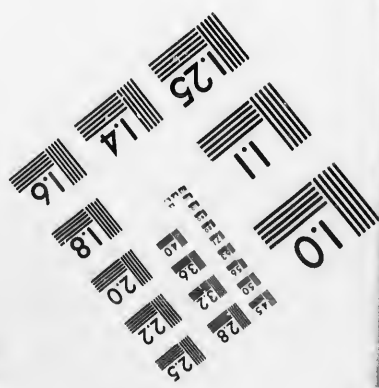
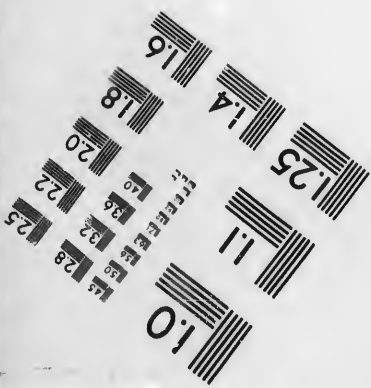
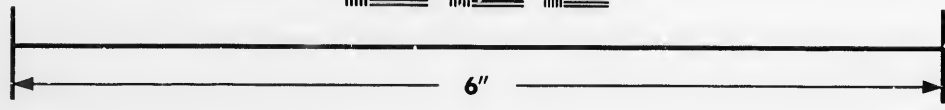
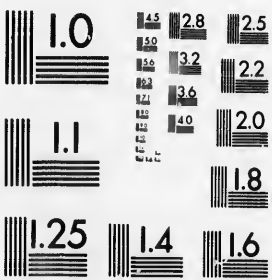


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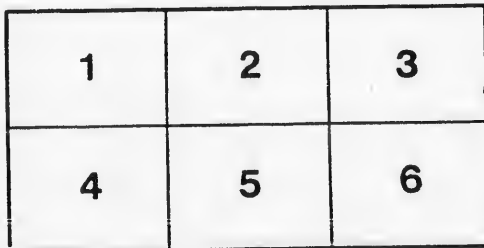
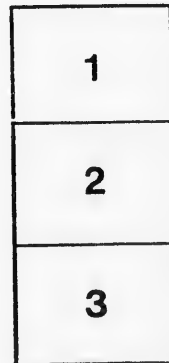
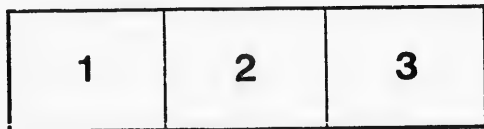
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TREATISE ON CHOLERA,

By Dr. Stephens:

EXTRACTED FROM HIS WORK ENTITLED:

OBSERVATIONS

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HEALTHY AND DISEASED PROPERTIES OF THE BLOOD.

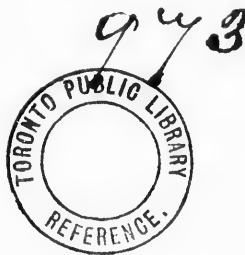
For the life of the flesh is the Blood.—*Leviticus* xvii. 21.

KINGSTON.

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PREFATORY NOTE.



WITHIN a few days an interesting work, by the celebrated Dr. WILLIAM STEVENS, late of Santa Cruz, now of London, has been received by a gentleman of this city, from the Consul of the United States at London, entitled "Observations on the Healthy and Diseased Properties of the Blood." The following is an extract from the letter accompanying the work.

LONDON, 14th July, 1832.

I send you by the ship Hudson a parcel to your address, containing Dr. Stevens's work on the Properties of the Blood, with a Treatise on Cholera in the latter part of the volume. It has excited great attention here; and the success which he relates as having attended his mode of treatment, may be depended upon as true. I beg your acceptance of the work; and I think that if you, or any society feeling interested in such matters, were to republish in the United States the part which relates to Cholera, it would be rendering a great service to the community in general.

I am, my dear Sir, very truly yours,
THOMAS ASPINWALL.

Having put the work into the hands of Dr. ALEXANDER H. STEVENS, President of the Special Medical Council of this city during the prevalence of the Cholera, he has recommended the republication of the Treatise, and has given his opinion of the distinguished author in the introduction that follows. L. T.

NEW-YORK, September, 1, 1832.



THE author of the following remarks on Cholera, Dr. WILLIAM STEVENS of Santa Cruz, has long enjoyed a high reputation as a bold and successful surgeon. It cannot be deemed irrelevant to mention that his father was eminently distinguished as a physician and a philanthropist, during the prevalence of the yellow fever in Philadelphia in 1793. Within the last two or three years his novel and original views of the changes of the blood in certain diseases have excited great attention among the profession in Europe, more especially in London, and, according to the statements herein contained, have been applied to the treatment of Cholera with signal success. Like every mode of treatment founded upon a priori reasoning, its value must finally be determined solely by careful and exact observation of its results. It is every way worthy of trial by those who have the means of comparing its success with that of other methods, and I heartily approve of the republication, in this country, of the work by which it has been introduced to the Medical Profession in Great Britain.

ALEXANDER H. STEVENS,

CHOLERA.

When this disease, which is generally believed to be of Asiatic origin, burst out at a late period from its usual boundaries, and extended its ravages towards the west, it was generally believed to be less amenable to treatment than it really is; consequently it spread for a time an alarm all over Europe. Almost every government was in arms against it; and the whole medical talent of the day appeared to be concentrated for the purpose of investigating its nature, and preventing the mortality from this new but destructive pestilence.

It is well known, that those practitioners in this country who had formerly seen the Cholera in India, remained, in general, most obstinately pertinacious of their former opinions, both with respect to its nature and treatment; whilst others, who had not yet bound themselves to any theory, and were well aware that nothing had been done in the East toward lessening the mortality, were eager in their endeavours to find out some more fortunate method of treatment than those which had hitherto been used with so little success in other countries.

It would be, however, but a loss of time to enumerate the various remedies which were proposed, tried, and found to be useless. When the Cholera first appeared on the isolated shores of this island, white wine whey with spice, hot brandy and water, cajuput oil, peppermint, kaudannu &c. were officially recommended to the public by one Board of Health; whilst another pressed into the service all the remedies which had ever been thought of, and recommended the whole to the profession in a confused mass. They approved of red hot irons to the spine, and bleeding, together with the internal use of opium and emetics, James's powders, calomel, Cayenne pepper, chalk and brandy, ice, quinine, *salts*, *acids*, &c. &c. But notwithstanding all this, the mortality continued, as might naturally have been expected; for such remedies so empirically used, cannot even mitigate the symptoms, much less cure the disease;*—and as a general rule, I firmly believe that there would have been fewer deaths if the patients had been kept in a warm room, allowed plenty of cold water, and then left to the care of a good nurse. There are however, some exceptions to this rule; and from what I have now seen, my conviction is, that when Cholera is taken in time, and properly treated it is, in the majority of cases, almost as easily cured as either the common typhus or the marsh fever.

*These observations apply only to the *treatment* recommended by the Boards of Health; in some other respects, the conduct of the present board appears to me to have been highly judicious; and if London has hitherto been saved from the awful scenes which have occurred in Paris, &c., it has been in no mean degree owing to the active and proper measures that were used to prevent it. I fear however, that the danger is not yet passed; and from what I have seen lately, there is reason to dread that this metropolis is at this moment slumbering on a volcano of pestilence.

The facts which I had previously stated relative to the effects of salts on the blood, appeared for a time to have been almost forgotten; but, in proportion as the danger drew near, they were again recalled to and warily recommended by some, as at least worthy of attention in the treatment of Cholera.

