a race ground (if we traverse it aright) must, of necessity, beset our path, yet that in some shape or another, and in her own limping way, the shaky charger will push on in spite of all opposition.

Then, as to my subject, it is not only an intricate, but, in many respects, a most repulsive theme. For, although there is a striking analogy between the functions of animals, and the functions of plants, a lecture on the one, in point of attractiveness is a very different thing, from a lecture on the other. While a lecture on the one, if managed by an able hand, can be clothed in a phraseology, resembling, in some respects, the lovely dress, or even gorgeous drapery of those vegetable forms on which

it treats, we, alas, if we must be true to nature, dare not depict the grim features of disease in such rich attire. A lecture especially on the causes of infectious and epidemic diseases, cannot fail to acquire a flavour, or rather let me say, to catch an infection, from those very noxious diseases themselves, with which it is obliged to come in contact. My subject, indeed, compels me to tell you something both about *odours* and *vegetation* generally. And these, you may think, will refresh the mind, like occasional *green spots* in some desert route. But these odours, unfortunately, to say the least of them, have none of the aroma of the myrtle or the rose! And the vegetation we have to contemplate this night, is not the vegetation which blooms in your fields, and perfumes, by its fragrance, your gardens and your bowers; but only the vegetation which stagnates in your marshes, and corrupts by its breath the atmosphere around.

But whether attractive or not, it would be impossible, I think, in the whole range of medical science, to select a subject more worthy of your serious consideration, than that of epidemic influence, and those noxious effluvia of various kinds, which experience teaches us to be the prolific fountains and sources of disease. This will appear, if we consider for a moment, the long catalogue of diseases, to which these noxious influences give rise; the very serious and alarming character of the diseases themselves; the rapidity with which they sometimes sweep over a district or a country; the vast number of households they invade, and hearths that they leave desolate and mourning; and, above all, if we consider the fact, now so well and clearly established, that Providence has granted, even to feeble man, the power, in a great measure, of grappling with these formidable maladies—the means of doing something in the way of resisting their invasion—of mitigating their ravages—in a word, of stripping these destroying angels of some of their terrors, and arresting them in their onward devastating career.

I am extremely sorry, that even in such an audience as this, it is necessary, at the very outset, to present the symptoms of Asiatic Cholera, in all their naked fearfulness, before you. For the truth

is, unless we look at our fearful foe *simply as he is*, it is impossible either to understand his nature, or how to deal with him. You must just excuse me then, if I ask you, to pay with me a very short imaginary visit to the bedside of a patient stricken down in all the helplessness of this disease. A scene alas! arises to our view, very much fitted to arrest our thoughts, to humble the pride of the human heart, and strike with awe the most careless observer. A human being lies stretched before us, with his high cheek bones, and fixed glassy eyes, languidly looking out from far within their hollow sockets. Though incessant vomiting and diarrhœa have already reduced life to the very lowest ebb, yet his restless frame knows no repose. His rigid limbs, from which all pulsation and all animal heat appear for ever fled, are tossed about in all the sufferings of cramp. His face has a blackish, or a blue appearance, and every feature shrunk in the extreme. You put your hand upon his pulseless wrist; it is cold as the touch of lifeless clay. Only a few short hours before, this prostrate being may have been walking about in all the bloom and buoyancy of health; and now we may almost say, that death's cold spectre form already sits brooding o'er his livid lip, and laughs to scorn all medical appliances and means of cure. Yet, strange to say, (and this particularly is what I wish you to observe), under all this exhaustion, with the vital flame flickering in its very socket, and reduced to a little spark, just about to expire, that man's *consciousness and mental faculties remain entire.* He attempts to speak to you; his voice is reduced to a tremulous whisper. And on bending down your ear to catch the sound, you are startled by a cold sensation striking on your cheek. It is his icy breath, issuing from his lungs, as frosty air would issue from an icehouse!

It appears to me that every one of these characteristic symptoms throws some light on the nature of this dark disease; to which I only add another equally instructive, and it is a strange one. Melancholy, alas, as is the condition of that poor unhappy sufferer, he is totally unable to *shed a tear* on his own behalf. The patient, indeed, exhibits signs of great distress, but

the more malignant is his case, the more surely do his eyes continue dry. And if one small tear is ever seen to flow, well may fond affection cling to it, and read glistening there, a bright ray of hope for that unhappy man. Surely this is a strange disease! The only instance, perhaps in nature, where acute suffering, conscious of its agony, cannot weep—the only suffering which the power of opium cannot mitigate—the only exhaustion which the power of stimulants cannot touch.

If such be a true picture of this fearful malady, what can be a more important theme of thought, than an inquiry into its exciting and predisposing causes—into the various circumstances which favour its development, and the means which Providence hath put within our reach of arresting it in its onward deadly march?

If you look up any of our old authors on this disease, you will see great allusion made to a mysterious thing called Epidemic Influence.

By Epidemic Influence is meant *a something in or about the air, which renders it, for the time being, peculiarly unwholesome.* I am sorry that I cannot define it in more satisfactory terms. For, when I simply call it an *unknown something*, I am really, to confess the truth, just giving you, in a condensed form, nearly all the information that is known upon the subject! We do, however, see the atmosphere at times assume such an unhealthy condition, and prostrate in disease great numbers of the human family. But what is the nature of the malign influence at work? What is its essence or how produced? On such points we may, indeed, have our conjectures, perhaps even very plausible conjectures; but as to anything like absolute certainty, the wisest among us know nothing at all. This, then, is our first great drawback in all speculations on Epidemic Diseases. The enemy we have to contend with here, is not only invisible, but actually unknown. Indeed, its existence can be learned only from its effects—the intensity of its power only measured by the weight of its strokes—and its progress traced only in the tracks of human woe. Should any of us, therefore, presume to speak somewhat largely and learnedly on this subject—should you hear a doctor,

for instance, telling you, with the utmost gravity and assurance, as if he was a perfect oracle of wisdom, that he has ascertained Epidemic Influence to be the cause of any particular disease—you may almost take for granted that he knows no more about the real essential cause of that disease than you do yourself—that the term Epidemic Influence is simply a word invented to conceal his ignorance—and that the sum and substance of the information he communicates, in suspecting that Epidemic Influence is the cause of epidemics, is just equal to this very shrewd and satisfactory announcement, that *small-pox influence* is the cause of *small-pox*, and *inflammation influence*, in all probability, the cause of *inflammation!*

And yet we are able to tell you a good deal about this mysterious subject, notwithstanding. For, exactly as a man might not be able to say what is the cause or essence of *scrofula*, and yet be able to depict very well what are those marks or characters about a human frame, which indicate what we call a *scrofulous constitution;* so, in like manner, though we do not know very well what *epidemic influence* is, we are able to depict to you, in some measure, what are those marks or characters about the air itself, which, under Cholera at least, indicate what we may call its *epidemic constitution.* Now, the marks or features of an epidemic constitution of air are chiefly these five, which I take from the best authorities:—At such periods, *i.e.*, during the prevalence of this great epidemic, and always more or less for some time before,—1. The atmosphere is observed to be unusually calm and still. 2. Frequent and sudden changes from cold to heat, and heat to cold. 3. A great number of mists and fogs prevail. 4. Increased atmospheric weight or pressure. 5. Lastly, and this is still more remarkable, there is a *deficiency* in the amount of its electricity. Whenever the atmosphere presents these characteristics, it is said to be endowed with its *epidemic constitution.* In other words, it is peculiarly unwholesome; and, if this constitution continue long, it seems capable of producing some malignant influence or other, which sooner or later, prostrates with this disease great numbers of the human family.

We have an example of a mild epidemic, or disease arising from atmospheric influence, and affecting simultaneously great masses of individuals, in Influenza or Epidemic Catarrh. A more serious epidemic is that scourge of the nations, Asiatic Cholera. Every thing about Cholera shows that it takes, as its usual, its grand, its primary or exciting cause, some malignant influence or other, operating on a grand scale, such as I have described. Because, at such periods, not only are all those features present in the atmosphere in a marked degree, already mentioned; but what is more, when Cholera is prevailing very extensively or severely in any particular district, this malignant influence is felt, not only by those who are stricken down with the pestilence, but more or less by every individual residing in that district. At such periods, it is well known (though this is not so frequently seen in our own country as in other lands), that there is a general feeling of languor and lassitude throughout its population. People of weak or asthmatic chests complain of a great amount of oppression in that region. But it is chiefly on the mucous membrane of the stomach and bowels, that this malignant influence is felt. At such periods, the bowels are unusually irritable: they are moved to looseness from the slightest causes,—from such causes, as at other periods, might not affect them in a perceptible degree. Even small doses of laxative medicine (prescribed for any disease whatever), are apt to operate with undue violence. Moreover, a considerable amount of actual diarrhœa, more or less severe, never fails extensively to prevail. In proof of all this, I may mention, on the authority of the Russian physicians, that when Cholera first prevailed in the South of Russia, there were large affected districts, where scarcely a human being was to be found free from nausea, indigestion, and looseness of the bowels. Not only so, but the inferior animals in such districts (as Professor Dick assures us, was remarkably the case even in Edinburgh in 1833) are generally very unhealthy and similarly affected. And, in other lands, at any rate, it is frequently observed, that if the Cholera influence be very intense, even vegetation itself, as if mourning for the afflicted

condition of man, partakes, in some measure, of the general depression. It hangs its head in pining sickliness, and refuses to shed forth its usual bloom, until the ravages of the fell destroyer be overpast. Everything indicates that some malignant influence is at work, and operating, too, on a grand scale, and that all organic nature feels more or less the pressure of its hand.

Now, though we have already confessed, that the nature of this influence is in the highest degree mysterious, that does not prevent people from forming their conjectures on the subject; and as no person ever opens his mouth on the subject of Cholera, without thinking himself quite entitled to enlighten the public mind by his crude speculations, you must just excuse me if I presume to avail myself of the general privilege. And if I fail in explaining, to your satisfaction, the cause of Cholera, I have used the precaution, at any rate, before I begin, of impressing on your minds, that perhaps, after all, it is totally inexplicable; and even in that case, I will only be accomplishing a feat in the art of expounding, which many an abler man has done before me.

Features of Cholera.

1. Characteristic symptoms of an individual case.
2. Prevailing diarrhœa in affected districts.
3. The cause sometimes seems to reside in wells.
4. It follows the track of a great river.
5. Medical men escape—sick nurses fall.
6. Runs along one side of a street only.
7. In a workhouse, may select its victims from *one* sex.
8. Strange sights in the sky over affected districts.
9. Phenomena of electric telegraphs and magnets.
10. Rarely ascends mountains.
11. Prevails in marshy districts, sea-port towns, etc.
12. Can travel *against* the wind.
13. A thunder storm suddenly arrests it.

