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OBSERVATIONS

ON

THE CHLORIDES AND CHLORINE,

AS

'DISINFECTING AGENTS,'

AND AS

PREVENTIVES OF CHOLERA.

BY HENRY BRONSON, M.D.

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THE CHLORIDES AND CHLORINE,

AS 'DISINFECTING AGENTS' AND PREVENTIVES OF CHOLERA.

SOME weeks ago, in a series of letters from Canada, I ventured to make some remarks respecting the anti-cholera powers of medicines as preventives. Strong doubts were expressed of their utility, or even safety, whether taken into the stomach or breathed in the form of fumes or gases. Even *Chlorine* was thought exceptionable. My object was to shake the public confidence in all *nostrums* and *specifics* for the preservation of health, and in all *substitutes* for real cleanliness. For all this I was censured. My sentiments were judged heterodox. My object now is to show the *grounds* of my opinions as then expressed, and particularly to state the arguments and the facts which bear upon the question as to the efficacy of the *Chlorides* as 'disinfecting agents.'

It seems to be taken for granted by most non-professional and by many professional men who have thought little upon the subject, that a disease which is ascertained to originate and spread independently of a contagious influence, is of course *atmospherical*. This is entirely a gratuitous supposition, unsupported by a single fact, and contradicted by many obvious truths. If it is said that there is any change in the component parts of the atmosphere, the assertion is destitute of proof. The most accurate philosophical analyses and experiments can detect no alteration. Its proportions are the same where cholera is raging in its direst form, and where no such disease is present. If it is affirmed that a foreign substance in the form of a gas or vapor, or in some other state, is introduced into the air, combining or mixing with it, and by its deleterious action upon the system giving a predisposition to the disease in question, the assertion again is void of proof. No one has ever discovered such substance, and facts would seem to render its existence impossible. Ponderable matter in any shape, even though it be a gas or vapor in the most tenuous form, when diffused in the atmosphere, is subject to the laws of matter. It moves with the element which contains it; it is driven by currents. But can the course of the cholera be calculated by the course of the winds, like the smoke of our chimneys or the clouds over

our heads? Is it facilitated or retarded in its march by the motion of the atmosphere? It travels with the same equal and resistless step in the face of the monsoons of India, as when aided by the strength of a tempest. It does not receive wings from the hurricane, nor is its flight arrested by a calm.

If I am asked the essential, non-contagious cause of cholera, I answer frankly—*I do not know.* Every agent in nature, real or imaginary, has been accused. Electricity, magnetism, earth, air, water, sun, moon, planets, comets, have each been arraigned in vain. There is a mystery which hangs over the origin and spread of epidemics, which will probably never be removed. The philosophers of the present day are no wiser on this subject than those who lived three thousand years ago.

There is, then, not a particle of evidence that the general atmosphere where cholera prevails is changed, or contains any impurity. On the contrary, all the evidence which exists upon the subject is against such a supposition. What folly, then—what short of empiricism—to charge the element we breathe with the smoke of gunpowder, the fumes of tar, brimstone, camphor, with chlorine and every species of stench, for the purpose of *purifying* it and rendering it wholesome! Does common sense teach us to introduce into the air by which we are enveloped, which contributes to sustain us, and which there is every reason to believe pure, a known noxious substance (chlorine), for the purpose of neutralizing or destroying an unknown something, of unknown powers, and of improbable existence? It scouts the idea.

Among the various substances which from time to time have been brought forward and lauded as 'disinfecting agents,' chlorine is perhaps the only one which at the present day deserves attention. The parade of pretended science with which its claims have been urged and defended, and the specious but superficial reasoning with which they have been supported, render its nature and its asserted powers worthy of examination.

Chlorine (the active principle evolved from the chlorides) is one of those acrid and poisonous gases which when respired in any considerable quantities occasion serious derangement in the animal economy, or even destroy life. It produces great irritation of the bronchial passages—manifested by heat, pain, stricture, &c.—which is followed by inflammation and destruction of the function of the lungs. If an animal is immersed in it, he dies suddenly of asphyxia. When largely diluted with common air, it occasions cough, dizziness, tightness across the chest, and an urgent desire for fresh air. These effects, if they do not result in speedy inflammation, or throw the system into some disease to which it may be at the time strongly predisposed, gradually cease as the constitution becomes accustomed to the agent. Like other poisons, by incessant and protracted use it finally becomes comparatively inert. The system calls into requisition its powers of resistance, gradually adapts itself to the noxious substance, and finally tolerates it with little injury. In very minute doses, it may be breathed without any appreciable effects. All the virulent poisons, such as arsenic, prussic acid, nux-vomica, bohon upas, opium, &c. may be used in small quantities with safety; yet who would think of employing them except for urgent sickness? Who