When it had been fairly proved on the Continent that the practice which had been used in India was of no value, Sir Astley Cooper, Dr. Prout, Dr. Elliotson, Dr. James Wilson, Mr. Travers, and some other talented individuals, who consider their profession as something more than a mere trade, openly expressed their opinions in favour of the saline treatment; and that, too, in a manner which renders it impossible for me to find words to express how grateful I feel to these, and some other scientific individuals, who had the good sense to perceive that the diseased condition of the blood had been too much overlooked, not merely in Cholera, but in other diseases.

Previous to the appearance of Cholera in this country, the following paper appeared in the Medical Gazette for September 3, 1831:—

On the State of the Blood, and Effect of Saline Medicines, in Malignant Diseases.

“We have been informed, on the authority of Dr. Harder, a physician to the court of St. Peter-burgh, who accompanied the Grand Dutchess Helena to England, that his countryman, Dr. Jaehnelien, of Moscow, has demonstrated that healthy blood contains a notable quantity of free acetic acid, which as well as the natural portion of its serous fluid, is in a striking proportion lost in the blood of Cholera patients; but that these substances are to be regained in nearly their right proportions in the fluids issuing from the primæ viæ, in Cholera, and voided by the vomitings and alvine evacuations in that disorder.” We think it due to our Russian correspondent to make this announcement, the rather as it is intended to correct what he regards as an inaccuracy on our part, though we are free to confess that we are by no means convinced even now of the erring with us. We cannot understand how acetic acid can remain free in a solution which contains soda; neither, as the addition of acids blackens the blood, does it seem probable that the removal of such agents should also have the effect of rendering that fluid more dark. It is not our intention, however, to enter further upon a question, for the satisfactory discussion of which

we lack materials; but we shall take the opportunity it affords of bringing before our readers the statements of Dr. Stevens, whose views with regard to the state of the blood in malignant diseases appear to us to merit more attention than they have received, and which are, to a certain extent, though indirectly, strengthened by some of the phenomena which the Cholera has presented in the north of Europe.

In our number before last we published a letter from Dr. Barry, in which he says—"Two physicians, (Germans,) Ysenbeck and Bralow, stated publicly and firmly yesterday, in my presence, at the Medical Council, that during the preceding eleven days they had treated, at the Custom House Hospital, thirty Cholera patients, of whom *Eight had not lost out.* They give two table spoonsful of common table salt, in six ounces of hot water, at once, and *one table spoonful of a similar mixture cold every hour afterward.* They always begin by bleeding." A similar treatment has also been tried with success at Warsaw, by Dr. Searle;—and most of our readers will recollect, that this is neither more or less than the practice which has been so warmly recommended by Dr. Stevens, not only in yellow fever but also (reasoning from analogy) in the cure of all other malignant diseases; and after reprinting the first paragraph from the paper which had been read at the College of Physicians, the editor observes:—Now Dr. Stevens holds the saline materials of the blood to be the cause of its red color, and certain other properties essential to life. He does not, indeed, identify the saline with the coloring matter; on the contrary, he considers the latter as a mere admixture which is naturally black, but which possesses the peculiar property of striking a red color with a solution of the neutral salts. He also considers the saline ingredients in the blood as the cause of its fluidity, on the assumed ground that the fibrin and the albumen are naturally solid, and that the tendency to this condition is counteracted by the saline impregnation.

"Nature," says Dr. Stevens, "does nothing in vain; and all the analyses of the blood have proved that, in health, it invariably contains a given proportion of saline matter. This is not accidental; for it is as essential, and exists invariably in healthy blood, as either the fibrin, the albumen, or the coloring matter. Arterial blood most evidently contains a larger proportion, or at least a stronger saline matter, than venous blood; for all the solids, and most of the secretions, derive their saline matter from arterial blood. But the serum of even the venous blood which is left contains a proportion of thirteen ounces to the thousand of these salts, independently of what is lost by evaporation, &c. We well know how active these salts are as chemical agents; and these agents are so constantly found in the blood, and in healthy blood their proportion is so exact, that we are forced to believe that they are placed there for some important use. But the importance of this saline impregnation has been almost entirely overlooked, from the great attention that has been paid both by physicians and philosophers, to the much less important coloring matter."

Of all the ingredients, Dr. Stephens appears to consider the saline matter of the blood as by far the most essential to its healthy state. Any of the other ingredients may be diminished, and still the vital fluid will perform its functions; but when the saline impregnation is lost, or greatly lessened, as he states it, to be in malignant diseases, the blood becomes black

goes fast to decay—a change which is soon followed by death. "On examining the blood soon after death of those who had died of the yellow fever, the color in the whole mass of blood, both in the arteries and veins, was completely changed from its natural scarlet, or Medina red, to a dark black. I have frequently filled on glass, by the black fluid taken from the heart, and mixed with the black vomit taken from the stomach. They were both so unlike the blood of health, and resembled each other so completely, that it was almost impossible to distinguish the one from the other."

The oxygen of the air had no effect whatever in reddening this dark fluid; but on adding a small quantity of any of the neutral salts, even to this black blood, the red color was immediately restored; and Dr. Stevens believes that certain saline agents have a specific effect, when administered during life, in remedying that diseased state of the blood which is uniformly met with in this, and probably in all other malignant diseases.

It appears that Dr. Stevens first commenced this practice with a solution containing two parts of carbonate of soda and one of nitrate of potass. An objection to this mixture was, that when given in large doses it was apt to disagree with the stomach; and finding that other saline agents possessed, in an equal degree, the same property of remedying the diseased state of the blood, these were occasionally employed; the carbonate of soda, for example, was preferred, particularly when there were any signs of acidity in the stomach, and the tartarised soda was generally given when a purgative was required. Under this practice, the result is stated to have been incomparably more successful than it was under the old treatment.

The resemblance between Cholera and certain malignant forms of fever, both as to their phenomena, and, it some of the latest accounts be correct, likewise as to the treatment which proves most successful, is very striking. Even in those cases in which there is no excitement, and of course no increased action to be reduced, the removal of a small quantity of blood is equally beneficial in both, by relieving the overcharged heart, and enabling it to circulate with more ease than which is left. But in the malignant fevers of the West Indies, much more commonly than in Cholera, there is great increased action, and the blood is then used freely. As early as possible after the first bleeding, the patients are freely evacuated by means of some active purgative. As soon as the excitement is sufficiently reduced by these means, which it generally is in less than twenty-four hours, the use of the saline mixture is commenced. This method of treatment, which Dr. Stevens has the merit of having first proposed, is gaining ground in the West Indies, &c., &c.

It appears certain that the mortality from fever has been lessened in those islands of the West Indies in which this treatment has been fairly adopted; and it seems to us, that analogical reasoning, as well as the statements of Dr. Barry and Mr. Searle, would fully justify a trial of the same method in Cholera. This last is, indeed, so virulent a pestilence, and so many perish in the first stage of collapse, that no treatment which human ingenuity can devise will probably do more than rob it of a certain portion of its mortality; but should even this limited benefit be obtained by saline medicines, exhibited on the principles of remedying the morbid condition of the blood connected with its blackness, it will be chiefly owing to the statements of Dr. Stevens on an anal-

agous subject; for though his paper, as we have said, has never been published, yet our account of it has made his doctrines extensively known, and will thus lead to their confirmation if true, or their rejection if false.

'Cause of the Red Color of the Blood.'