Whatever the cause of Cholera may be, it must be something

that can account for all those features, these being the chief well-known features of it, which I have selected from a variety of authors. By placing them in juxtaposition against each other, they are, at first sight, not only mysterious, but what is more perplexing, totally irreconcilable and contradictory to each other. For example, is the cause of Cholera in the atmosphere? Why, one would think so, from the prevailing diarrhœa in affected districts—from the strange sights in the sky over such districts—and especially, from the rapidity with which a thunder storm sometimes arrests it. But if so, how comes it to pass, that its cause may be so isolated as to reside in wells? as to follow in the track of certain rivers? as to run down one side of a street only? finally, that though it seems scarcely able to climb a hill, it yet can travel against the wind? Again, if Cholera be infectious, why do medical men almost invariably escape, and sick nurses, in considerable numbers, almost invariably fall? A person may assign a cause which can account for the icy breath, black appearance of the patient's countenance, etc.; but unless it can account also for the strange sights in the sky, the remarkable phenomena of telegraphs and magnets, etc., etc., it is not the true one. Or, we may find some cause which may account for every one of these general phenomena; but unless it can explain also the vomiting and purging, and all the symptoms of an individual case, it is not the true one. What we are in search of this night, is *one simple cause*, which may account for all these remarkable phenomena, and harmonize them into one consistent whole. But, as I never saw such a *wholesale* explanation attempted by any author (though I do not assert it has never been done), I must claim your indulgence, if I do utter any thing remarkably absurd, or trespass rather longer on your time than is usual on these occasions. In order to walk on as safe ground as possible, I shall take care to select nearly all my facts from such authors as have no theory whatever, or at least have not (to the best of my knowledge) the theory now about to be proposed.

I. My first position, then, is, that as infection, or the cause of

fever, is a distinct material substance; moreover, as influenza itself is now known to arise from a material substance in the atmosphere; so Cholera, doubtless, arises from a distinct material substance also. Indeed, the most important reason why epidemic influence is so very mysterious and difficult to grasp, is, that after all, when one comes to think of it, *there is not, and cannot be, such a thing!* This may surprise you, if you have heard that at one period this same epidemic influence was given out by the whole medical profession, as the true and only cause of Cholera. But, the reason was, that in those days of darkness, we did not know any thing whatever upon the matter. And when medical men are totally ignorant of the cause of a disease, it is quite necessary, for the dignity of the profession, to invent a word, in order that we may speak about it, etc., etc. You must not, however, misunderstand my meaning. There is such a thing as an epidemic constitution of air, and this constitution of air is favourable to the production and diffusion of a material substance. But there is not, and cannot be such a thing as a mere influence, apart from some subject or substance, in which that influence resides. A moment's reflection will convince you, that the term influence is just what grammarians call an abstract noun—something after the nature of an adjective. And all abstract nouns, like all adjectives, are quite well-known to be perfect nonentities, which people, indeed, can speak about, but which nobody ever saw, and which, indeed, cannot stand alone. It is just as absurd, therefore, to speak about an *influential*, or what comes to the same thing, an *influence*, as it is to speak about a *black* or a *white*, without supposing a something in which these qualities reside. Depend upon it, Cholera does not arise from an *adjective*, even in the most superlative degree, but from a *noun!* For let the cause of it be what it may, it is not a *word*, but must be some *very influential* THING.

II. All the symptoms of an individual case can be accounted for, by supposing that this material substance is *something of an acrid nature, operating upon the mucous membrane of the stomach*

and bowels.[1] Observe, if there be an acrid poison operating there, it accounts at once for the violent vomiting, and violent diarrhœa. Such profuse watery evacuations again, by abstracting the watery principle from the blood, account at once for that *thick condition of the blood*, which renders it almost totally unable to flow. And this condition of the blood, is of itself sufficient to account *for all the other symptoms of the case.*

The establishing of this point being of vital moment, and I fear too much overlooked by a number even of medical men, let me briefly take up these symptoms one by one, and show how every one of them can be explained in consequence of this thick condition of the blood. Observe then, that after the ordinary contents of the stomach and bowels are discharged, the very profuse evacuations of Cholera consist, in a great measure, of simple water. Where can the intestines get all that water? From one source only, viz., the blood. Accordingly, we find the blood becoming so thick, that if a vein be opened in the collapse stage, instead of flowing forth in a continuous stream, as in other diseases, a big black drop just falls now and then, nearly as languidly as after death; and if collected in a vessel and allowed to stand, instead of dividing itself into a *thick* and *thin* like other blood, it remains all thick, and does not separate any water at all. This viscid blood, therefore, being obstructed in the capillaries or minute vessels, produces *cramps*, which usually begin in the fingers and toes. Stagnating in the lungs, it produces *asphyxia* or suffocation, with its consequent *blue appearance* of

[1] *Queries for medical readers.* Is the poison of cholera anything else than a drastic *Hydragogue* Cathartic (though acting also somewhat on the mucous follicles), with this difference between it and other Hydragogues, that it varies in virulence, and multiplies itself in the alimentary canal, as the seeds of fever multiply themselves in the blood? If so, could an artificial Cholera be induced in a dog, with its rice-water evacuations, cramps, etc., by a combination of such medicines as *Elaterium*, and something else, which chiefly acts on the mucous follicles? If Cholera be a literal case of poisoning, can any treatment be considered rational, until we discover a direct antidote, to be administered in the stage of premonitory diarrhœa, which might kill the poison as effectually as *Hyd. Peroxide of Iron* kills *Arsenic*, or *Chalk* kills *Oxalic Acid*?

face and surface generally. The blood, by its circulation, and union of its carbon with the oxygen of the air, being in health the source of animal heat, easily explains to us the *great coldness*, in this disease, of the frame and breath. Though the term *icy* breath is certainly a misnomer; it cannot be really colder than the surrounding air. It seems so, however, because air in motion (or wind) invariably feels colder than air at rest. The *choleraic voice* arises from rigidity of the vocal chords or laryngeal muscles. And as for the diminution or suppression of all watery secretions (whether salivary, lachrymal, or urinary), there surely can be no mystery here, so long as the glandular system has scarcely any water on which to work. Thus, I think, theoretic reasoning alone proves, that on the strictest physiological principles, this condition of the blood can of itself account for all the characteristic symptoms of the case. But as one fact is at all times worth a ship-load of arguments, I may mention, as a further illustration, one extraordinary fact, which appears to demonstrate this point equally well. When Cholera first invaded Edinburgh in 1833, one mode of treatment adopted as a *last resource*, after all other means had failed, and the patient seemed inevitably and hopelessly gone in the collapse stage, was to inject a considerable amount of watery fluid (almost simple water) into the veins. And although there were serious objections against this operation, and it was considered so dangerous, that in *not one instance* was it ever performed in the Edinburgh Hospital, if there was the slightest hope or chance of recovery in any other way, yet its effect on the patient, for the time being, was enough to overwhelm the mind with wonder. After a few ounces had been introduced, and even during the very act of the operation, every one of the characteristic symptoms already enumerated at once gave way. The cold icy breath, cold perspiration, black appearance of the face, that rigid state of limbs—rigid almost as a piece of wood, those acute pains in them which no power of opium could allay, *were at once dispelled*. The very tone of the patient's voice was restored; his intense thirst gone; those ghastly features assumed, in a twinkling, the aspect of almost perfect

health; a genial glow of warmth and comfort diffused throughout his frame; and an amazing amount of strength imparted to him. In one word, the patient seemed snatched, as if by miraculous agency, from the very jaws of death, and, with tears of joy starting to his eyes, restored for several hours at any rate, and in some cases permanently, to an astonishing amount of health and vigour. In the language of the late Dr Mackintosh, physician of the Cholera Hospital at that time, who, by repeated injections, rescued from the cold embrace of death many a seemingly hopeless victim: "I have not unfrequently seen patients sit up in bed immediately after the operation, in perfect possession of themselves, and speak with joy on the sudden transition from agony and death to happiness and life."[1] Here, then, is most undeniable evidence, that the thick condition of the blood can account for all the characteristic symptoms of the case; because the moment you dilute that blood with water, they are at once dispelled; that thick state of blood can only be accounted for by the profuse *watery* evacuations; and these evacuations, again, as well as the vomiting, can be most easily, rationally, and satisfactorily accounted for, by supposing some acrid poison operating on the mucous membrane of the stomach and bowels.

It would be out of place, in a popular audience, to enter at large on the best modes of treatment. But, if this theory be correct, so far as it goes, we need not be surprised, when we look at the *results* of different modes of treatment, to find that the use of *astringent medicines* here has not been found to answer expectations—the vomiting and purging being an effort of nature to throw off the poison. Neither can we expect that it is in the power of brandy to combat, effectually, with the extreme *exhaustion*, or that it is in the power of opium to relieve the intense and incessant *suffering*, as neither brandy nor opium alters that *condition of the blood*, on which both the suffering, the extreme

[1] One woman was injected *six* times. Her veins receiving in all *fifty pounds and a half!* This patient recovered.—See Mackintosh's *Practice of Physic*, page 369. Again, page 379, "Not one of the patients operated on had a chance of recovery by any other means."

exhaustion, and all the other symptoms depend. And yet, possibly, such a simple affair as the liberal use of cold water, by the absorbent vessels of the stomach taking it into the blood, may be rationally expected to produce wonders. And, leaving you to consult, at your leisure, the astonishing results of hydropathic treatment in this disease, I now detail to you the testimony of an old and most eminent Indian physician,[1] founded on pure experience alone, without any theory whatever — experience acquired before such an operation as injecting water into the veins was ever adopted, and before such an idea as Cholera, arising from an acrid poison in the bowels, was ever entertained. I find (says he)—

1*st*, That it is not by astringent medicines that this disease can be cured most effectually.

2*d*, That the administration of very powerful astringents, such as strong doses of brandy and laudanum, will almost invariably destroy your patient.

3*d*, I have cured far more patients, by allowing them to drink abundantly of cold water, and prescribing mild laxatives (if the stomach will receive them), or even no medicines at all (as the homœopathists do), than ever I have cured by any such means.

4*th*, The most favourable and hopeful cases in India, are those in which violent vomiting sets in at an *early stage* of the disease.

5*th*, The most utterly hopeless and malignant cases—those which run their deadly course in six, eight, or ten, hours—are those wherein there is almost no vomiting at all.

Such, I repeat, is the result of pure experience, founded on no theory whatever. For, on communicating these views to me, in conversation, a considerable number of years ago, as a warning against falling in with the prevailing astringent treatment of the day, he honestly confessed, at the same time, that, after dissecting hundreds of cases, and attending many thousands, he remained as ignorant of the true nature or cause of this disease as he was

[1] T. Tweedie, Esq. of Rachan, Physician General E.I.C.S.

when he first commenced his career, and could assign no theoretic reason whatever, why one mode of treatment should be better than another. But, if his object had been to establish the position that Cholera arose from an acrid poison in the alimentary canal, could he have done so in more appropriate terms? And, on my asking that acute observer, and asking with amazement, what earthly objection he could urge against large doses of brandy, when we had such extreme exhaustion to deal with; and what objections against large doses of opium, when we had such acute suffering to relieve; his only reply was, "I tell you that I have no objection in the world, except that I find, by sad experience, and *contrary to all expectation*, that these patients almost invariably die!"