would be mad enough to swallow them on the supposition of his *possible* illness, when he has every symptom of health? And who would be willing to inhale the noxious fumes of the chlorides, because some visionary has idly conjectured that the air may be impure, when it has every appearance of purity, and when at the same time the fact is assumed—not proved—that chlorine has an universal power over atmospherical contaminations?

Of the effect of chlorine in destroying some of the fetid gases, I am well aware. It does this (generally at least) by its powerful affinity for one of the elements (hydrogen) in the composition of those gases, detaching it, entering into combination with it, and destroying the compound. This is a common effect of chlorine. But there *are* offensive gases upon which it has no effect; at least, when used in such small quantities as not to render the air which contains it irrespirable. The truth of this remark I have often proved in dissecting rooms. In such places the 'purifier' has often failed to remove stench, even when the apartment was strongly impregnated with it, as evinced by the senses and the appropriate tests. A similar failure has often happened when a strong solution has been applied to decomposing animal matter. Sores and ulcers giving forth an offensive effluvium have not been uniformly deprived of their fetor by its application. Similar results have been witnessed by others. Chlorine, then, is no more of a specific for stench, than Swaim's panacea is for indigestion. This is readily accounted for. Fetid gases are not necessarily compounds of hydrogen; and those that are so may retain this element by a strength of affinity which is too powerful for chlorine to overcome. Such gases or substances are often, probably, of a specific nature—peculiar proximate principles formed by peculiar chemical agencies. When such is the fact, 'the universal purifier' is little better than burning tar or feathers. While chlorine, then, is an agent of considerable power in destroying bad smells, entering chemically into combination with one or more of the elements which compose them, it is not a *specific*.

It is believed that the knowledge of the power of chlorine over offensive odors first suggested its use as a 'disinfectant.' At the time of this suggestion, the shades of alchemy were not entirely dispelled. Men occasionally dreamed about 'the philosopher's stone,' and 'the elixir of life.' Chemistry was thought to have an importance among the sciences which it does not possess. Not only inorganic matter, but organic beings, were supposed under the dominion of its laws. The animal fluids were considered definite chemical compounds, which it was not beyond the powers of the laboratory to simulate. The matter of contagion was considered a gas not unlike what 'chemists are accustomed to catch in their receivers,' and the cause of epidemic and malarious diseases a similar gas floating in the atmosphere. The foul air which commonly surrounds the beds of the sick was identified with these aerial poisons, and it became an object to correct it. The 'purifier' (chlorine) was applied. If odor could be removed, or drowned and rendered imperceptible by a more powerful stench, all was considered safe. This is the way in which the 'preventive' came into use. The chemist, instead of *trying* his *infallible* and collecting *facts* in proof of its efficacy, sat qui-

etly speculating in his closet. If his dogmas were doubted, he refuted the sceptics by an appeal to experiments made in his laboratory. This is the kind of *science* which has made so much noise in this matter.

There is a great error prevalent—particularly among those of little medical reading—respecting the agency in disease of *those gases perceptible by the senses* which are evolved from decomposing organic matter. Though I cannot persuade myself that they are entirely harmless, yet abundant observation has conclusively proved that they act a very subordinate part in the production of disease. There is the best reason to believe that the deleterious principle which is evolved from filth—from vegetable and animal bodies in a state of decomposition—does not reside in those effluvia which are most obnoxious to the sense of smell; but in something else which is tasteless, inodorous, and often too subtle for the tests of chemistry to detect. There are numerous facts which show the inadequacy of the fetid gases alone to produce serious derangements of the health, much more endemic or epidemic diseases. The stench of slaughter-houses, barn-yards, privies, dissecting rooms, masses of putrifying animal matter, &c. particularly where there is free ventilation, although so concentrated as to produce occasional nausea and vomiting in those unaccustomed to it, and so abundant and diffusible as to impregnate the air for a furlong around, has been satisfactorily shown to have often no effect upon the health of those who are constantly exposed to it. Upon the sea-shore of New England, the farmers make much use of fish as a manure, leaving them to putrify and dissolve upon the soil. A powerful and most offensive odor is evolved, which is conveyed on the winds to the distance of miles, sickening the stomachs of passers-by; and yet no ill effects are experienced by those who turn up and till the ground. The facts of this description are so common that many physicians have contended that *animal* putrefaction is never productive of sickness. If fetid exhalations were of themselves sufficient to occasion permanent disease, or were indicative of an atmosphere *necessarily* unwholesome, surely no such facts ought to exist.