As connected with the above subject, we may lay before our readers the following communication, extracted from an American journal. It is a letter from Dr. Sewall, the Professor of Anatomy and Physiology in the University of Washington, which we find published in the Boston Journal for December last:—

"The cause of the red color of the blood has long been a subject of keen discussion among physiologists, and nothing has hitherto appeared upon the subject at all satisfactory, and against which powerful objections could not be brought.

"Dr. Stevens, an eminent physician of St. Thomas, has instituted an experimental inquiry into this subject, which has led to some novel and interesting results. From his experiment it appears—

"1st. *That the blood owes its red color entirely to the presence of the saline matter which is invariably found to exist in it while in a healthy state.*

"2dly. *That the dark color of venous blood arises from the presence of carbonic acid, which, like every other acid, turns the blood black.*

"3dly. *That the oxygen of the atmosphere can only affect the color of the blood inasmuch as it possesses a powerful affinity for carbonic acid, which it takes from the blood by attracting it through the delicate membrane that lines the bronchial vessels and air-cells of the lungs.*

"4thly. *That the removal of the carbonic acid from the blood by the action of oxygen does not produce a change in its color, unless there be saline matter actually present, to impart to it the arterial tint the moment the carbonic acid is removed.*

"5thly. *That acids, alkalis, electricity, and every thing which destroys the neutrality of saline matter, gives to the blood a dark color.*

"Whatever practical inferences or change in the treatment of diseases these experiments may lead us to, the idea that the red color of the blood is owing to the saline matter which it contains, is entirely new: and no one can deny to Dr. Stevens the merit of having been the first discoverer of this interesting fact. He is still prosecuting his inquiries; and his researches upon this and other subjects connected with it, promise much to the profession. They will soon be laid before the public in detail. I have had the pleasure of witnessing a number of Dr. Stevens's experiments, as performed by his own hand, upon the blood; and so far as I have had an opportunity to examine them, they have been performed with great care and accuracy, and were entirely satisfactory."

"We are aware that Dr. Stevens himself is about to publish on this subject; yet, as there are some parts of Dr. Sewall's letter which we do not clearly comprehend, and as every thing relating to the blood and the treatment of malignant diseases possesses great interest at this moment we have applied to that gentleman for information on certain points; should we succeed in obtaining this, we shall lay it before our readers in another number."

In answer to the above, the following communication was sent to the Editor of the Gazette.

ON THE TREATMENT OF MALIGNANT DISEASES
To the Editor of the London Medical Gazette.

Sir,—As I have never seen even one case of Indian Cholera, of course I can only judge of the treatment of that disease by reasoning from analogy, betwixt this & other malignant fevers which I have actually seen; but probably I was not far from the truth when I stated, that the practice which I had found so useful in the malignant fevers of the Western world, would be equally successful in the treatment of all other forms of malignant disease; & perhaps, also, after the treatment has been fairly tried, the outline of the practice in all malignant diseases will ultimately be nearly the same. I can now add, that the same treatment which I have recommended in the yellow fever, &c. has been most extensively used, and with equal success, in the treatment of those malignant forms of the marsh fever which were formerly so fatal to the Genesee country on the southern side of Lake Ontario. This country is so flat that the Erie Canal runs through it for upwards of seventy miles without even one lock. From being so flat it is full of marshes; and during the hot months, there are many of the districts in that territory nearly as sickly, and until lately, nearly as fatal, as the marsh fevers of Sierra Leone. The result, however, is now very different, particularly at Rochester, and other places in that country, where the alkaline carbonates, &c. are now used in place of the calomel, or the mere purgative and bark treatment, which were formerly employed in these localities with so little success.

The sickness of the stomach which is so generally met with in the commencement of all those fevers that are produced by the specific aerial poisons, is probably the effect of the poison itself, which is thrown out of the circulation, and causes irritation in the gastric organs, in the same manner that tartarized antimony produces nausea and vomiting, when we inject a small portion of that agent into a vein; when proper remedies are used, that sickness at the stomach which begins with the disease, soon passes away; but the peculiar irritation of the gastric organs which comes on at a later period, and which is often so distressing in the last stage, is evidently in these fevers produced in a great measure by an excess of acidity in the stomach. This may perhaps arise from the decomposition of the saline ingredients of the blood by the serous or electric fluid which appears to exist to excess in all fevers, but particularly in those of a malignant character. After the decomposition, the acids of the salts may be attracted into the gastric organs, where they exist in excess, and act as a source of intense irritation. This, however, is in part theory; but there is no question of the fact, that there is in all the malignant fevers of the new world, particularly in the last stage of these diseases, an excess of acids in the alimentary canal, which extends from the very tip of the tongue to the very verge of the anus. When we apply at this period of the disease a piece of litmus paper to the foul or red irritable tongue, the test is reddened almost instantly; & when we apply the same paper to the fluids ejected from the stomach, it is reddened almost as suddenly as if it had been dipped in a pure acid. In fact, even the matter of black vomit (which is merely an internal effusion of the black and dissolved blood) receives such an addition of fixed acid in the stomach that it effervesces freely with the alkaline carbonates.

The excess of acid which produces the intense irritation in the stomach, is not the acetic, for even the matter of the black vomit has no sour smell. This

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excess of acid is probably derived from the saline matter of the blood : and as the muriate of soda is the principal saline ingredient in the blood ; so I believe that the muriatic is in fever the acid which exists in the greatest excess in the stomach ; * but whatever the source of this acidity may be, it is, as I have said, at this period of the disease, the true source of the intense burning, and that local irritation, amounting in some cases even to inflammation, which is the real cause of the gastro-enterite of Broussais. This species, however, of the enterite cannot be cured either by gun water, taken internally, or by leeches applied to the pit of the stomach. The irritation is produced by a chemical cause, and can only be removed by chemical means.

It is not this period of the disease that the alkaline carbonates are of such infinite value : when we give, for example, the carbonate of soda, the fixed acids of the stomach are immediately neutralized by the alkali of the carbonate ; a large quantity of carbonic acid is evolved by the mouth, and the irritation of the stomach disappears almost as fast as if it had been removed by a charm.

By this treatment we not only remove that irritation and severe burning in the stomach which is so distressing to the patient, and even so destructive to the gastric organs, but we gain another point, which is, at this period of the disease, of still more importance than the mere removal of a local irritation. The fixed acids are, as I have said, immediately neutralized by the alkali of the carbonate. The muriate of soda, and the other natural salts of the blood, are instantly formed in the stomach itself. Now we know that these salts do enter the circulation ; we also know that they mix with, and become a part of the circulating blood ; we know that they change its properties and remedy its morbid condition ; we know also that they add to the stimulating power of the circulating current, and enable the heart to keep up its action.

In consequence of this addition of saline matter, the kidneys and the other secreting organs continue to perform their functions. The skin does not become yellow, nor the breath fetid : neither is the mortality one twentieth part so great as it had been under the old modes of treatment. In fact, the successful results which have already followed the use of the above practice, prove that the saline remedies are the agents of all others the best that we yet know of, for the successful treatment of malignant diseases.

When there is an excess of acid acting as the source of destructive irritation in the gastric organs, the treatment with the alkaline carbonates is decid-

edly the best ; and those agents are as decidedly the worst, the effect of which is in direct opposition to that of the alkaline salts. When there is no excess of acid in the stomach, as sometimes occurs in fevers that are more mild, the carbonates enter the circulation unchanged, and we know that when they are mixed out of the body, even with the black blood taken from the heart of those who have died of the yellow fever, they redden its color as much as the muriate of soda, or any of the other stronger salts. I have also stated, that all the acids blacken the color of the blood so completely, that with the addition of a little water even healthy arterial blood is immediately converted into a fluid exactly resembling the black vomit.