The truth is, that the average rate of mortality, under the astringent treatment, is rarely less than 50 per cent. It was so at the beginning, when Cholera arose, like a fell destroyer, from the jungles of Jessore, and is so still. The rate of mortality, under hydropathic treatment, is apparently so exceedingly small, that, after searching through various treatises on the cold water cure, I am totally unable to form an estimate: because I know not what deductions to make from the extraordinary assertions of such authors. They unhesitatingly affirm, that they cure all cases of Cholera that come in their way, with perfect ease, by this system alone; and that such a thing as even one death from Cholera, in any of their hydropathic establishments, is a perfect phenomenon, rarely, if ever, to be seen at all! I conscientiously believe, that there must be some gross exaggeration or delusion in such statements; the more so, as these authors generally display such ignorance, both of the nature of diseases and the action of drugs, that, when they themselves assure us, that they would regard it almost as a breach of the sixth commandment to prescribe one grain of any drug whatever, to any individual whatever, and under any circumstances whatever, we are bound to confess that, in this part of their conduct, they show themselves to be uncommonly judicious practitioners. And yet, two other points must be candidly admitted:—1*st*, That a man's judgment

on the nature or cause of disease may be absolutely worthless, and yet, if his statements be confirmed by noblemen, officers in the army, ministers of religion, etc. (as these people insinuate), his *testimony to any matter of fact may be perfectly trustworthy.* —*See Note* 1*st, at the end.* 2*d,* On such theoretic grounds as we have now advanced, this result, to a great extent, is just what, in the nature of things, we would be led to expect. For, I ask any rational man, If Dr Mackintosh never failed, by the simple injection of artificial serum into the veins, to lift up patients from the very grasp of death, and restore them (for several hours at any rate) to the appearance of almost perfect health; and if, by repeating this operation, time after time, *until the diarrhœa had run its course,* he thus kept people alive for several days, and, in one instance, kept a poor woman alive for several weeks, and ultimately *restored her to perfect health,* after her veins had received, by repeated injections, the enormous quantity of 50½ lbs. of water; then, is it not extremely rational to suppose, that, if water can be introduced into the blood in any other way than by means of a dangerous operation—introduced through the absorbent vessels of the skin in the act of rubbing, or through the absorbents of the stomach by its internal administration—and especially if this treatment, instead of being deferred till the eleventh hour, be adopted at an early stage of the disease, and kept up vigorously throughout, so as constantly to dilute the blood and prevent its *stagnation in vital organs;* is it not the most likely thing in the world, that it may produce most astonishing results? Indeed, how the acute mind of Dr Mackintosh himself could escape from an inference so obviously deducible from his own operations, I cannot understand.—*See Note* 2*d.* But, on mentioning this argument in favour of water, to a much more learned and eminent individual (Professor Syme of Edinburgh, whom I met in consultation a few days ago), he did me the honour to remark, that the argument, so far as he was aware, was original, and, what is more important, apparently conclusive.

Of course, I do not mean to insinuate, that water alone ought

to be trusted to in this disease: because, although it is one means of affording a helping-hand to nature, it does not follow that it must be the only means; and I think abundant reasons could be given, why other treatment might be safely and judicially combined with it. Still less do I insinuate, that in all stages of the disease, and under all circumstances, brandy and laudanum, under every dose, ought to be at once and completely thrown aside.[1] *On the contrary, I assert the very reverse.* But I do mean to insinuate, that whatever other treatment is adopted, as we are responsible men, that intense craving of the thirsty blood for water must not be disregarded. Moreover, I express it as my sincere conviction, that, at no distant date, it will be admitted, by all sound and judicious practitioners, that, in the collapse stage, there is more virtue in a small bit of ice, or in one teacupful of simple water—virtue either as an opiate to allay pain, as a restorer of animal heat, or a cordial to sustain exhausted nature—if by any safe means such water can be introduced into the blood—than is to be found in all the brandy and all the opium, that ever were poured into a poor, prostrate, dying man.

What man among you, if his famishing child cried for *bread*, would give him a *stone?* and if nature, in her last expiring efforts, cries aloud for *water, water*, how cautious should we be, lest, heedless of the call, and prescribing in excess what, in other doses, might prove a blessing, we give a *serpent* in the shape of brandy!

A man, who was once a poor soldier in India, lately related to me that, when there, he had an attack of Cholera, under its most malignant form. Being on midnight guard, he had not even the advantage of a bed to lie on, or any medical aid whatever, until he was far, and apparently hopelessly, gone in the

[1] In the stage of premonitory diarrhœa, for example, a combination of castor-oil, laudanum, and a little brandy, is a usual, and, for aught I can see, most useful prescription. As, indeed, we find that some such combination (soothing, heating, and aperient) never fails to do good at the beginning of mostly all bowel complaints whatever.

collapse stage. He mentioned his case to me, as a proof how a good constitution will bear one through, without almost any treatment whatever. I put the question to him, "Are you sure you never tasted a drop of water?" "Oh!" (says he) "I drank it like a fish." "What!" (I continued) "did they allow you water in those days?" "Not at all" (was the reply), "I knew it was a dangerous thing; but, as I was a dead man, at any rate, in my own estimation, I could not resist the intense craving for it." The best proof that he made a good recovery is, that, as one of the members of our Biggar Athenæum, and being alive at this moment, and in this room, he is quite well able to speak for himself.

III. The Cholera poison does not appear *to be absorbed into the blood*. I suspect, indeed, that this is not the ordinary opinion of medical men. I know, too, that in some degree the symptoms can be accounted for, by supposing that it is absorbed. We know, for example, that were a strong solution of Epsom salts introduced into the jugular vein of a dog, it would operate on that dog's bowels, as if received in the ordinary way into the stomach. I confine myself to one argument, though I think I could mention several, which appear to preclude the idea of any such absorption. Observe, this Cholera poison must be something extremely acrid; so acrid as to produce all these violent symptoms; so acrid as sometimes to produce death in a very few hours; so acrid, that in the language of those who have conducted *post-mortem* examinations, we invariably see a "soft and pulpy mucous membrane," and frequently "great *irritation*, *inflammation*, *ulceration*, and an appearance of *mortification* of the large intestines."[1] Surely, if a substance so exceedingly virulent were absorbed into the blood, it could not fail, by circulating on the brain, to excite violent delirium. But the fact that the patient, dying in the collapse stage, usually retains his consciousness and mental faculties entire till the very last breath —aye, and in some instances even long after the breath itself, to

[1] Mackintosh.

all appearance, has ceased to flow, and the heart itself has ceased to beat—clearly shows that this acrid poison is not absorbed into the blood. I know of one instance where the patient seemed so completely dead, that he was treated as such, even laid in his coffin, and yet knew all the time (for he afterwards revived) what they were doing! But from utter exhaustion and rigidity of muscles, could not move an eyelid or a finger, or give the slightest sign that he was still alive.—*Note* 3*d*. "Sometimes (says Dr Mackintosh), the body seems to be *long dead*, while the *functions of the brain* are still going on and *comparatively entire*." Impressive thought! The vital spark flickering, dying, seemingly even *long extinct;* yet the flame of consciousness still keeps burning; as if hovering to the last in its wonted domicile, it wished to trace, with open eyes, the whole through passage into the world of spirits! In this stage preceding death, we find clearly indicated the presence on the brain of black, carbonaceous, non-oxygenated blood, producing, as it does, by its benumbing influence, listlessness, torpor, indifference to life; but surely, if the quickly acting, virulent, Cholera poison be there, it is very unaccountably shorn of its potency; or brain, even tender brain, stands proof against its irritating touch.

Now, the inference (viz. non-absorption), so obviously deducible from these phenomena, seems strangely and unaccountably to have been totally overlooked by medical authors. I am not, indeed, extensively acquainted with them (and this remark may therefore arise from ignorance), but not one that I have had access to, for the selection of my facts in preparing this lecture, ever makes the slightest allusion to such a thing. Yet, it appears to me, that this is the true key to the solution of some of the most remarkable phenomena of this disease. Moreover, I humbly submit, that had this very obvious inference not been completely overlooked, Cholera would not so long have shrouded itself in such airs of mystery; and the important question, whether it be infectious or not, might have been settled long ago.

Such, then, is our theory in its infant stage, that Cholera arises from some acrid poison, deposited on the stomach and bowels,

but which is not absorbed into the blood.—Notes 4th and 5th, at the end.

It would be satisfactory if we could discover what is this acrid poison, and how is it produced?

Now, some people have told us, that there may be diffused through the atmosphere at such periods some noxious fluid, the subtlety and minuteness of which have hitherto eluded the grasp of chemical analysis. But, as no person is prepared to tell us anything about this fluid, or where it comes from, I think we may, without further ceremony, throw this idea overboard. A greater number of eminent medical men have supposed, that the atmosphere at such periods may be loaded with myriads of minute invisible acrid insects (animalculæ). And to show that this idea is not so absurd, as at first sight you may suppose, there is actually an epidemic diarrhœa, which sometimes prevails among the inferior animals, particularly among sheep, that seems to take its origin entirely from this cause. In fact, so sure was one very eminent authority, a man distinguished by his great learning and great abilities, that this was the true and only cause of Cholera, that because these minute little creatures near the surface of the earth are so exceedingly small, as to defy all human eyes to see them; and conceiving the idea that they might be developed to a more gigantic size in the higher regions of the atmosphere, he actually took a trip one day far up in a balloon, in order to catch them and see what they were like! But the result of his dissections or other discoveries has not yet been revealed to his humble fellow-mortals dwelling on the earth. A few years ago, Professor Schonbeen of Germany, threw out the idea, that the Choleraic poison might consist of minute and invisible *acrid vegetable effluvia* (or *fungi*, as they are called) formed in the atmosphere in consequence of a disturbed condition of electric action. So far as I can judge, this appears quite a rational theory on the subject. What the Professor, indeed, might be able to say, in behalf of his own theory, I do not know. For except a simple announcement in a newspaper, of what the theory was, I am not aware of any author whatever that has

undertaken a defence of it, or application of it as a key to the various phenomena or features of the disease. But I do think much more might be said in its behalf, than I shall be able to give you this night. It will, however, be one strong evidence, if it can be shown that an epidemic constitution of air is not only favourable to the production of these effluvia, but that, in the nature of things, it must produce them. In the meantime, let us just take for granted that there are such particles floating about in an affected district, and you will see at once how some of the phenomena can be accounted for. Of one thing we may be perfectly sure, that if these effluvia bear any analogy to all other effluvia known as the causes of disease, they cannot be at all times equally acrid, or equally influential to the production of disease. Unlike all mineral poisons, the mere dose of poisonous effluvia is a matter of comparatively little moment. Several strange experiments on dogs demonstrate, that marsh miasmata and other fever poisons, can be imbibed into the system, in large doses, without producing almost any effect. But their virulence can be so increased by congenial circumstances, that the minutest dose introduced into the jugular vein of a dog, proves a deadly poison. In truth, there is not a marsh throughout our country, but exhales in the autumn months (though people breathe them with almost perfect impunity) the same effluvia which, in more congenial circumstances, would prostrate a man in all the helplessness of an Indian fever; and, in other circumstances more congenial still, would strike him down, by one inspiration even, with instant death. There is another law applicable to all such effluvia (though I do not stop now to prove it), viz. that when first produced in a free and open atmosphere, they are exceedingly mild, almost totally inert; and what, above all things, is known to increase their virulence, is a close confined atmosphere, especially if distinguished for heat and moisture. Let us just apply these principles, then, to the seeds of Cholera, floating about in an affected district. Perhaps every individual in that district must be imbibing into his system the Choleraic seeds, *i.e.* what, under favourable and congenial circumstances, might be-

come such. Yet, with the great majority they produce little effect. Inhaled into the lungs, however, they produce the feeling of oppression already alluded to. But, it is chiefly on the mucous membrane of the stomach and bowels that their influence is felt. Not only because all poisons, like all medicines, have their own peculiar organ, on which they chiefly act; but also because these particles, being deposited on earth and all its objects, may be taken into our system with the very food that we eat, the water that we drink, and in a variety of other ways; producing, however, in the strong and robust no perceptible effect, in others mere irritability of bowels, in others more susceptible of their influence, actual diarrhœa more or less severe, and in others very peculiarly predisposed, the disease itself. In certain states of air, moreover, their virulence is somewhat stronger from the very first, and they then affect the inferior animals, vegetation, and account for those phenomena in the South of Russia, etc., where, in large affected districts, scarcely one human being was free from nausea, indigestion, and looseness in the bowels.