Again, intermittents, bilious fever and yellow fever, which are generally admitted to be produced by the effluvia of animal and vegetable relics (particularly the latter) in a state of decomposition, frequently prevail to a most alarming extent, and with singular fatality, when the senses recognize no contamination of the air, and when of course no *fetid* gases exist. We come to the conclusion, then, which has often been arrived at, that *fetor* merely has little to do with sickness or health—that decomposing organic matter often evolves a most deadly poison which has neither smell nor taste—that the removal of nauseous odors in using the means of cleanliness is a matter of secondary importance—and that the employment of chlorine, as one of these means, which has no ascertained power over anything but stench, and only a limited power even over this, is of little real service.

But suppose the fetid gases are deleterious to health; and suppose that chlorine, under favorable circumstances, will destroy them: is it easy to regulate the quantity of the latter necessary to decompose the former, and have none in excess? Is it not always required that the chlorine should be greatly in excess in order to effect this decomposition with any

certainty? And is not this *free* chlorine productive of altogether greater and more certain injury than could possibly have resulted from the effluvia it was designed to destroy? But on the supposition that the 'disinfecting agent' can be employed in the precise quantity required to decompose an offensive gas, and does actually decompose it, what is the result? A substance is formed, consisting of chlorine and the hydrogen which it has detached from the offensive compound. This is muriatic acid gas. It is acrid, irritating, and irrespirable; as poisonous as chlorine, and far more destructive to life than the fetid gases for which it is a substitute. A bad smell is indeed exchanged for one more tolerable; but, at the same time, an agent decidedly noxious is added to the atmosphere in the place of one which was hardly injurious.

In the preceding remarks on the employment of chlorine, I have considered it as mingled with the air we breathe—the way in which it is ordinarily recommended and used. But there is another mode of employing it. The apartment to be purified may be vacated, a vessel containing the materials for evolving the gas placed within it, and the doors and windows closed. The room is thus soon filled with the chlorine. After a few hours, it may be opened and thoroughly ventilated. If everything which is capable of contaminating the air has been previously removed, the apartment will now perhaps be found sweet and wholesome. But chlorine gas is not the only one which will do the same. Any of those which have energetic decomposing powers will accomplish as much. The nitrous acid gas has often been effectually used for this purpose. Indeed, the free use of soap and water alone, aided by a plenty of pure air, never fails to answer a similar end. While the effects of the latter are equally or more certain, they can always be used without endangering the health.

Of the power of chlorine over the principle of contagion or infection, so roundly asserted by some modern alchemists, there is not a particle of evidence. True, indeed, if you could catch this principle in the bowl of a spoon, and pour upon it a concentrated solution of chlorine, there is little doubt you would destroy its activity. You might do the same with nitric, or muriatic, or sulphuric acid, or any other powerful chemical agent. The virus of smallpox or cowpox may be readily destroyed in this way. The mode in which this is done may be easily conceived, by observing the action of oil of vitriol or lunar-caustic upon the surface of a fresh wound on the body. A complicated chemical change is effected, the nature of which is not exactly understood. But I am not considering the influence of chemical agents on the contagious virus enclosed in vessels, but when diffused in the atmosphere. *When in this state*, if the 'disinfectant' in quantities not irrespirable can destroy it, those who assert that it can, ought to prove it. This has not been and cannot be done.