The dark color of the blood, which we observe in the beginning of pestilential fevers, is the effect of the poison on the vital fluid ; but the blackness in the last stage of these diseases is produced by the loss of the saline ingredients, † which I can prove are beyond all question the true cause of the red color of healthy blood. The mere fact that the blood has a dark color in all the fevers which arise from poison has been long known, but the causes of this dark color have been but ill understood. An attempt to redden the dark color of the black blood in fever has been with some practitioners, the chief object in the plan of cure ; but ignorance of the real properties of the vital fluid, has led to errors which have been even more fatal than those which now generally exist as the consequence of the doctrine of pure solidism. Acids redden the blue of vegetable colors ; and these agents have been extensively used by a certain class of physicians to redden the blood in various diseases on the supposition that they contain an excess of oxygen, which they would give over to the black blood and thus redden its color. The fact is, however, that though acids redden the vegetable coloring matter, they completely destroy the red color of the blood ; yet these are the very agents that in fever have been thrown so unmercifully into an organ, already burning from an excess of acid, on purpose, as they say, to redden and revivify the color of the dark blood.

I shall afterward have occasion to bring forward some melancholy proofs of the fatal effects of the acid treatment, and to show that, in some places, it has been already used to a fearful extent. The calomel, and some other modes of treatment, have done much mischief,* but the acids have been the agents of all others, the most destructive in the treatment of the yellow fever, and other diseases that really possess a malignant character.

*We are indebted to Dr. Prout for the discovery that the muriatic is the acid that is chiefly generated in the morbid conditions of this organ.

†The above paper was written previous to the appearance of Cholera in this country. The blood in this disease has since been analyzed by Dr. O'Shaughnessy, Dr. Turner, Dr. Thomson, of Glasgow, &c. They all agree in the fact, that there is a material diminution of the saline matter. Dr. Thomson however, makes the diminution to be less than any of the others ; but the cause of this has been ably pointed out by Dr. O'Shaughnessy, in one of the late numbers of the *Lancet*.

*The calomel practice, in Cholera, had been tried at Warsaw, and found to be of no use, even before the arrival of Mr. Searle in that city. Notwithstanding this, he commenced with his favorite remedy ; but, according to the latest accounts, he had been trying the saline treatment with the most marked success. The calomel practice appears to have completely failed, even in the hands of Mr. Searle, who is known to have been one of its warmest advocates. In one of the late numbers of the *Journal Universel et Hebdomadaire* we find it stated in a letter from M. Londe, the President of the French Commission, now in Poland, that 'The principal means used here against the Cholera, are 1. Calomel in strong doses, (from 8 to 20 grs. an hour, or even half hour.) It is administered here in the Hospital de Bagatelle by Mr. S— an English Physician. In this Hospital the mortality is frightful.'

It has been already stated, that when the blood is black from the loss of its saline ingredients, oxygen is not attracted into the circulation in the lungs after the removal of the carbonic acid; but that, if it be attracted at that period, even the strongest oxygen has no more effect in reddening the black blood than it has in reddening the black clot that has lost its saline matter, and of course its red color from immersion in distilled water. Yet, though this practice has been already weighed in the balance and found wanting, we are annoyed almost daily by the recommendation of means for oxygenating the black blood. Oxygenating the blood, however, is of no use in such cases, for the blood can only be reddened by saline remedies. Calomel and antimony may fret the stomach, and add to the suffering of the patients. Acids and opium may and do darken and destroy the red color of the blood; but when the red color is lost as in bad fever, it can only be restored by the use of those remedies which are, in reality, in its healthy state, the true cause of its redness.

It may be easily ascertained, by the litmus paper, whether there be or be not, in Cholera, an excess of acid either in the blood or in the fluid ejected from the gastric organs. If there be an excess of acid, then the alkaline carbonates are the remedies of all others, the most likely to be useful; if there be no excess of acid, then the mixture of muriate of soda and nitrate of potass may probably be preferred; and as all parties agree in admitting that, during the first stage of Cholera, the blood is not only diseased, but black in color and thick in its consistence, I am, therefore, inclined to believe that, *under all circumstances, the non-purgative saline medicines are the remedies, of all others, the most likely to be useful;* for they not merely redden the color of the blood, but, by increasing the fluidity of its solid ingredients, and adding to its stimulating power, they will render the blood more fluid, and, of course, better fitted to serve the important functions which it is intended to perform in the living system.

I will afterward bring forward so ne very strong facts to prove, that the aerial poisons which act as the remote cause of the essential fevers, do not produce their effect by any direct impression on the nervous system; on the contrary, they appear, like the oxygen of the air, to be attracted into the circulation, and produce their effects on the solids of the system, entirely through the medium of the blood. The diseased state of the blood is the immediate cause of fever—the diseased action in the solids is merely the effect. I have seen cases in which there was no excitement from first to last; yet these very cases, in which the solids were not injured, even in the least, were of all others the most fatal.

All the fevers from poison are generally preceded by a stage of torpor; for the first effect of the poisoned blood is to paralyze the heart, and indeed the whole of the vascular organs. The continuance of this cold stage is in proportion to the quantity or the virulence of the poison that has been taken into the system; but in all such cases, reaction is the road by which the animal economy marches to health, and the first duty of the physician is decidedly to bring on reaction, or fever as speedily as he can. When this is effected, should the reaction run high, the excitement may be reduced by the use of the lancet, and the typhoid symptoms, which sometimes

afterward occur, may probably be prevented by the subsequent use of the carbonate of soda, and other saline medicines, which we know do possess the power of preventing that black and dissolved state of the blood, which is, in reality, in fever, the true cause of the nervous as well as the other bad symptoms.

The diffusible stimuli produce their effect in some cases, by a direct and transitory impression on the nervous system; but, as already stated, the saline agents enter the circulation, mix with, and become part of the blood. The blood is the natural stimulus of the heart, and the active non-purgative saline medicines decidedly add to its stimulating power; these, when given early in Cholera, and in active doses, will by increasing the stimulating power of the vital fluid, enable it to act with more force on the vascular organs and in this way rouse the patients from that cold fit, or stage of torpor in which it appears they generally die.

From what I have seen of their effects in other diseases, I have little doubt that, if the saline medicines be fairly tried, the mortality from Cholera will be considerably less than it has hitherto been; but to say the truth, I do not anticipate much advantage from either the saline or any other remedies, or believe that they will be fairly tried, or generally successful, so long as they are used by practitioners who believe that fever is a nervous impression, and who believe also that all our remedies in that disease act merely by sympathy, or some mysterious agency, on the nerves of the stomach.

It is well known that many practitioners have long been in the habit of using the saline medicines, particularly as purgatives, in the treatment of fever; and many still continue their use, merely for the very substantial reason that they find them useful. The true reason, however, why these remedies are so decidedly superior to all others, in the treatment of this disease, has not, I believe, been generally understood; and therefore these medicines are often combined with acids, calomel, or other adverse and powerful agents, which prevent the good effect that would otherwise have followed the judicious use of the active saline agents, when given on a steady principle, and used only at certain periods of the disease, where they can do no harm, and when there is almost a certainty of their doing good.