What, then, are the circumstances which may be supposed to increase the virulence of the Choleraic seeds? Here, again, analogy alone would lead us to expect that three things especially will have this effect, viz., certain kinds of *water*, certain kinds of *air*, and certain states of the *mucous membrane* itself, *i.e.* peculiarly adapted states of the human constitution. On this last head I do not enter, though perhaps the most important of the whole.

An *open well* in a tainted district will not only act as a reservoir for the reception of some of these seeds, but if the water be in the slightest degree impure, by containing vegetable or animal substance undergoing decomposition; and, especially, if the action of the sun's rays be brought to bear upon its surface, the virulence of the effluvia may be much increased. Accordingly, we find that Cholera sometimes locates itself in particular wells, and that there has been more danger of catching the disease, by drinking out of certain wells in a tainted district, than by breath-

ing for any length of time its epidemic air. In the last number of the *Edinburgh Medical Journal* (March 1856), mention is made of one instance, where the infection, in several cases, could be distinctly traced to such a source; though, as I shall afterwards show, the effluvia got admission to it in a different way.

We see something analogous taking place on a more extensive scale in India. From the rank vegetation growing on the banks of rivers there, their water must frequently be in the state here supposed. And no feature of this disease is more remarkable in India, than the frequency with which it is seen to follow in the track of a great river. It will follow that river for many miles throughout all its windings. Victim after victim in great numbers fall upon its banks. Yet, with the exception of a few isolated cases here and there, the districts all around may be totally unscathed. Now, we are not for a moment to suppose that the seeds of the disease are only developed in the atmosphere immediately above that river. We are to suppose that they are developed in the districts all around as well, but in such a mild form, that except with individual cases here and there, where they find peculiarly adapted constitutions, or from other local favouring causes, they produce no very great effect, except that universal irritability of bowels, and prevailing diarrhœa, so characteristic of Cholera seasons. But the inhabitants residing on the borders of that river may be supposed to catch the infection in two ways,—either by drinking the water of that river, or more frequently, perhaps, in consequence of the intense heat of the sun in these regions, being brought to bear on the edge of that river, and causing these effluvia again to be exhaled in a dry state in their more virulent form.

The most important reason, however (I doubt not), is, that the very atmosphere of such low damp and marshy districts, besides producing in persons breathing it a more debilitated or susceptible constitution, is extremely rich in the main elements of an epidemic constitution of air, such as *dampness*, *quietness*, *increased weight*, etc., and therefore favourable for the production and diffusion of these effluvia under a more virulent form. This

will appear more clearly afterwards. In the meantime, however, before I proceed to other phenomena, let me stop to inquire, If the theory be correct, that certain kinds of water can increase the virulence of the Choleraic seeds, what then may be the effects in a tainted district of what some may think a very paltry affair —a stagnant ditch placed at the very door of a human dwelling? Year after year the vapours from such a ditch may have done little harm; although, in so far as they acted as a substitute for pure atmospheric air, their effect, however imperceptible, must have been injurious. But once let that become a tainted district, is it not possible that some of these seeds floating about may find their way to such a ditch, and festering there, and by the action of the sun's rays bearing on them, be again exhaled in this more virulent form, and blown into the house? And is it not possible, therefore, that in this way a whole family might be prostrated in the arms of this malignant disease, who, if they had only taken care to keep more cleanly doors, might have entirely escaped? I do not boldly assert, that such a thing frequently takes place; but I do assert, that reasoning from theory alone, such a thing is extremely likely. And with such notions as I entertain on this disease, I never do see such a stagnant ditch, so situated, and sending its streams of effluvia to the clouds, but I think I see so many electric conducting wires, sent up by the hands of man himself, to attract down to earth the judgments of heaven. And I never see a great stagnant pool of liquid manure, lying at the very door of a human habitation, but I just think I see as much manure applied to the very roots of that gigantic Upas tree, which rears up its huge proportions, and casts forth its darkening shade throughout our land.

There are even more remarkable features about this disease than that of flowing in the track of a great river, observed in our own land. I may mention three of these all at once, as they can be accounted for on the same general principle. 1st, If Cholera be infectious, it seems fortunately to have a great aversion to attack the doctors; for, although sick nurses in our Cholera hospitals almost invariably fall in considerable numbers, medical

men have hitherto enjoyed a remarkable immunity—there scarcely being such a thing known as the physician of a Cholera hospital becoming a victim. In proof of this, it is a curious circumstance, that almost the only two authors from whom I have selected all my facts in preparing this lecture, are Dr Gregory of London, and Dr Mackintosh of Edinburgh—both of them physicians of Cholera hospitals about the same time, and both equally honest in confessing their ignorance of the cause of the disease. But the only thing that Dr Gregory seems quite certain about is, that *most assuredly Cholera is infectious*, and his one and only argument is, the great number of sick nurses that he saw fall victims under his own eye. Again, Dr Mackintosh asserts the very reverse; for, although at first he was so strongly impressed with the idea of its infectious character that (to use his own words), "for the first five or six weeks, when I retired to bed at night, I scarcely expected to find myself alive in the morning;" yet he soon found that all this was utter nonsense. And his chief argument is the *immense number of doctors that escape.* During the eleven months that Cholera prevailed, the house surgeons were never fewer than twenty to thirty at a time, during all hours of the day and night, under all circumstances of fatigue, want of rest, etc., constantly exposed to this infection—if there was any—and yet he asserts, that not one of that immense number of medical men, during all these eleven months, fell a victim. Here, then, I give you Dr Gregory as evidence that sick nurses fall—Dr Mackintosh as evidence that medical men escape; and surely, any theory which can reconcile two such great opposing doctors, must contain some elements of truth. And, by the way, Dr Mackintosh himself admits that, even in his hospital, a number of the *sick nurses* fell likewise; but then, as they were rather addicted to intemperance, he considers this a sufficient explanation,—of course, taking for granted as an axiomatic truth, that every member of the medical profession is a sort of *ex officio* member of an abstinence league! 2d, When Cholera invades any of our large towns, it sometimes runs down, for a great distance,

one side of a street only, and leaves the other totally unscathed. And what appears still more strange, it does not attack every house. In the most capricious way imaginable, it passes over houses in immediate contact with infected houses, and breaks out here and there with great virulence in other houses, whose inmates have had no communication whatever with the infected. 3d, But the most remarkable feature of all is, that if it gains admission into any of our large public establishments, such as an English workhouse, where hundreds of both sexes are all eating the same food, drinking the same water, breathing the same air, and intermingling as the members of one great family, it has been known for a length of time to *select its victims entirely from one sex*,—in some instances fancying only females, in others attacking only males; and this not to the extent merely of three or four victims, but to the extent of ten, twenty, or even, I believe, more at a time. And in so doing, it seems to abide by a general rule, *i.e.* it usually confines itself for a length of time to the sex of the party first attacked.

A medical author, of so recent date as six years and a half ago, in commenting on some of these phenomena, not obscurely insinuates, that their nature is so mysterious and inexplicable, as utterly to defy the power of any human understanding. And he adds, that the only thing which they clearly prove is, that *assuredly Cholera is not infectious*. Of late, however, our knowledge of Cholera has been so much increased, that with all safety I may tell you, that no theory is worth a sixpence which cannot account for these phenomena too. Moreover, I may tell that anonymous author (if within hearing) that Cholera, since then, *is clearly ascertained to be infectious;* and, what is more remarkable, it was just these mysterious and inexplicable phenomena of his (which he says prove the contrary), which led to the discovery, and most of all established its truth! You are aware that, for a long time, the infectious nature of Cholera was an unsettled point. But, after a great deal of wrangling and disputing on the subject, it has come to be clearly ascertained, that, to some extent, it is as surely infectious as either typhus fever,

small-pox, or scarlet fever are. Yet, if our theory be correct, it cannot be infectious *precisely in the same way* as these fevers are. Observe the difference between them. In these fevers, the seeds of the fever are *absorbed directly into the blood.* Take small-pox as an example. It matters not how the virus of small-pox gets into the blood—whether through the absorbent vessels of the lungs, in the act of breathing, or when applied in a liquid form to a wound in the skin, as in the process of inoculation. Only let the virus of small-pox, or any fever, be fairly introduced into the blood, it acts as a ferment on that blood—like a little leaven leavening the whole mass. And the whole vital fluid becoming tainted, the infectious effluvia are again exhaled from that blood, wherever it flows, *i.e.* they are exhaled through every pore of the skin, and flow forth along with every breath. But if the seeds of Cholera are not absorbed into the blood (and one evidence we gave of this was the absence of delirium), then it is impossible that any emanations from that blood can contain the infection again. In other words, while it is rational to look for the infection of fevers in the breath and perspiration (and there accordingly we find it), it is not rational, on such theoretic grounds as we have now advanced, to look for the infection of Cholera there. Accordingly, if we appeal to actual fact, this is precisely how the matter stands. We have evidence, overwhelming evidence, to believe that Cholera is infectious; but no evidence, as yet, to believe that either the emanations of the skin or lungs are so—or rather, I should say, a great deal of evidence to believe the contrary. Let me supply one illustration of this. Some years ago, when the dispute about the infectious nature of Cholera was at its height, several of the Continental physicians adopted very bold and daring experiments on this subject. They not only deliberately inhaled the breath of Cholera-stricken patients, but took off their flannel shirts, wet with their cold and clammy perspiration, and applied them to their own persons; they stripped themselves naked, and lay down side by side with them in their very beds; yea, one of their number was actually so rash, as to adopt the most revolting experiment,

of drinking a little blood abstracted from the veins of a Cholera patient. In short, they seemed, by every means that ingenuity could contrive, to try, if possible, to catch the infection, and, strange to say, could not possibly succeed! And all this, you perceive, was for the purpose of silencing their opponents, and proving, by one bold and satisfactory test (as they thought), that such a bugbear as infection was not to be found about this disease at all. Now, it did not prove this in the slightest degree. But it went far to prove two things. *First*, It proved very clearly, and no mistake, that these were a set of daring, foolhardy enthusiasts, who, in their search after this undiscoverable bugbear, were just groping in the dark, not knowing where to look for it. And, *secondly*, it went far to prove, that if Cholera be infectious (as we now know to a certainty that it is), it is neither in its cold and icy breath, nor in its cold and clammy perspiration, where the seat of that infection is to be found. But observe, as the seeds of this disease are deposited on the mucous membrane of the stomach and bowels, and multiply themselves there, as the seeds of fever are multiplied in the blood; so it must be in the *matters ejected from the stomach and bowels*, in the course both of the vomiting and diarrhœa, *that the true source of the infection is to be found.* Precisely in the same way, as if so many grains of arsenic were deposited there, it would be in these materials where you would look for the poison again. Here again, if we appeal to facts, this is not now a mere matter of opinion. During the last few months, it has been clearly established, that these matters are at least *one source* of the infection of Cholera—in the opinion of many, the *only source*—which undoubtedly must be the case, if the intestinal theory be the true one.