On a question of the kind under consideration (the 'disinfecting' powers of chlorine), the burthen of proof devolves upon the advocates of the chlorides. Until they have collected an adequate number of *facts* (not inferences) in support of their case, their statements are deserving of little credit. But where are these facts? The subject has been long before the public. The claims of chlorine have been asserted and reasserted. It has been employed for a length of time and on an extensive

scale in epidemic, endemic, and contagious diseases; and what is the result? It has been used in cholera wherever this disease has appeared—in Russia, Germany, France, England, Canada, and the United States; and what that is new have its advocates to say in its favor? Were its powers such as they have been maintained to be, would not this matter long ago have been put to rest, and the voice of cavilers and sceptics silenced? No new evidence seems to have been gathered upon the subject. Nine-tenths of the medical world still go on doubting, while chemists continue their scientific reveries, publishing to the world their closet speculations, and anon repeating the stale story about 'the cathedral of Dijon.' When the cholera commenced its ravages in Albany, high hopes were entertained of arresting its progress by the chlorides. All took good care to lay in a supply of 'the preventive.' Everything inside and out was deluged with the 'disinfecting' gas. One's chance of safety seemed to be considered directly as the quantity of chlorides he had with and about him. What followed? The disease increased, as it had been wont to do in other places. Men sickened and died. Some fell victims with 'the immortal catholicon' in their pockets! People lost confidence in their protector. It went out of fashion and was abandoned, and presently the pestilence took wings. While the epidemic was among us, I watched closely and incessantly the effect of the means which were used as preventives. Burning tar, the fumes of sulphur, and the exhalations from the chlorides, were all fairly beaten. The latter seemed nothing better than the others; that is, it was of no service at all. I have diligently searched, and have not been able to collect a single unequivocal fact to show that its use has with us been attended with the least benefit. Nor have I met with one who has been more fortunate than myself. Many who were its advocates in the beginning, were faithless towards the close. Most of the physicians here are now either indifferent or entirely sceptical as it regards the 'disinfector.'

But has chlorine had no positively injurious effects in the profusion in which it has been used as a *cholera preventive?* Is it easy to conceive that the inhalation of so noxious and powerful an agent can be a matter of indifference, especially when the system is in a state of lively susceptibility to the action of causes disturbing the health? Where cholera prevails, there is an universal predisposition to disease—a predisposition which is kindled into a fatal blaze by the application of a spark. An injurious impression made upon the body, whether through the medium of the stomach or lungs, which in other circumstances would be productive of little harm, will *in this state* be followed by sickness and death. Is it safe, then, to recommend the general breathing of chlorine where this epidemic is raging? Is it not eminently hazardous? Would not this measure, if adopted, instead of preventing the disease, add to the exciting causes of an attack?

But what are the *facts* upon this subject? Enough have occurred in this city to satisfy any candid mind that the gas exhaled from the chlorides is *not innoxious*—that it cannot be respired with impunity where epidemic cholera is prevailing—that its tendency is to augment and not to diminish the number of the sick. It has taken rank here among the numerous exciting causes of disease, and has not been least in impor-

tance. I have experienced inconvenience from it myself, in common with many others. The effects on susceptible persons have often been powerful. On such, a state approaching asphyxia has sometimes been produced while walking the streets. An attack of the epidemic has in more than one instance been satisfactorily traced to the free respiration of chlorine. One physician has mentioned to me a remarkable instance. All the members of a large and respectable family were seized with the symptoms of the malady within eighteen hours after a liberal use of the 'preventive' in all parts of their dwelling. Their physician not unreasonably attributed their sickness to the said 'preventive.' I could mention other instances hardly less melancholy. I learn from a private letter, from a respectable source, that effects of a similar description were witnessed in Paris, during their late epidemic, on a much larger scale. Chlorine, then, is about as much of a cholera preventive as ardent spirits.

But there is an *indirect* injury which is liable to result from the recommendation and use of the chlorides, which has not yet been alluded to, and which is of no slight magnitude. If the people are made to understand that these substances are adequate to the purposes of cleanliness, they will resort to them on the score of economy, to the neglect of more effectual and expensive means. We might argue this from the known mental constitution of man. This was argued and the consequences predicted. What was feared has taken place. Cleanliness with us has been neglected. Faith in the 'disinfectants' has been one cause of this neglect. Filth, instead of being removed, has been too often merely sprinkled or mixed with the chlorides. This has not only been done *about* dwellings, but *within* them. I have seen the floors, furniture, &c. literally *plaistered* with a mixture of filth and 'the preventives.' *Removal* has too frequently been neglected, even when practicable, in consequence of its being thought unnecessary. It is laborious and expensive, and was so considered. Besides, it is an *antiquated* mode of making clean, and, moreover, is highly *unscientific*. *The new and improved plan* was enthusiastically adopted. Matters were conducted on *chemical principles*. Common sense was scouted, and her place occupied by a nobler genius—the genius of philosophy. The old and vulgar means of purifying, such as washing, and scouring with soap and water, ventilation, sweeping, scraping and removing, &c. were frequently abandoned, not only as costly, but *as behind the improvements of the age*.