I know it will be asked, why have the citric and other acids been successful in seury, where the blood is darker than it is in health? To this it may be answered, that the seury is not, like the cholera or the yellow fever, a disease that causes death in a few hours, or a few days, and therefore medicines that may be used without causing immediate death in the one, cannot be used in the others with equal impunity. My own conviction is, however, that there is no one disease in the whole catalogue in which the profession has been so much misled as in the very disease now under consideration. During a residence of twenty years in the West Indies, I have only seen one case of seury; and that case was decidedly brought on by the excessive use of citric acid which an American gentleman had been recommended to use as a preventive against the yellow fever. His own conviction as well as mine, was that the scorbutic symptoms had been brought on by the acid. This was immediately laid aside, and, under the use

* I know one respectable practitioner in this country, who has been using the chlorate of potass for the last nine years with great advantage in the treatment of typhus.

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of the carbonate of soda, he was completely cured in three weeks. To those, however, who are disposed to see the contrast betwixt the effects of the neutral salts and the citric acid, in the treatment of scurvy, I would recommend the perusal of Mr. Cameron's paper, on this disease which they will find in the *Medico-Chirurgical Review*, in one of the numbers for 1820.

It has long been, and I am sorry to observe still is a common source of error, particularly in fever, to confound a similarity in certain symptoms with a sameness in kind. The sporadic cholera, which is occasionally met with during the hot months, both in this and in other countries, is evidently as totally different from the Indian Cholera as east is from west. The one is a symptomatic affection, followed by a mere momentary excitement, arising in part from a severe local irritation in the gastric organs; the other, however, is a most malignant disease, produced by the existence of a specific and virulent poison in the system, which contaminates every drop of the blood, and excites diseased action in every solid of the body. Such being the fact, it is evident that remedies which are successful in the one, may be not only inert, but even actually injurious in the other.

The Asiatic Cholera is, as we well know, a most fatal disease, and will require both an active and judicious treatment to overcome the evil effects of the morbid poison; while the sporadic or plum cholera of this country may, I believe, in most cases, be almost entirely left to itself to work its own cure; and were it at all necessary, the cases which are now so numerous in most of the journals, might be faced by others, where the patients were obstinate, and refused to take any other remedy except a little warm brandy and water, which was given during the cold fit, on purpose to bring on reaction as speedily as possible. In one case, which I saw lately by accident, the symptoms for the time, were quite as severe as those described in the various journals; yet, though the patient refused all remedies except warm brandy and water during the cold stage, he was just as well (perhaps even better) on the following day, than if he had taken 125 drops of the castor oil.

There is one circumstance connected with the history of Cholera which renders it a much more formidable disease in northern latitudes than either the yellow fever or the plague. The poison which produces the yellow fever requires a given degree of heat to enable it to exist in the atmosphere; and when the thermometer either rises or falls above or below a given range, the plague disappears. But the poison of Cholera is not rendered inert by the first morning of frost, as is the case with the poison of yellow fever in the United States of America; for it appears that this poison like that of the small pox, can produce its fatal effects almost as certainly in the middle of winter in Russia, as in the burning plains of the Torrid Zone. When once introduced, the contagious poisons possess the power of multiplying themselves; and, as the Cholera poison acts in every temperature, it is more than probable that if it once finds its way into this country, it may remain here as a fatal scourge, not only to the present but to future generations. This, as well as the great mortality caused by the poison of Cholera, imposes a solemn responsibility on those who are,

or at least ought to be, the guardians of the public health.

At present I have merely given a general outline, but the same subject will be considered hereafter more in detail. The above has been written in haste and may probably contain more errors than one. Should the treatment, however, which has been so useful in the malignant diseases of the new World, be found, even in the slightest degree, to lessen the sufferings or diminish the mortality of fever in the other divisions of the globe, I shall then be repaid for the dislike which I now feel in appearing before the profession as the advocate of doctrines so much in opposition to the common opinions of the present day. That this may be put down to its proper account, is the wish of,

Sir, your obedient servant,

W. STEVENS, M. D.

September 5 1831.

I must here observe, that when the paper was read at the College of Physicians, about fifty copies of it were hastily printed, and most of them were distributed chiefly amongst my friends in this country. Three or four copies of it were also sent to Paris, and the same number to some of my friends in Germany. The experiments and facts contained in that paper, as well as the reviews of it which had appeared in this country, were translated into the French and German journals, and circulated by these all over Europe. It is, therefore, not improbable, that it was this which led the two German physicians* to the use of the saline treatment in Cholera. The muriate of soda was the remedy on which these gentlemen chiefly relied; and by way of having a theory of their own, they used it as an emetic, and gave it in the beginning in such quantities that it produced vomiting, after which they used it in smaller quantities; and to this in all probability they were entirely indebted to their great success.

In 1831, these gentlemen had charge of the Custom House Hospital at St. Petersburg, in which there were in all during the epidemic, thirty cases of cholera; and of this number they lost three patients, and twenty-seven recovered. I mention this fact on the authority of Sir William Crichton, who states also, that at the request of the Emperor, he had communicated this practice to the army physicians in Poland, by whom it had been found to be very advantageous †.

About the same time, Mr. Searle tried this treatment at Warsaw. He used it in eight cases, and in every one of them he succeeded in bringing on reaction. Most of them, however, died afterward,—not from cholera, but under circumstances of the most gross neglect on the part of their attendants. Mr. Searle, at that period, considered the muriate of soda as a *valuable remedy*; but when he had an opportunity afterward of giving the saline treatment a fair trial at Berlin, in place of doing this—by which he would probably have done much good, and gained great credit to himself—he returned to his old calomel practice; but the destructive effects of this were so obvious, that the German physicians compelled him to discontinue its use in that capital.

As soon as it was generally known that the Cholera had made its appearance in the north of England, I wrote to a physician in Sunderland, recommending him earnestly to give the non-purgative neutral salts

* Namely, the two that are referred to in the letter of Dr. Barry.

† See the Supplementary number of the *Medical Gazette* for January 7th, 1832.

a fair trial, in any cases where either himself or his friends might have an opportunity of using it. Soon afterward I sent him a second letter; but from that day to this I have not received an answer to either the one or the other. His reasons for such conduct are best known to himself. He had previously pretended to be my friend, and, so far as I am aware of, had never given him the slightest offence either in word or deed.

When the Cholera made its appearance in this metropolis, I did every thing in my power to induce my medical friends who were in practice to try the saline treatment, and some of them did give it a trial in a few instances; but it was either in the most hopeless cases, or in the very last stage of the disease; consequently, the result made no very favorable impression. Others used the saline treatment in milder cases; but they combined it at the same time with opium, brandy, colomel, and other improper agents, consequently, the good that was gained by the one was lost by the others.

About this period, cases were published almost daily in the various journals, stating the successful result of the saline treatment; but still all this made no impression, either on the Board of Health, or on the generality of practitioners. Those who believed that Cholera was produced either by a nervous impression, or a local inflammation, would not try the saline practice, because they could not see on what principle it could possibly do good. Some would not try it because it was too cold for the stomach; and one philosopher of the right old breed, who appears to be ignorant of every improvement that has been made in the profession for the last fifty years, when he was told that in Cholera there is a deficiency of saline matter in the blood, declared that it was all trash,—and even if the fact were true, he could believe it just as possible to make up for a want of the bile by throwing ox-gall into the stomach, as credit even for a moment that salts could be of any use by entering the circulation, and acting on the blood.* In short, almost every one that I met with had a theory or a practice of his own, which he was determined to support, and was equally ready to throw cold water on every thing like improvement that was proposed by another. There were, however, some brilliant exceptions to this rule.