In making a few remarks on the true seat of the infection of Cholera, I know, that in such an audience as this, graced as it is by so many ladies, I am treading on very indelicate ground, perhaps even violating the rules of etiquette; but really this is a matter of such overwhelming practical importance—a life and death affair to all of us—that I know you will excuse me if I use a little liberty of speech.

I believe, then, it was either Professor Liebig of Germany, or Dr Snow of London, who first threw out the hint, that perhaps the seat of the infection might be found in these materials; and this idea was at once taken up by several eminent medical men, both in England, and even Edinburgh, a great number of accurate observations established, and even experiments performed on the inferior animals, in the way of infecting them with this disease. And the truth has at length been clearly established, not only that *there* is the true seat of the infection to be found, but also that these materials are not so infectious in the first instance as several days afterwards they become. This may arise from the self-multiplying power of the Cholera seeds. The infectious effluvia seem to be in the height of their power, about the third, fourth, or fifth day, according to circumstances; after that they gradually subside, until they totally disappear. Now, before alluding to the vast importance of this discovery, in a practical point of view, let us see how easily those phenomena already adverted to can be at once explained. You will perceive that it has not been medical men, after all, who have been most exposed to the infection, but *sick-nurses and washerwomen.* Washing the clothes, perhaps, after death, *i.e.* just about the third or fourth day after some of the infectious material may have been deposited on them; and when, by inhaling the hot steam, the infectious effluvia, in their highest state of virulence, were sure, alas! to find admission into the mouth. Again, if, under any circumstances, the infection is at its height about the third, fourth, or fifth day, you can easily perceive, that if, by any chance these materials should find admission into a drain or *common sewer* (as must frequently be the case in our large towns), the close and confined atmosphere of such a region cannot fail to increase the virulence of these infectious effluvia in a most extraordinary degree. Is it not rational, then, to suppose, that when Cholera runs down one side of a street only, and breaks out here and there in houses whose inmates have had no communication with the sick, the infection all the time *has been flowing in the track of a common sewer*, and breaking out here

and there as the outlets in that prison-house enabled it to do? And the same principle explains that remarkable phenomenon about the English workhouses. If a male be the first attacked, you perceive, that though they are intermingling with each other in all possible ways, yet in consequence of *certain domestic arrangements*, it is only males, who for a great length of time, may come in contact with the infectious matter; and so with females in other workhouses, if a female be the first attacked. In fact, that this is the true explanation of the great mystery about the workhouses, is now established beyond all dispute. (See *Edinburgh Medical Journal* for December 1855).

But it is not only in the way of explaining phenomena; in a practical point of view also, this discovery is out of sight the most important that has yet been made regarding Cholera. It at once gives man a restraining hold over the ravages of this disease, the importance of which it is impossible to conceive. Without affirming that it reveals the one vulnerable heel by which this giant of a pestilence *may be slain*, we may safely say, that in consequence of this discovery, a half educated medical student, at the present moment, could do infinitely more, in the way of checking its ravages, in a tainted district, than the whole medical faculty could have done before this recent discovery was made. Should Cholera ever invade our country again, you will see, that not only will streams of chlorine gas, or other disinfectants, be sent along our common sewers, to search out the enemy in his subterranean passages, and find for him a grave in matters so congenial to his nature; but you will see, that by the most simple contrivances imaginable, even by a few handfuls of chloride of lime, the infection can be checked in the very first instance, and in fact these matters prevented from becoming infectious at all. The importance of the discovery consists in this, 1*st*, That these matters are scarcely, if at all, infectious at first, and can easily be prevented from becoming so; 2*d*, That in our country, in the midst of all our doubts about infection, and even denial thereof, it is now nearly self-evident, that it has been almost entirely by infection that the disease has been kept up in the midst of us at

all. Of course, it being only a few months since this discovery was made, medical men have not yet had long time to experiment upon the subject. But experiments have been adopted on a small scale, testing our power to stay its ravages, by destroying the infection of these materials; and the result has been so exceedingly satisfactory, as to have convinced many a one, that had man only as much power over the seeds of this disease in the regions of their first atmospheric development, as it can be proved he has over them under their far more virulent form of infection, we might surely conclude, that Providence at length had begun to look down with His benignant smile on our afflicted earth, and that the days of Cholera itself were ended. And were this the opinion only of a humble individual like myself, it would be a matter of little moment. But I do assure you, that one of the most eminent of our Edinburgh professors, the man who has stood at the head of physicians there for the last forty years, and who, perhaps, has devoted more attention to this department of the subject than all the rest put together, viz. Professor Alison, gives it as his calm and deliberate conviction, that in consequence of this one discovery, and the likelihood that this is the only mode of its propagation between man and man; whatever may be the case in its native India, or other warm climates, where atmospheric influences have more to do with it, yet *that we have great reason to hope* (the cautious Professor makes no rash assertions, but emphatically expresses a strong and "*confident hope*") *that in our country at any rate, this hitherto virulent and intractable epidemic will very soon be* TOTALLY SHORN OF ALL ITS TERRORS (See *Edinburgh Medical Journal*, November 1855), *Note* 6.

Let us suppose, for one moment, that this opinion of the eminent veteran Professor turns out to be correct, (and indeed whether we reason from theory or experience, we have good grounds for believing that Cholera never shall again devastate our land as it has hitherto done), does it not appear a most extraordinary thing, that this grand discovery should have been so long in being made? Now that it has been found out, it

appears the most obvious and natural thing in the world, that if Cholera be infectious, the infection must be found in these materials. Ask the humblest individual upon earth, if so many grains of arsenic be deposited on the stomach, where would you look for that arsenic again? and he would probably take it as an insult to his understanding. Yet here have the whole medical profession, not only in this country, but throughout the world, been wrangling and disputing about whether Cholera be infectious or not, some going about making observations, others collecting statistics, inhaling breath, and drinking blood, etc., etc. And though perhaps the opinion has been very general for several years, that the Cholera poison was deposited on the stomach and bowels, yet it never, till lately, seems to have occurred to a human being, to look for the infection where it is now known to exist. And when the announcement of this discovery was made a few months ago, it fell like a thunderbolt of surprise on the whole profession—not the least element in that surprise being amazement at our own profound stupidity! It is not, however, to expose the stupidity of the profession that I allude to this. But as we are on the subject of mysteries at any rate, I must endeavour to account for this mystery too. No person in this room will deny, that everything in nature is regulated by the hand of an overruling Providence. Does it not appear, then, as if Providence had purposely blinded our eyes to this very obvious circumstance, and invested this disease with such airs of mystery, in order the more surely to accomplish the work assigned it on the earth? I allude not to any moral or religious work, but refer to a great work of health. Observe, so long as this disease was so intractable and so mysterious, people were glad, in self-defence, to adopt any sort of measures which might have a tendency to check its career; and in adopting, among other things, all judicious measures of sanitary reform, they have at length discovered the grand secret, that such measures operate like a charm, not only in arresting the ravages of Asiatic Cholera, but what is of infinitely more importance in such a country as ours, in arresting the ravages of

other diseases too, especially the ravages of typhus fever. Just as if Providence, before opening our eyes how to deal with the ravages of Cholera, had, in kindness, waited until Cholera itself had opened our eyes how to deal with the ravages of fever. Or as if this mighty pestilence, which we have ever been regarding in no other light than a destroying angel devastating our land, has been, after all, in many of its features, an angel of mercy sent to bless us. Or as if the Divine Being had sent it forth like His commissioned messenger to do its work—sent it like a great schoolmaster, to teach men wisdom, and chastise the nations into obedience to His laws. And the moment He finds that His commissioned messenger has done its work, and that men have been taught the grand lesson, that obedience to God's laws in all matters of cleanliness, as in every thing else, does prove its own reward, that moment does He arrest the rolling tide of pestilence, and address that angel as He addresses the proud waves of ocean, "Here must thy proud waves be stayed."

Such a view, I think, may be adopted without fanaticism, for two reasons. *First*, because most assuredly Cholera has taught us an important lesson on the power of cleanliness to check the ravages of typhus fever; and this being our country's greatest foe, we must conclude, that in this vial of wrath there have been mingled some drops of mercy. And another thing is equally clear, that during all time past, we never could look on this strange and intractable epidemic in any other light, than as a dark, a mysterious visitation, sent into the midst of us—something like a black, an impenetrable cloud, hovering above the horizon of our country, ever and anon discharging its drops of wrath upon the earth, and whose utter darkness defied all human intellects to pierce; and now, at any rate, even within the last few months, the mists and vapours of such a cloud have been so far cleared away, that the far-seeing eye of the most sagacious of our medical professors can already detect, spanning it from side to side, a beautiful rainbow—emblem of *hope* to an afflicted world.

It now behoves us to advance a step, and endeavour to show

how these seeds come to be developed in our atmosphere at all. As already said, they are supposed to be of the nature of *vegetable fungi*. In order to understand my reasonings here, you must first attend to two preliminary observations:—1*st*, You must have a clear idea what *kind of air* is most favourable to the production of fungi in general. When we place a book or piece of bread in a damp and musty-smelling closet, we find that these articles very soon become *mouldy*. Well, that mould is vegetable fungi of a certain species, so large as to be visible to the naked eye. And, what I wish you particularly to observe is, that the *damper* the closet is, and the more *foul* its air (as indicated by its musty smell), the more quickly and abundantly will vegetable fungi be deposited on these articles. 2*d*, The next preliminary observation is, that, let the cause of Cholera be what it may, it is somehow or another closely connected with a disturbed condition of electrical action. The first evidence we have of this is, that remarkable feature in an epidemic constitution of air, viz., a *deficiency* in the amount of its electricity. We are all so much accustomed, indeed, to think of electricity as a noxious agent—accustomed to see it in its dire effects, as lightning flashing across the sky, as splitting up trees, knocking down walls, striking men dead, etc., etc.,—that we are far too apt to conclude, really the less we have of such a dreadful thing about our atmosphere, so much the better. This, however, is entirely a mistake. These are but the actions of this mighty agent in a state of frenzy. There cannot be a doubt that, in its ordinary, natural, or healthy condition, electricity is something like the nervous energy that animates and invigorates the whole frame of nature. Again, it has been observed that, during times of Cholera, there are a greater number than usual of those bright zones of light, falling stars, and phosphorescent appearances of various kinds, which have ever been considered to be connected with a disturbed condition of electric action. Not only is it usual, however, to observe these phenomena in the sky over affected districts, but, what is still more remarkable, the very first appearance of these strange sights in the sky, over a district, has been known to be

simultaneous with the sudden invasion of Cholera there. Thus, a few years ago, the officers of one of our Indian regiments, stationed in the south-east of India, were called out, a little before nightfall, to witness a very extraordinary phenomenon in the atmosphere. This consisted of an immense number of small, bright, lurid, phosphorescent-looking clouds, which had just made their appearance above the horizon, and came floating along, with great rapidity, until they stood directly above where that regiment was encamped, and even enveloped the whole station in their ominous folds. The officers stood for a long time admiring such a strange and beautiful phenomenon, and various were the conjectures what might be its cause. Alas! these clouds were but the portentous omens of a coming storm. Even before midnight, whispers began to float about, that several cases of Cholera had occurred in camp. And what was the surprise of all, next morning, to learn that, during the course of that single night, an immense number of the poor soldiers had been stricken down; in the course of the next day, all the hospitals were filled, and, of these poor soldiers, several hundreds actually died! Again, when the Cholera influence is very intense, electric telegraphs have sometimes refused to work for several hours at a time, and even powerful magnets been shorn of their strength. Thus, in the month of November 1848, at the very time when Cholera was at its highest death-point in Edinburgh, the electric telegraph between Edinburgh and Glasgow thus struck work for several hours together, the needles all the time being powerfully deflected—without any apparent cause, except probably a mysterious arch of fire, which also, during several hours on that same evening, cast down its lurid glance on that devoted city. And, more remarkable still, a few years before that, in a district in the south of Russia, where the Cholera was prevailing to a most intense degree, a powerful magnet, capable of sustaining the weight of several pounds, became so shorn of its strength, that, when the Cholera influence was in the height of its power, it could only lift up one-sixth part of its ordinary weight! Unfortunately, this phenomenon was not observed until the disease