Considerable authority has been quoted on the question under examination, which would seem to controvert the opinions and arguments which have been advanced. Though *authority*, unsupported by facts and reasoning, passes for little with me, it may do with some. By the way, if a question relating to the 'disinfecting' power of a substance is to be determined by the numbers of those who assert it—those who give their opinions and then vouch for their truth—chlorine is not entitled to our *exclusive* confidence. The nitrous acid gas was once brought forward with extravagant pretensions as a purifier and antidote to contagious and miasmatic emanations; and if its efficacy is to be judged of by the numbers and respectability of those who attest it, it is far better deserving of consideration and respect than the *modern specific*: and yet, the nitrous acid gas is now little thought of by the *scientific* world. This is because

its *modus operandi* in destroying morbific miasms cannot be explained by *chemical laws!* [See Medico-Chirurgical Review, Vol. X. page 355.] For the benefit of those whose minds are swayed by authority and names, I shall make a few extracts—all which my limited space will allow—chiefly from *medical* writings, for the purpose of showing the sense of the profession on the powers of the chlorides as 'disinfecting agents.' And here may I take the liberty to say, that *physicians* [all M.D.'s are not physicians], from their opportunity for observation, their intimate knowledge of *facts* and all their bearings, and their acquaintance with the correct mode of reasoning on medical subjects, are best capable of passing a correct judgment on a question like that under consideration. Those who have appeared as the advocates for chlorine, have been almost to a man *chemists*, who have had no *practical* knowledge of the subject which they have handled. Their *facts* have been gathered in the laboratory. Their conclusions have been the fruit of study. Their philosophy has been the result of speculation. How much, then, are their assertions and opinions worth?

The Medico-Chirurgical Review, the highest authority on any medical question, says:

'We object to coupling the words *purification* and *disinfection*. Bad smells may be corrected, and contagion still remain. We have always upheld the doctrine that ventilation is the best and safest disinfectant. To *remove* the infected air is surely more effectual than to correct or cover a fetid exhalation floating in it.

'*With* cleanliness and ventilation there will be little or no danger—*without* these, we should have no confidence in the chlorurets' (chlorides). Vol. X. pages 355, 356.

The following paragraphs are taken from the Westminster Review, No. for October, 1831.

'Little reliance, it would appear, is to be placed on any of the disinfectants which have as yet been tried.

'But free and frequent ventilation is certainly more to be depended on than any or all these modes of purification' (purification by the 'disinfectants').

Dr. Caldwell, of Kentucky, a gentleman of general science and of great eminence in his profession, uses strong language upon this subject.

'Combustion excepted, I repeat, that thorough washing and ventilation are the only certain means discovered, to purify foul and sickly ships, and render them the abodes of cleanliness and health. Of hospitals and infirmaries the same is true.

'It is not only useless, then, it is injurious, to fill the wards of receptacles of the sick with suffocating and irritating fumes and gases, to the annoyance and distress of patients with tender eyes and weak lungs. I have never seen a place thus fumigated, without exciting among the sick painful coughing and other disagreeable affections. And if disinfection seemed to be the result of the process, it was owing to the other means used at the same time, and not to fumigation.

'Shall I be told, in objection to my opinion on this subject, that chlorine gas and some others destroy the fetid exhalations emitted by putrid animal matter, and in that way contribute to purity? The fact is known

to me ; but it is also known, that such exhalation is not the febrile miasm of which I am treating. That poison exists in its most virulent and destructive condition, unaccompanied by any odor. It does not follow, therefore, that because chlorine gas destroys the fetor arising from the dissolution of animal or vegetable substances, it will also destroy the poison. This loose substitute for reasoning is an abundant source of error and mischief. Nothing but an accurate and successful experiment is competent to prove that any known gas is capable of uniting with febrile malaria, and neutralizing it. And as far as I have been able to inform myself, such an experiment has never yet been made. Hence the belief in the (anti) miasmatic properties of the gases referred to is nothing but hypothesis.'—[American Journal of Medical Sciences for August, 1831.]