In the beginning of April, I received a visit from Mr. Pont, a medical gentleman in Albany-street, who called to inform me that the Cholera had broken out in the prison at Cold-Bath Fields, and that he had been requested by Mr. Wakefield, the surgeon who had charge of the prison, to say that he would be glad to show me the cases; and from what he had heard of the saline treatment, he should be very willing to give it a trial—the more so as he had now no longer any faith in the common remedies.

On the receipt of this message, I immediately went to the prison; and after some conversation with Mr. Wakefield on the subject, he not only agreed to adopt the saline treatment, but invited me to attend the cases along with him. He consented also that Mr. Crooke, a young medical gentleman who had lived with me for several years in the West Indies, should be allowed to remain constantly in the prison to see that the medicines were faithfully administered, as well as to take notes of the cases.

* Such physicians as this are justly entitled to the enlogium which a certain practitioner gives to his son, in Moliere's inimitable comedy of *Le Malade Imaginaire*—“Mais, sur toute chose, ce qui me plait en lui, et en quoi il suit mon exemple, c'est qu'il s'attache aveuglement aux opinions de nos anciens, et que jamais il n'a voulu comprendre, ni écouter les raisons, et les expériences des pretendus de notre siècle, touchant la circulation du sang, et autres opinions de meme farine.”

The following is an outline of the practice which was pursued, not only in the prison, but every where else where I have had an opportunity of treating the disease.

First. The treatment was generally commenced with a Scidlitz powder, which was given with a view of lessening the gastric irritation, and partly for the purpose of removing the diseased secretions from the intestinal canal.

Secondly. When the stomach was irritable, (which it generally was,) a large sinapism was immediately applied to the epigastric region, and where the patients were cramped in the extremities, frictions were used with hot flannel. The pain produced by the spasms in the muscles were not only relieved by the frictions, but by this and the application of sinapisms to various parts of the body, the quantity of animal heat was increased, and this, I need scarcely say, is an object of great importance in the treatment of Cholera.

Thirdly. A powder containing

Carbonate of soda, half a drachm,
Muriate of soda, one scruple,
Chlorate of potass, grs. viij.

was dissolved in half a tumbler of water, and given soon after the Scidlitz. In severe cases, the above powder was administered every half hour. In those that were less severe, it was used every hour, and in some malignant cases it was given every fifteen minutes. In short, it was given more or less frequently according to the circumstances of the case, and continued until the circulation was fairly restored; it was then given at longer intervals, and when the reaction was completely established, it was left off by degrees.

Fourthly. Where the stomach was irritable, the use of the above powder was occasionally suspended and common effervescing mixtures, or small doses of the common soda powders, with an excess of the carbonates, were frequently used, until the irritation was lessened, and then the carbonate of soda with larger doses of the chlorate of potass were generally given without the addition of the muriate of soda, and frequently in such cases the chlorate of potass was given by itself, in doses containing ten grains each.

Fifthly. A solution of muriate of soda was also thrown up into the intestines, at as high a temperature as the patients could well bear this saline fluid.

Sixthly. In two very severe cases, which occurred out of the prison, the patients were put into a hot saline bath with evident advantage. It is well known, that a hot saline fluid is a better conductor of heat than fresh water at the same temperature; but, independent of this, a part of the saline ingredients may be absorbed from the skin, and the patients may also be benefited by respiring the hot saline vapor. It is but fair to state, however, that this means, which was evidently beneficial in the cases in which it was tried, was proposed by Mr. Marsden, one of the surgeons to the Free Hospital in Greville-street.

Seventhly. Seltzer water was allowed *ad libitum*, when the patients expressed a desire for something to drink. A strong infusion of green tea was also occasionally used, in severe cases, apparently with advantage.

Eightly. To keep a patient in a state where the well known collapse occurring and so of the two coldest; as an excellent independent force, with through the great degree. Now, with low, as it air which small quantities black veins, air, and c

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Eighthly. It was considered essentially necessary to keep a large fire, both night and day, in every room where there was a patient with Cholera. It is now well known that in by far the majority of cases, the collapse commences betwixt two o'clock in the morning and six A. M., or, in other words, at the period of the twenty-four hours when the atmosphere is coldest: from which it appears that external cold acts as an exciting cause to the state of asphyxia. But independent of this, we have seen that the degree of force, with which oxygen can remove carbonic acid through the medium of a membrane, depends, in a great degree, on the temperature of the two fluids.-- Now, when the temperature of the blood is so very low, as it is during the state of collapse, and if the air which the patients then breathe be also cold, the small quantity of carbonic acid which exists in the black venous blood, will not be attracted by the cold air, and consequently this of itself may be one cause of the sudden death.

Ninthly. It is necessary to be very careful not to dismiss the patients as cured until they have been, at least, several days completely out of danger. Two of the cases, which proved fatal in the prison, at Cold-Bath Fields, were lost from our not having been at that time sufficiently aware of the importance of this.

Tenthly. The patients ought not to be allowed to use one particle of solid or indigestible food, for at least five days after they have recovered from the state of collapse. We nearly lost more cases than one, from the too early use of solid indigestible food; and one woman, a nurse in the London Free Hospital in Greville-street, actually died from this cause, after having been considered as completely out of danger from a most violent attack of Cholera accompanied with collapse.

Eleventhly. Those who put their patients under the saline treatment, ought to trust almost entirely to this; for if they use calomel, brandy, or other destructive agents at the same time, they will do little good; but above all, not one particle of opium ought to be given internally; for, from what I have seen, I consider this to be as fatal in Cholera, as it is in the last stage of either the African typhus or the seasoning fever of the West Indies. Where the stomach, however, is extremely irritable, about twenty-five or thirty drops of laudanum, diffused in a little tepid water, may be injected with a small syringe into the rectum, not only with impunity but considerable advantage.

When the stomach is very irritable, small quantities of milk with carbonate of soda, may be given occasionally; and when we use the saline powders in such cases, they ought to be dissolved in a very small portion of water.

When the case is exceedingly malignant, or where we are called in late in the disease, and find the patient already in collapse, we ought then to have recourse to the most active measures. An ounce of the muriate of soda, with half a drachm of the chlorate, or the muriate of potass, should be given immediately in cold water, and repeated, if necessary, every half hour, until the patient has taken about three doses of this strong solution. Should reaction be brought on by this, it may then be kept up by the common saline powders; but should this experiment fail, we may then, as a last resource, give the patient another chance for life, by injecting a saline fluid into the veins.

The ejections, and every other source of impurity ought to be immediately removed from the room

where the patients are; and the infected wards should be fumigated at least twice a day with gunpowder, and every particle of suspicious clothing, bedding, &c., should be boiled, for at least half an hour, in a strong solution of common soda.

Those who are recovering from the disease are liable to a relapse, and such cases are generally fatal; but from what I have seen, my belief is, that those who have completely recovered, after having had the Cholera once, have an immunity from any future attack of this disease.

The above is an outline of the treatment and means which were used; the following is, I believe, a fair statement of the outline of the result:—

The three first cases which occurred in the prison were treated by Mr. Wakefield in the common way — with opium, brandy, the hot-air bath, &c.; but they all died after a very short illness. Almost immediately after this, another case was treated in a similar way by another practitioner, who had been sent for to the prison during the night, in consequence of Mr. Wakefield being unwell at the time. This gentleman was not then aware that any new practice had been adopted in the prison. He treated the patient *secundum artem*, with brandy, opium, and chalk; but the result was, that this patient was past all hopes of recovery before either Mr. Wakefield or myself saw him in the morning;—consequently, in the four cases that were treated in the prison in that way, there were four deaths and not one recovery under the common practice.