was at its highest death-point; and, therefore, we do not know whether the magnet gradually lost its sustaining strength, just as the Cholera influence advanced; but, of one thing we are informed (and we have no reason to doubt the authenticity of the reports), that the magnet very slowly and gradually regained its ordinary strength, and, in so doing, *kept pace with the gradual declining of the disease.*[1] A writer in a London medical journal mentions a more extraordinary circumstance still. He declares that, from one of his patients, during the collapse stage, and while in the act of rubbing his limbs, for the purpose of restoring animal heat, he educted from that patient's frame, and from his limbs, distinct streams of electric light. They varied in length from 1 inch to 1½ inches; were quite visible to the naked eye; came off with a crackling noise; and were perfectly analogous, in all their features, to those electric sparks, or mysterious streams of crackling light, which any of us can educe from a Leyden jar, when charged with this mysterious fluid. I lay no stress on this case, however, because I believe it is the only one of the kind on record, and also because electricity is often evolved by means of rubbing, in various states of the human body. But, surely, we have said enough to show that Cholera is connected with a disordered state of electrical action: and the next question is, What influence can electricity possess over the production of *vegetable fungi?* Now, in order to understand this, let me first inquire of you, What becomes of all those noxious smells and putrid effluvia, of various kinds, which are ever streaming forth, in such vast abundance, from the surface of our earth? What becomes of the smells arising from every stagnant marsh and ditch? from every mass of corrupting manure? from all vegetable and animal substances whatever, undergoing decomposition? Before answering this question, observe that a smell is a real material substance—very subtle indeed, and very minute, and quite invisible to the human eye—but just as distinct a material

[1] See some of these electrical phenomena alluded to, in *Hogg's Instructor*, 1849.

substance as is the solid rock itself. It is so material, that, striking on your olfactory nerves, it will produce in you a strong sensation; so material, that, adhering to your clothes, you can carry it about with you; so material, that you can actually cork it up in a jar, or roll it up in a blanket, and keep it there, in all its virulence, for many a day! Yes, noxious vegetable smells have been taken in jars to the laboratories of chemists, and been compelled, at the touch of chemistry, not only to confess the secret of their power as the focus of disease, but to show themselves forth in a form visible to the naked eye. Remember, too, that, if material, it cannot be destroyed. The particles of which a substance is composed may enter into new states of combination. They may be decomposed or rendered inert. But, I repeat, such a thing is not known in nature as the annihilation or destruction of one particle of matter. Of course, then, you will see, that it is no answer to our question to say, that these smells merely arise in the air, and are driven away by the wind. For, please, where does the wind drive them to? Wind may shift them about from place to place, but cannot certainly destroy them. Wind, at any rate, cannot drive them beyond the limits of the atmosphere itself; and that atmosphere only extends to the distance of fifty miles above our heads. If we consider, therefore, that our world has now been in existence for some 6000 years, and, during all that period, been exhaling these smells in great profusion, it does become an interesting and important question, What becomes of all noxious smells? or, What is it, in our atmosphere, that ever keeps it sweet and pure, and prevents it from becoming such a festering mass of corruption, as to be unfit for the breathing of any living thing?

Now, I have to tell you, that it is electricity which does all this. Professor Schonbeen of Germany has recently discovered, that during nearly all electric actions, there is an acrid fluid or vapour given off, which has a very material influence on smells, and to which he has given the name of *ozone*. If any of you choose to look up any work on electricity, you will find that the phenomena which attend most electric actions, are three in

number—a flash of light, a crackling noise, and a *faint peculiar odour*. That faint peculiar odour is ozone, which is found to have a very strong attraction for smells. When brought in contact with a smell, it unites with that smell, so as to decompose it and render it inert, after the manner of chlorine gas or nitric acid fumes. Indeed, Professor Schonbeen asserts that, by the working of a powerful electric machine in a small room, so much ozone is given forth, that, in this manner, you can *decompose*, or, what is vulgarly called, *destroy*, any smells whatever, good or bad, that you choose to introduce into that room, and thus ever keep its atmosphere sweet and pure. If this be the case, let us revert a little to the smells of earth. You perceive that these smells are all lighter than air, and, consequently, ascend. Had they not been so, woe betide all breathing creatures! But these smells, rising on the wings of their volatility, all naturally ascend to where they will find ozone, to decompose them, and render them inert. The electrical influences, constantly at work above our heads, are just doing, on a grand scale, what the electrical machine does in Professor Schonbeen's room. What, indeed, are those clouds that hover over us—those beautiful clouds—now fringed as with resplendent silver, and anon glowing as with burnished gold, but so many different electric batteries, constantly playing upon each other—constantly giving out this blessed ozone—which, by its diffusive qualities, disperses itself through the air, to attack and decompose all noxious smells, and thus ever keep our atmosphere sweet and pure? Truly, we may assert, that *cloud-land* is the seat of a purgatorial fire, or, in the language of theology, a great and mysterious half-way house between heaven and earth; to which are packed off, as so many vile and impure spirits, all noxious smells and putrid effluvia, to get all their vileness and all their impurity purged away. For the benefit of our world, this blessed fire is ever acting on its noxious inmates, and, when heated to a very intense degree, its emanations become visible as the lightning's flash, and its crackling audible as the thunder's roar, to the sense of man!

But, perhaps, you may ask, what light does all this throw on

the cause of Cholera? Why, I think, that in the light of that purgatorial fire, we may read the whole theory of this disease. I mean not to assert, that the vegetable fungi or seeds of Cholera are some of these vile and impure spirits, that have made their escape and let loose upon our world; but I do assert, that they are the natural and legitimate offspring of such vile spirits, or *undecomposed noxious smells*. In order to perceive this, have I not proved that Cholera is connected with a disturbed condition of electric action? Then, if we bear in mind that one feature of an epidemic constitution of air, viz., that there is a *deficiency* in the amount of its electricity—the disturbed condition may consist in this, that the electric actions at such periods are unduly *weak;* the ozone is not given forth in sufficient abundance; the noxious smells, ever streaming forth from the surface of the earth, *are not sufficiently decomposed*. In other words, the atmosphere becomes, to a certain extent, in a *foul* condition; and if, along with this *foulness*, you take into account the great abundance of its mists and fogs, you perceive that we have, on the grand scale, the same quality of air in point of *dampness and foulness*, as exists in that damp and musty smelling closet, so favourable for the production of vegetable fungi. I do think, that this discovery of the German professor throws an important ray of light on one of the links in that mysterious chain of second causes, concerned in the production of this disease, the first link of which chain, no doubt, hangs from the throne of the Eternal.

If this theory, then, be correct—if the seeds of Cholera be the natural offspring of a damp and foul condition of the air—from a disturbed electricity being brought to bear on it—surely we must conclude, that *whenever that disturbed condition of electricity exists*, which seems necessary for the production of these acrid seeds, they must be developed in a more virulent form, in any atmosphere characterized above the rest by the two elements of dampness and foulness. This appears to me just as inevitable as that the same causes, in superior circumstances, will produce superior effects—or that more vigorous parents

must necessarily produce more vigorous offspring. Indeed, I may here mention that, having embraced this theory when it first came out, some five or six years ago, and even written a small defence of it in a popular periodical, I boldly asserted, at that time or shortly afterwards, that were a good chemist to analyse the atmosphere in different districts, he could tell beforehand where, in an expected invasion, Cholera would be almost sure to select its victims. And the truth of this view has recently been very remarkably demonstrated. During the very last invasion of Cholera, a commission of the most scientific men which our country affords, was appointed by the London Board of Health, for the purpose, among other things, of analyzing the atmosphere in affected districts. They analyzed the atmosphere of districts where it was prevailing in a severe degree, compared it with the air in other districts where it was prevailing in a mild form, and again, in other districts from which it was entirely absent. That commission has very recently published a report upon the subject; and I stake my reputation for veracity in asserting that, wade through that report as you may—and divest it of all its technical terms—the sum and substance of it just comes to this, that in proportion as we found an atmosphere characterized by *dampness and foulness*, and *deficiency of ozone*, especially if close confined and warm, in that proportion did we find Cholera prevail in a severe degree; and in proportion as we found these elements awanting, in that very proportion did we find the epidemic awanting too.—(*See Note* 7.) If this be so, why should we be surprised that this mighty pestilence, in its onward deadly march across the earth, should seem almost unable to climb a hill—that it prevails very seldom in mountainous regions, but is sure to settle down with unusual virulence in all low, damp, and marshy districts? The reason is, that, as a general rule, the atmosphere of the one district is pure and dry, and richer in ozone—the atmosphere of the other damp and foul. And why should we be surprised that one of its favourite routes should be from sea-port town to sea-port town, along both our eastern and western shores? Such low levels have usually close

and misty air, and always, at any rate, the disadvantage of increased atmospheric weight (this being an element in the Choleraic or epidemic constitution of air); moreover, if we take Newcastle, Musselburgh, etc., as samples of the rest, they are also the most uncleanly throughout the country. In one word, why should we wonder that Cholera should attack our large and overcrowded cities much more frequently than our rural districts, and, in doing so, should prowl about, like a fell destroyer, through their filthy lanes—that it should so frequently follow in the tracks of typhus fever,—what are the haunts of the one being to a great extent the haunts of the other? As well might we wonder, that any two roaming beasts of prey should naturally settle down where they will find most abundant food.

I will allude to only one other feature in this disease, and then I am done. It has frequently been remarked, that Cholera can travel *against* the wind, that it refuses to be scattered by the hurricane itself, and even bids defiance to the wildest storms. And this, at one time, was thought to disprove the idea of an atmospheric poison. But this is not so remarkable after all, if we bear in mind, that Cholera can travel by means of *infection*, as well as in the course of *streams;* and especially if we remember the important part electricity plays in the production of the disease. Still, one fact is very remarkable, and goes far, I think, to establish the truth of the theory we have now advanced, viz., that while all ordinary storms fail to arrest its course, a very violent thunder storm is sometimes known to do this in a most marked degree. This is, indeed, seldom or ever seen in our country, where atmospheric influences have less to do with it. But in India (as I was lately informed on good authority), the effect of a thunder storm is sometimes perfectly extraordinary. Here, for example, we shall suppose, is some inland district or hamlet, where the disease has been raging in all its virulence. Scores of victims have been falling daily—the place has literally been a place of mourning, of pestilence, and of death. But, on the occurrence of a very great and very violent thunder storm, immediately and directly over that place, the ravages of the

pestilence have at once been stayed—stayed in a manner almost instantaneous. And what is a thunder storm, by its huge electric flash, ever and anon setting the heavens in a blaze, and its loud electric peals rolling tumultuously from cloud to cloud? What is it but nature's process of doing two things,—1st, Nature's process of restoring into equilibrium that disturbed condition of electric action, on which the primary formation of these acrid effluvia depends; and, 2d, Nature's process of evolving her disinfectant ozone on a magnificent scale, so as to fumigate the air, and destroy these effluvia themselves? And why should we be surprised at the suddenness of the event? If our theory be correct, the very crash of the elemental war was just nature's grand convulsive effort to shake off the malign influence that was oppressing her; yea, imagination might even conceive that the very demon of the disease itself had just been hovering for weeks over that ill-fated district, and pouring down on the inhabitants his pestilential breath, when lo! in a twinkling, a flash of lightning struck him dead, and the air was restored to its wonted salubrity!