Dr. Drake, of Cincinnati, a physician of great celebrity, uses the following language :

'Not the least reliance is to be placed on lime and its chlorides as *direct* preventives of epidemic cholera ; and no great confidence ought to be reposed in their power over nuisances. It is better to remove putrescent matters than to correct their stench with lime, or even the boasted chloride. Moreover, an independent use of the last may and often has proved injurious to health ; the chlorine gas which is liberated being, if breathed undiluted with atmospheric air, a more deadly poison than that which produces cholera.'—[Treatise on Epidemic Cholera, July, 1832.]

Dr. Tully, of New Haven, whose standing as a professional man and as a chemical philosopher entitles his opinions to great weight, in a private letter, dated August, 1832, says :

'I concur with you most fully in regard to the supposed efficacy of the chloroxids of calcium and sodium (in other words the chlorides), and even chlorine itself, either for the destruction of specific contagions, morbific miasmata, or epidemic causes, whatever they may be. I have come to this conclusion, because I have not seen even a particle of evidence in favor of what is called their *disinfecting* powers. I do not know, however, that, on a subject of this nature, a negative can be proved. The *onus probandi* must rest on those in the affirmative. Now where are the proofs ? If there are any, would they not long before this have been adduced ? That the chloroxids, and especially the chlorine itself, will frequently destroy offensive smells or odors, I do not pretend to question ; but they certainly do not do this universally. I have myself often known them fail.

'It is well known by physicians that those effluvia which are most manifest to the senses, possess but little if any power in the production of disease ; while those which are most noxious have no sensible properties. The contagion of smallpox and measles, and the power or influence by which jail fever is produced, cannot be recognized by the senses.

'I have long been satisfied, that washing with soap and water, and ventilation, are the only adequate means of purification, and, I will add, *disinfection* (as the fashionable and cant phrase of the day is).

'In addition, it appears to me that the chlorides, when freely used,

may do injury. They may prove exciting causes of disease, when the predisposition is strong, like other noxious exhalations.'

Dr. Yates, of New York, makes some very sensible remarks on this subject:

'The power of "disinfecting agents," except on stench and putridity, I deem extremely problematical. We want proof that the atmosphere is less pure now than at other seasons. We want proof—only *probable* proof—that the air contains a particle of infecting matter,' &c.

'But allowing that imperceptible particles of infectious matter exist in the atmosphere, what proof have we that the chlorides will alter their nature or their properties? Only from this analogical deduction, that inasmuch as chloride destroys the stench of putridity, it must of consequence destroy the substance matter of infection—an unphilosophical deduction at best. But let us come to a case in point. Will chloride destroy the poisonous quality of arsenic, the emetic property of antimony, or the soporific effect of opium? If not, what right have we to suppose it will otherwise affect an imaginary particle of poisonous matter floating in the atmosphere? We *cannot* know, from anything that has yet been discovered, that chlorides have the slightest chemical influence on the quality of *any* matter except its odor, much less on that of the matter in question. Hence, I conclude that all the expense incurred in their distribution throughout our streets and yards, is a mere boon to public alarm and prejudice.'—[Yates on Asiatic or Spasmodic Cholera, August, 1832.

I shall now make an extract from a letter from Dr. Parsons, of Providence, to a gentleman in Boston. The letter was designed to show the inefficacy of the 'disinfectants.'

'The sloop Hero sailed from New York on the 17th of July (1832), with thirty passengers on board, and was quarantined at Newport eight days from her time of leaving that city. On the day of landing the passengers, four of them were immediately attacked with Asiatic cholera, and died in a few hours. *This vessel had five tons of best Scotch chloride of lime on board*, shipped on the 14th of said month; any one cask of which, the owner informs me, would give out through the staves sufficient gas to saturate the atmosphere of the vessel as effectually as would be done if the floors and decks were sprinkled with the powder. *Yet with thirty such casks between her decks, this happens to be the only vessel out of the great number arriving with passengers from New York, that has brought any person infected with the disease*'!!

This statement, methinks, must prove of difficult digestion to the advocates of '*preventives*.' It contains an argument which may serve any purpose but theirs. It seems to prove that chlorine is not *the specific*, after all—that *science* is not always triumphant. It reveals a *fact* which may be justly regarded as an outrage on *rational chemistry*.

Albany, September 6, 1832.