It may be proper to state that previous to the beginning of April there were no bowel complaints in the prison, and the whole of the prisoners were then as healthy as they generally are at that season of the year. The first case that was reported to the Board of Health occurred on the 5th of April;—the saline treatment was commenced on the 8th. There were in all at that period about one thousand three hundred souls in the prison; and from the 8th of April to the cessation of the first epidemic, there were at least one hundred individuals who were evidently more or less, under the influence of the poison.

In about fifty of the above cases, the patients were attacked with a bowel complaint, and most of them had, more or less, irritation at the stomach. The fluids that were ejected, were generally deficient in bile; and the bowel complaint was attended with the following peculiarities:—

First. The inclination to go to the night-chair came on more suddenly than it generally does in cases of common diarrhoea.

Secondly. The ejections were less bilious than in common diarrhoea; and opium, chalk, astringents, &c., which are generally useful in cases of common bowel complaints, were of no use in checking the diarrhoea, which occurs when the patients are under the influence of the Cholera poison. These remedies were chiefly used in cases which occurred out of the prison; but they evidently had no effect in checking the specific ejections which are produced by the Cholera poison; and this I presume was the cause of the diarrhoea which occurred in the fifty cases in the prison to which I refer. The whole of these were immediately put under the saline treatment, and this appeared to give an immediate check to the disease; and I believe it was owing to this, that the patients, as well as the prisoners, were cured, though by the original hope, some of them were cured, though by the original hope, some of them were cured, though by the original hope, some of them were cured, though they were constantly breathing in an atmos-

were completely impregnated with the poison, yet not one of them was lost.

There were also about thirty-one similar cases, in which the above symptoms were still more distinctly marked, and in many of them the bowel complaint was more or less accompanied with cramps. These were all treated in the same way with the non-purgative salts, and in three, four, or five days, every one of them were sent from the observation ward, as we believed at the time, completely out of danger. I am sorry, however, to be obliged to add, that two of these cases which had been unfortunately dismissed too soon, and sent back as cured to the cold wards of the prison, were attacked with collapse during the night; and before they could again be put under the saline treatment, their stomachs were so irritable that they could scarcely retain even a teaspoonful of water; and both these cases proved fatal in a very short period from the commencement of the collapse.

In addition to the eighty-one individuals already referred to, we had about nineteen cases in the prison, where the patients were either attacked with the disease, and got into a state of asphyxia in the cold wards of the prison during the night, or where the stomach was so irritable in the first stage that it could not retain the stronger salts. In almost every one of those cases the disease assumed a most malignant character. These were all treated with the energetic non-purgative saline remedies; and in the nineteen malignant cases to which I now refer, we had eighteen recoveries, and only one death: consequently, the total number of patients, who were all evidently under the influence of the Cholera poison, was about one hundred, yet in those cases where we treated almost entirely to the saline practice, we had only three deaths, and ninety-seven recoveries.

In corroboration of the above statement, I will insert here the following letter from Mr. Wakefield, which was published in the Medical Gazette for April 28, 1832.

[“In further illustration of the treatment which has been adopted in the cases of Cholera which have occurred at Cold-Bath Fields, we insert the following communication from Mr. Wakefield, the intelligent and highly respectable practitioner who has the medical charge of the prisoners.”] - *Editor of the Gazette.*

‘Lansdown-Place, Brunswick-Square,
April 25, 1832.

‘*Sir*,—So much has already been written on the subject of Cholera, that I should not now appear before the public, but from a conviction that the facts which I am about to state, if generally known and properly authenticated, (which they can easily be,) must be useful to those of the profession who in future may be called upon to treat this new, but most malignant disease.

‘The first case which I saw, occurred on the 5th of this month, in the prison at Cold-Bath Fields. Three others quickly followed, and were immediately put under the common treatment: these four patients died, after a short illness, with all the symptoms of Cholera distinctly marked.

‘Soon after the commencement of the disease, a number of the prisoners were attacked with marked symptoms of derangement in the gastric organs; and as all of these cases occurred in the infected part of the prison, it is more than probable from this, as well as the general appearance of the patients, that the diarrhoea with which they were attacked, was the effect of the poison which produces Cholera. From

having seen similar cases in the commencement: transformed rapidly into a state of collapse, my conviction is that every one of those patients were more or less in serious danger; and I believe also that, had they either been left to themselves or improperly treated, the majority of these cases would have run into a state of collapse, perhaps in a few hours; indeed I have little doubt that the one-half of them would have been lost under the practice which is generally adopted in the treatment of this disease.

‘Independently of the numerous cases where the individuals were laboring under the premonitory symptoms, I have now had twenty-five cases of decided Cholera, where the patients were in a state of collapse; and in justice to Dr. Stevens, who suggested the use of the saline remedies, as well as from a sense of what I owe to the public, I conceive it my duty to state, that after having seen both the old and the new treatment fairly put to the test, I am fully convinced that the saline practice is not only the most scientific, but decidedly the most successful that has yet been adopted for the cure of Cholera; and from what I have seen, my conviction is, that if this treatment be fairly and extensively tried, the mortality from Cholera will be greatly diminished. When used at an early period, it either prevents or arrests the progress of the fatal symptoms; and even where this treatment is not used until a later period of the disease, its effects are distinctly marked; and I may safely say that I have seen several most malignant cases recover from the state of collapse under the saline treatment, where the patients, I doubt not, would have died under any other practice.

‘We have now upward of twelve hundred persons in this prison; and from the commencement of the disease up to this date, there have been nearly one hundred cases where individuals have been more or less evidently laboring under the influence of the Cholera poison. Twenty-five of these assumed the malignant character of the disease, having the majority of the symptoms described in the printed document issued by Dr. Macann. Four of the first cases, as before observed, were treated in the common way, and every one of them died. All the others, however, were immediately put under the use of the saline practice as recommended by Dr. Stevens, and out of the whole number who have been thus treated, we have only had three deaths from Cholera, and two of these were cases of relapse. I may state also, that within the last few days I have had one most malignant case in the New Prison at Clerkenwell, where the patient was in a state of complete collapse before I saw him. His extremities were cold; his pulse at the wrist was entirely gone; he had the Cholera voice, and his tongue was icy cold. This man, like those in the other prison, was immediately put under the saline treatment with the happiest effects, and I consider him now in a state of convalescence.

‘I am, Sir,

‘Your obedient Servant,

‘H. WAKEFIELD.’

It has been observed, lately, by individuals who are still anxious to cling to their former opinions, that the above cases occurred at a period when the disease was on the decline in this metropolis. These gentlemen forget, however, that London is not a village, and that though the disease was then decreasing in Southwark, Rotherhithe, &c., where it first commenced, yet at that period it was only beginning in that part of the metropolis where the prison is situated. There is also one most important fact

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which the said individuals forget to notice, namely, that almost every one of those patients, either in or out of the prison, died, who were treated in the same quarter and at the same time with the remedies recommended by the Central Board of Health; whilst the fact is equally certain, that almost every one of those cases recovered which was treated, either by myself or others, with the non-purgative alkaline salts.