From all that we have said, you will see at once the folly of those who, when they contemplate the ravages of this fearful foe, hold up their hands despairingly and cry out, What, alas! can poor feeble man do to arrest its course? You will see, that while we can do nothing, absolutely nothing at all, in the way of acting on its primary or exciting cause, we can do something, and thank God, a very great deal, in the way of acting on its *predisposing* causes, *i.e.* those fostering influences which favour its development, and render more active its exciting cause. We cannot, indeed, change the constitution of the air (unless the drying of marshes and ditches at our doors be considered so), but we can do something to change the constitution of man. A creature of the earth cannot mount upwards to the clouds, and pluck from its seat the destroying angel there enthroned; but a creature of the earth can sometimes work wonders on the earth itself. I may illustrate this by a very simple and rather ludicrous comparison. All of us have seen a little dog barking at a crow

flying in the air; and some very ignorant people may suppose, that because the magnanimous cur cannot get at it, such a thing is just as ridiculous as barking at the moon. This, however, is entirely a mistake. That little dog can deal effectually with the crow in two ways; 1st, Should the crow come down to earth, it can give it a very effectual bite; and, 2d, It is at all events very useful in the way of keeping it soaring where it is, and preventing it from coming down to earth at all. Such, precisely, is the power granted by Providence to feeble man, over the ravages of this disease. In the regions of its first atmospheric development, it may fitly be compared to a bird of prey floating in the air. And though we dare not call that useful man, a scavenger with his broomstick, something of the nature of a scaur or hobgoblin, to frighten it away, yet we may safely assert two things at any rate. 1*st.* That even though it should dart down to earth, the one discovery of the seat of its infection enables us now to give it a very effectual bite. 2*d.* That the grand thing, notwithstanding this, is if possible to keep it soaring where it is, and throw no temptation in the way of inviting it to earth at all. As it soars in that region, it is comparatively weak, but with vulture eye it is ever looking down for impurity and corruption, for these form its most appropriate food. The very atmosphere that it loves to breathe is an atmosphere of vileness. The very water that it loves to drink is the turbid water of a stagnant pool; and, smelling from afar its fœtid breath, it will come down to bathe itself, and slake its thirst, and with recruited strength again take wing, to fix its talons in the hearts of men! But, most assuredly, by drying up such sources of its power, you reduce the creature to a state of weakness. And were sanitary measures adopted on a magnificent scale throughout our country, all theory and all experience alike demonstrate, that this malignant *carrion-crow* or bird of prey would either die upon the wing, out of pure starvation; or, at least, take its flight from such cleanly shores, to its native nest, in those rank and pest-producing jungles of Bengal, —those viper dens, and haunts of tigers, snakes, and fevers,— where it first was hatched into a living form!

And in thus asserting the power of man over the ravages of pestilence, we do not, for one moment, deny that the Cholera influence, like everything in nature, is wielded by the hand of an over-ruling Providence, and will only strike where that hand directs. We rather think that we assert that Providence, in the strongest manner, and cling to that Providence as our only hope; because we take it up as the very basis of our argument, and reason thus, that because Providence has ever blessed all efforts hitherto, it will continue to bless them still. So far from denying the doctrine of a Providence, this is only to assert that its ordinary streams flow in the channels of natural law; it is only to assert that obedience here, as in everything else, will prove its own reward, and disobedience bring down deserved wrath. It is only to assert, that if the latent seed be the work of God, the fostering influences which blow it into power, are in a great degree the work of man. In one word, it is only to assert that, as a bird of prey flying in the air, or a ravenous wolf roaming in the desert, cannot thrive without appropriate nourishment, so neither, thank God, can a pestilence or a fever. And just as surely as our brave and gallant British army, in union with their no less brave and gallant Allies, might, by a sheer process of starvation, drive from the Crimea their stubborn foe, without so much as one shot fired at the Russian strongholds on the heights above; and just as surely as the leaves and branches of the sturdy oak itself, must wither and decay, if we abstract the sap and soil from its absorbing roots; and just as surely as there is an established connection (not of our making) between means and ends—that ends are never accomplished without means—and where appropriate means are used, the Lord himself never does withhold His blessing; so surely has Providence granted to feeble man (if we will only accept the gift at His hands), the power, in great measure, of grappling with this formidable foe; and that, not in the way of firing our unavailing shots at its inaccessible strongholds in the heights above, but just in the way of drying up the sources of its influence upon earth, and stopping the supplies of aliment on which it feeds.

NOTES FOR MEDICAL READERS.

Note 1*st*. Here is one example of such statements from Captain Claridge, "Priesnitz, in his establishment, has successively treated seventeen cases of Cholera, and has *cured them all in a few days*." It is rather amusing to notice the most learned and eminent hydropathist in England, in explaining the *modus operandi* of his own specific, arguing for its use in Cholera thus: viz., that Cholera can only be cured by *animating* the great function of perspiration! that this can be done only by irritating "the organs of the skin!" and as cold water is the only thing which can irritate that skin effectually, *ergo*, cold water must be the only cure! (*Claridge's Hydropathy*, page 229). Nevertheless, as a mazy labyrinth often leads to a place of safety, and many a good cause has been supported by doubtful arguments, so without subscribing to the Captain's theory, we must (for aught I know) admit his testimony to be trustworthy in a matter of fact. Seventeen cases treated in succession without a death! "Oh (say medical men), these cases must have been all slight from the first." Now, *if we accept the fact*, this explanation, I fear, is rather unfair. For pray how do we know a malignant case from a mild one? Only by the malignancy of the symptoms, *i.e.*, if there is no great amount of coldness, cramps, asphyxia, etc., etc., the case is judged mild, but if the reverse, it is judged malignant. Well, if all these symptoms (as we have seen) arise from want of water in the blood, and disappear when the water is supplied, then if hydropathic treatment be early begun and vigorously pursued, it may possibly be extremely difficult to afford any evidence of malignancy, even when it exists. Because such early and constant dilution of the blood may prevent these malignant symptoms showing themselves, by obviating the cause on which they depend. The logic which infers, that all cases which recover must have been from the first extremely mild, is equal to that which would lead us to believe, that all cases which die must have been from the first exceedingly malignant! And were such logic only let loose on the profession at large, they would grope in vain for any remedy, in any disease, better than another.

Note 2*d*. He indeed informs us, that in the Cholera Hospital he tried all modes in reference to liquids, restricting them, giving a moderate supply, and allowing the patient to drink as liberally as he chose, and says, that *the last method was found of most avail*. But he mentions the circumstance merely incidentally, and lays no particular stress on the value of water, as the most important element required in the treatment. This is the more remarkable, as he knew so well the condition of the blood, and must have known too, that the power of *absorption* in Cholera is so strong, that one or two trifling doses of calomel sometimes produce violent salivation.

Note 3d. This case was related to me by an eye-witness of the scene, on whose word I can confidently rely, an intimate friend of the coffined alive; and this case having occurred in a Cholera hospital, led to a change in the law as to the period that must elapse between death and interment.

Note 4th. Dr Snow probably entertains views similar to, perhaps identical with, those expressed above. I infer so from an article (inconclusive, as I think) opposing his theory, in the last number of the *Edinburgh Medical Journal* (March 1856). That writer truly insinuates, that we never will learn how to cure Cholera, unless we discover some means of stimulating and *oxygenating the blood;* and suggests various plans, such as receiving into the stomach solutions of oxygen gas, chloroform, chlorate of potass, hyper-manganate of potass, per-oxide of hydrogen, and perhaps iodine! inhaling some of these into the lungs! and finally injecting some of them into the veins, especially *oxygenated water*, and a solution of a something called *deutoxide of hydrogen!* I humbly submit, that nature's plan, by means of ordinary atmospheric air, and just in the old fashioned way of breathing it, is better than the whole. But in order to get advantage of such a simple remedy, the blood must be enabled to circulate through the lungs, which it cannot do so long as it continues thick as treacle. And this brings us back again to another remedy equally simple, which the learned call *Aqua Fontanea*, but better known (in the language of Mr Gough) as "*water, pure blessed water*"—assuredly the most important element it has lost.

Note 5th. There is undoubtedly blood-poisoning in the stage of reaction or consecutive fever. Hence there is both delirium and all the symptoms of an exanthematous fever. But this follows as a natural and necessary consequence of the collapse stage. The poisoning here may not arise from the reception into the blood of the original Cholera poison deposited on the alimentary canal, but simply from the non-elimination out of the blood (from the suppression of secretions) of its own acrid materials. This is confirmed by the fact, that saline injections into the veins, by restoring the secretions, either moderate the consecutive fever, or prevent it altogether. The last five successful cases operated on by Dr Latta of Leith, recovered, *without any consecutive fever whatever.* (See *Mackintosh*).

Note 6th. Since the Professor wrote these lines, the likelihood that this is the true and only source of the Cholera infection, appears to me to have become a certainty. Dr Budd of Bristol (*Edinburgh Medical Journal*, December 1855) mentions several instances, where, by operating on these discharges, the spread of Cholera, raging at the time, has been literally *checked at once*, in barracks, prisons, etc., *without one additional case ensuing*, and where this result was confidently predicted! "In the recent epidemic of Cholera (says he) I tried the same method in a *large number of cases* in private practice; and *in no instance* in which I was consulted early, did the disease spread beyond the single member of the family first attacked."

Note 7th. Extract from said Report.—"With this mystery still unsolved

(*i.e.*, the true nature of the Cholera poison), there has grown more and more into shape a doctrine which is both intelligible and practical, that the undiscovered power, in its wanderings, acts after the manner of a *ferment;* that it therefore takes effect only amid congenial circumstances, and that the stuff out of which it brews poison, must be air or water, abounding with organic impurity. Taking this as hypothesis, and testing it by the facts before us, we find, that it would include and explain them. Either in air or in water, it seems probable that the infection can grow. * * * But on the whole evidence it seems impossible to doubt, that the influences which determine in mass the geographical distribution of Cholera in London, belong less to the water than to the air."

Hints on Treatment.

In its practical bearings, it must be highly important to know, whether the primary receptacle of the Cholera seeds be the *blood* or *intestinal canal*. If the former, it is vain, I fear, to look for any very effective treatment by means of drugs. For if once they get there, it must be extremely difficult either to *destroy* them, or *get them out*. But if Cholera be a real case of gastric or intestinal poisoning, we may entertain a confident hope, that a rational treatment, perhaps effective, may yet be devised. In addition to the evidence already adduced in favour of the intestinal theory, arising, 1*st*, From the ease with which it explains the symptoms; 2*d*, From the discovered source of the Cholera infection; 3*d*, From the positive evidence of the non-infectious character of the breath and perspiration; 4*th*, From a comparison of the results of different modes of treatment, let me adduce the three following considerations:—

First, If the vomiting and purging be the *effect* of a certain condition of the blood instead of its *cause;* in other words, if these evacuations arise from that poisoned blood, in the same way as all the other symptoms are supposed to do, then, surely, the same action upon that blood (*i.e.*, by saline injection) which dispels all these other symptoms, ought, for some time at least, to *cure the vomiting and purging too*. But, instead of this, it is found, that the same operation which cures, for several hours or days, all the other symptoms, *takes no effect on the diarrhœa at all*; and, unless the operation be repeated, time after time, until the diarrhœa has run its course, the patient usually sinks down into his former condition, and soon expires. *Ergo*, we conclude that the evacuations arise from one cause, viz., an irritant directly operating on the bowels; and all the other symptoms from another cause, viz., the thick and acrid condition of blood, which these profuse watery evacuations produce.

Secondly, Many cases of British or Sporadic Cholera, where the cause can be clearly traced to some acrid poison operating on the bowels (such as sour porter, unripe fruit, etc.), resemble the true Cholera so completely in every symptom (except the character of the evacuations), that we may safely infer, that, if intestinal poisoning be the cause of the one disease, so must it be,

though from a different poison, the cause of the other. This was strongly impressed on my mind, some years ago, from a case occurring in my own practice—in which, from the ghastly countenance, livid hue of face and extremities, cramps, pulseless wrist, choleraic voice, remarkable coldness of frame and breath, I could not determine, for some time, whether this was a case of the true epidemic malignant Cholera, or the ordinary form of it, called British or Sporadic. I soon found, however, that it must be the latter —1*st*, Because no epidemic Cholera was prevailing; 2*d*, Because it arose from a large draught of butter milk, on the patient returning home weak and exhausted, on a warm summer day, from a long journey; 3*d*, Because the evacuations, though equally profuse and equally *watery*, had not the characteristic rice-water appearance. I ask any rational man, if intestinal poisoning be the cause of the one disease, is it not reasonable to infer that it is the cause of the other? And, though the evacuations certainly have a different appearance, is this more remarkable, than that *elaterium* will produce discharges differing from those of *arsenic*, or an overdose of *calomel* produce evacuations different from both? As I quote this case, however, entirely from memory, the argument will be strengthened by referring to the following case of Sporadic Cholera, related by Mr Marshall, which occurred in Dublin in 1826, *i.e.*, *six years before the epidemic Cholera reached our shores*.—(See *Mackintosh*, p. 333). "Private Dickie, 26th Regiment, aged 19, was brought to the hospital on 13th August 1826, in a state of great exhaustion, labouring under *violent vomiting and purging*, with which he had been attacked about an hour previously. He is also affected with severe *spasmodic action in the bowels*, and *cramps* in the legs; the matter vomited is bitter, and has a dark-green colour; that passed by stool has a dirty-grey appearance; face and extremities of a *livid hue*, *cold* and *clammy; no pulse at the wrist;* the action of the heart is very obscure; articulates with difficulty, and moans incessantly; he cannot protrude his tongue; his eyelids half closed; appears on the point of expiring; and he died before the lapse of twelve hours from the time of his admission, notwithstanding the adoption of the most judicious practice. The only probable cause ascertained, is *the drinking a quantity of porter* before going to bed last night, but not to intoxication."

Thirdly, So far as I can judge, we have the same evidence that Cholera arises from poisoning of the bowels, as we have that yellow fever, or the other endemic fevers of India, are true cases of poisoning of the blood, *i.e.*, direct experiment on the lower animals. It is one of the achievements of modern science, to have seized hold on that minute, that invisible and subtle thing, the *smell of a marsh*, and other fever miasmata floating about ditches, filthy lanes, etc., and to have condensed them into a liquid form (or rather solid form, and afterwards dissolved). By injecting a few drops of this liquid into the veins of a dog (thus saving the absorbent vessels of the lungs the task), you can induce, in that dog, a fever analogous in all its features (not

excepting even the characteristic black vomit) to the yellow and other fevers of tropical climates; and, according as you vary the *intensity* and *dose*, you can, in the language of Dr Southwood Smith, "induce fever of almost any type, and endowed with almost any degree of mortal power." Can any man doubt, after such an experiment, that the blood is the ordinary receptacle of such fever poisons, especially when he finds that all the symptoms, during life, harmonize with such a view? And, in like manner, if, by causing an animal to eat, mixed with its food, rice-paper dipped in the Cholera evacuations, during a certain stage of their decomposition, and if, by a person drinking out of a tainted well (thus bringing the poison into direct contact with the alimentary canal), the animal in the one case, and the human being in the other, become affected with the disease, how can any person escape the conclusion, that Cholera, under its *ordinary* manifestations, can be nothing else than a real case of intestinal poisoning? To be sure, an occasional instance is said to happen in India (though this is doubtful), where even death appears to result, either from the Cholera poison, or something very like it (acting in some unknown anomalous manner), without producing the ordinary well-marked symptoms of the disease. And these are called deaths from *Cholera*, and brought forward to disprove the intestinal theory. At best, however (and, perhaps, not even this), they can only be called deaths from the *Cholera poison*, acting, probably, by direct inhalation into the lungs, or in some unknown anomalous manner—in the same manner as the action of marsh miasmata on the human frame is, on rare occasions, even mortal, without inducing one symptom of fever. For nobody will insist on calling a fever, that which may run its deadly course in the twinkling of an eye!

These seven arguments, taken together, are apparently decisive on the point, that the primary receptacle of the Cholera seeds is the stomach and bowels. Yet, strange to say, I find an Indian physician, writing in the last number of the *Edinburgh Medical Journal*, who scouts the very idea of such a thing, and wonders how such a man as Dr Snow can for a moment entertain it!

If the intestinal theory be correct, what (on theoretic grounds, of course, to be corrected by experience) might be considered a rational mode of treatment? To answer this, let us ask what would we do if called to any other case of gastric poisoning? Administer strong astringent medicines? Assuredly not. For, though this has been adopted too much hitherto (by reason of ignorance, and therefore partly to be excused), in the treatment of Cholera, we know the melancholy result, and cannot wonder that any treatment must be disastrous, which vainly hopes to cure a case of poisoning by doing every thing we can to keep the poison in! Must we cling, then, to homœopathic globules, *i.e.*, atoms whose virtue lies in their inertness? Certainly not. Because though truth obliges us to confess, that this system hitherto has beat us hollow in the treatment of Cholera, by simply allowing nature to fight her battle as best she may; we are not yet prepared to concede the point, that nature, struggling under grievous difficulties, should not receive one helping

hand, or (now that the nature of the disease is better understood), that it is beyond the power of science to impart it. And we ask any conscientious homœopathist himself, if called to a case of arsenic poisoning, would he cling to his globules rather than ordinary allopathic treatment? In the arsenic case, we would, first of all, probably give an emetic. Then let us continue our mustard emetics as hitherto in the primary stage of Cholera. Mild laxatives would also be prescribed. In Cholera, let us continue our mild laxatives too, the best of which would seem to be frequent doses of some mild mercurial, either alone or combined with *very minute* doses of opium. Because this medicine has great power in allaying irritability in all diseases. Because dissections show the gall bladder gorged with viscid bile—and because it accords with the experience of observant practitioners, that if *one bilious discharge* from the bowels can be obtained, your patient may almost be considered safe. But thirdly and especially, in the arsenic case, we would pour in spoonful after spoonful of *hydrated sesquioxide of iron*, *i.e.*, a direct antidote to destroy the poison in the bowels. What is wanted to make our treatment of Cholera more rational and effective, is a direct antidote too, to be administered at an early stage of the disease. In the present state of our knowledge, this is probably not to be obtained. On the supposition, that fungi are the true Cholera poison, might not experiments on various fungi out of the stomach succeed in discovering some material, mild as sulphur, which could destroy all kinds of microscopic fungi, as effectually as sulphur destroys nearly all kinds of acari or microscopic insects? There are two substances, indeed, which (let the Cholera effluvia be what they may) would certainly prove decided antidotes, viz., *ozone* and *chlorine gas*. In their undiluted form, however, both are so acrid, that in this shape they would only be substituting one poison for another. Yet it is a truth, for I have tried the experiment, that mucous membranes can bear with impunity both of these vapours in a very diluted form—though not so diluted as to prevent a material influence on *noxious smells*—(and the Cholera effluvia, like the malaria of all febrile diseases, are, in their nature, nothing but organic smells). In former times, one practice adopted was to inflate the bowels with oxygen gas!—probably in the expectation of oxygenating the blood! If it was thought advisable to inflate them with *ozone*, a very simple contrivance (a solid zinc and copper cylinder, like an enema pipe, with free platina poles) could do this to any amount desired; and as for inflating them with diluted chlorine, nothing could be more easily done. But a more convenient mode of administering an antidote, would be to send a stream of chlorine gas from the stomach downwards. If the stomach could bear, before vomiting begins, minute doses of chloride of lime *either in substance* (enclosed in metallic hollow spheres, like small pills, perforated), or rather *diluted very largely with water*. This, followed up by castor oil floating in some acidulated water, might possibly convey the disinfectant to the end of the canal. And, perhaps experiments on dogs might show, that the worst which could happen would be its operation as a poison-

killing emetic at the beginning of the disease. We have reason to believe, that a *very minute dose* of chlorine would either modify or destroy all Cholera seeds, and all infectious effluvia whatever. When people hang a towel, wet with solution of chloride of lime, in the tainted atmosphere of a sick-room, the vapour evolved from it can be breathed with perfect impunity; yet surely it has an influence on the febrile malaria. Dr Graham, writing on scarlatina, tells us never to neglect such a precaution in the sick-room, because the vapour evolved, mild though it be, has an extraordinary influence in *destroying the poison*. Might it not be found, by experiments on dogs, that the mucous membrane of the alimentary canal could bear without undue irritation, four, six, perhaps eight times, more than the membrane of the lungs is fit to do? People will scout at the idea of the grand principles of sanitary reform being brought to bear on the stomachs of men! But the idea (perhaps ridiculous) could it only safely be realized, would be truly sublime. And while boards of health were dealing with the enemy in all the dens of pestilence—white-washing and fumigating our closes and our wynds—their medical officers, by household visitation, while the epidemic continued, might cleanse from their impurities all tainted stomachs, and disinfect every bowel from the seeds of death!

On the whole, however, I merely throw out this as a hint (I trust in the right direction), to more ingenious minds—having little faith that in practice *this precise antidote* would be found free from strong objections, or likely to work as one would wish. In the meantime, let me impress on my medical brethren the importance of conjoining hydropathic treatment, both by external friction and otherwise, more than they do, with whatever other measures they think judicious. This, indeed, is the advice of one (whom it behoves to speak with diffidence), having never treated more than a single case. In some respects, therefore, it is highly presumptuous. Still, it is the advice of one who, from theoretic reasoning alone, independent altogether of the assertions of hydropathists, is so conscientiously convinced of the value of water in this disease, that if himself prostrated in all the helplessness of its collapse stage, and the alternative was proposed to him, "Not one grain of drugs, or, not one drop of water?" would unhesitatingly whisper out, with all the energy left him, "By all means throw physic to the dogs: let me cling to water as the anchor of my hopes." If he died under the water system, he would at least have the satisfaction of knowing that he was dying of the *disease*. Whereas, in the other case, he would probably spend his last conscious moments, in vainly attempting to solve the problem (perhaps after being coffined!) Am I dying of CHOLERA, or of its CURE?

THE END.