There were other individuals, even lately, who had so little respect for their own reputation as to deny that Cholera ever existed in London; and those are equally in error who believe, at present, that this disease has ceased to exist merely because the Board of Health may not think proper to publish an account of the cases; but the truth is, that in many parts of London, the cases, at this moment, are as numerous, and just as virulent, or perhaps even more so, than those that occurred at an earlier period.

In the first irruption of Cholera which occurred in the prison of Cold-Bath Fields, the disease was confined entirely to the males. It commenced in the beginning of April, and the last case was dismissed cured on the 30th of the same month. From this period up to the 31 of June, there were no new cases; but on that day it broke out a second time. In this instance it commenced amongst the females, and soon spread almost all over the whole establishment, and is now at this moment much more virulent, and I am sorry to add, more fatal, than it has ever been at any former period. In the first case that occurred, the woman was attacked on the night of the 31 and died on the 5th. Her sister, who attended her, was next taken ill, but recovered under the saline treatment.

Soon after the commencement of this second irruption, I called at the prison, and there were then four cases. These were under the saline treatment, and as they were all doing well, I did not return.— On the 21st of June, however, I received a note from Mr. Wakefield, requesting me to meet him at the prison as soon as possible. When I went there, I found about twenty patients with Cholera, and out of this number five were actually dying. There was one obvious cause for this, which I do not feel myself at liberty to point out,—suffice it to say, that it originated from either a mistake or neglect on the part of the nurses who administered the medicines.

A saline fluid, similar to that which had been used at Leith, was injected in two cases, into the veins; but the one died almost immediately, and the other, though he rallied for a time, yet he also ultimately died.*

From the commencement of this second irruption there have been, in all, about eighty-one cases: many of these have been of the most malignant description. Out of this number there have been thirteen deaths, and the other sixty-eight have either recovered or are now apparently nearly out of danger; but new cases are brought into the infirmary almost every hour. They are all of them, however, now under the most energetic treatment, and I sincerely trust that the mortality of the disease will be arrested in its progress.

When the Cholera was first raging in the prison at Cold-Bath Fields, the disease broke out about the

* Should I have occasion to try this experiment again, I shall certainly add a portion of the chlorate of potass to the other ingredients. The muriate of soda answers very well for a time, but it is too apt to run off by the bowels; and then the blood is swamped by the large quantity of water.

† The most awfully virulent cases which I have ever seen, occurred in some individuals who had been employed to scour the blankets, &c. from the different wards,

same time amongst a colony of itinerant Italians, who resided in the neighborhood. The first cases were put under the care of a physician, who had charge of a Cholera hospital in that part of London. These patients were first bled, and then most scientifically treated with opium and brandy; but the result was such, that the other Italians who were taken ill about the same time, refused to be treated by the Cholera physician; and fortunately for themselves sent for Mr. Whitmore, an intelligent practitioner, who lives in that neighborhood. This gentleman had seen the effects of the saline treatment in the prison, and afterward trusted entirely to this, in every decided case of Cholera which he attended. Since then he has had in his own private practice about thirty Cholera patients, chiefly amongst the Italians, and out of this number he has lost only two cases, and saved about twenty-eight; and this surely is no common occurrence, particularly amongst the poorer classes, where we do not always see them early, and where we are not certain either that the medicines which we prescribe are properly administered, or that they are not occasionally used at the same time with other improper agents which counteract the beneficial effects of the alkaline salts.

The first case which Mr. Whitmore lost, was that of a woman whose husband had just died from Cholera and this patient had not used the saline powders which he had ordered. The second unsuccessful case, was that of another woman in the same place, who was attended by Mr. Whitmore and another physician. In this case effervescent mixtures were given, made with *muriatic acid* and carbonate of soda; but this experiment did not succeed, and the woman died after a short illness.

The following case is one of those which occurred in Mr. Whitmore's private practice. It has already been published in the Medical Gazette, but as there are some facts in it which may not be without interest, I shall insert it here.

CHOLERA WITH ABORTION, BLACK DISCHARGE FROM THE UTERUS BECOMING FLORID UNDER THE SALINE TREATMENT.

To the Editor of the London Medical Gazette.

SIR,—I am induced thus publicly to communicate a recent case of Cholera successfully treated by the *saline practice*, and under circumstances which may, perhaps, render its recital not altogether uninteresting to the profession.

May 12th.—I was consulted in the afternoon, by Mrs. L., æt. 42, the mother of twelve healthy children, the eldest twenty-three and the youngest three years old. Supposes herself about three months advanced in utero gestation; complains of diarrhoea of two or three days' standing, with great prostration, and cramps in her lower extremities. Pulse infrequent, and feeble.

Ordered R Mist. Cretæ, ℥4 oz.; Tinct. Opii, minimis xl. capiat statim partem statim repetatur post singulas dejectiones.

In the evening her daughter came to say her mo-



ther had taken all the mixture without experiencing any benefit; indeed to her former symptoms were superadded vomiting of a violent character.

Ordered the mixture to be repeated, with the addition of Tinct. Catechu, ℥. 1 oz.

13th, 6 A. M.—Mixture all used, but the patient is considerably worse. Has passed a very restless night; countenance much sunk; voice peculiar, and little more than a whisper; stools feculent; a bilious fluid was also ejected from the stomach, and complains of a bitter taste in the mouth.

Ordered Pulv. Cretæ, C.c. Opio, ℥. 1 scruple; divide in Pulv. iv. to be taken in the same manner as the mixtures were directed

Noon.—The powders have all been taken, without the slightest improvement in any one symptom. Stools liquid, and now, for the first time, of a rice-water color. The fluid which she vomits, however, is still bilious; tongue flabby, coated, and cold; pulse scarcely perceptible at the wrist; complains much of headach.

R Liq. Opii Sedat ℥. 1 scruple; Ammon. Carb. ℥. 1 scruple; Syrupi Aurantii, f. 6 scruples; Aquæ, 5 oz. misc. capiat Coch. i i. secunda quaque hora cum Acid. Tart. gr. xv. in statu effervescentie.

10 P. M.—No better. Some discharge from the uterus of black blood, with bearing-down sensations as if about to abort.

14th, 7 A. M.—Mis carried in the night; appears to have been very correct in her calculation as to her period of gestation. Purging and vomiting not at all relieved; extremities cold; pulse gone, and appears to be fast approaching to a state of dissolution. Ordered a Seidlitz powder to be taken directly, and repeated at pleasure; also one of the following powders to be taken in twenty minutes after the Seidlitz, and repeated every hour.

R Sodæ Carb. 2 scr.; Sodæ Mur. ℥. 1 gr.; Potassæ Oxymur. gr. vii. misc.

Noon.—Vomiting has ceased; purging less frequent; pulse begins to be perceptible, but small, slow, and tremulous; some return of heat on the surface. One Seidlitz powder has been taken; also four of the other powders; all of which have been retained. These were ordered to be continued.

10 P. M.—Nine of the above powders have now been used, and retained. Considerable reaction has taken place; voice and countenance much improved; pulse 80, and begins to be more full. *Lochia beginning to be florid in appearance*, and of the usual quantity. Only one dejection since my last visit. Powders ordered to be continued every hour. From this time she rapidly improved, and is now out of danger.

It is worthy of remark, that the eldest daughter and the husband of this woman have also been attacked with diarrhoea and cramps in the extremities for which Pulv. Cretæ C. c. Opio was given, without affording the slightest relief. After persisting in their use for some time, and as the symptoms were evidently becoming worse, recourse was had to the above saline remedies, and speedy recovery was the almost immediate result.

You will observe, Sir, I was very tardy in putting these patients under the saline treatment; but I must beg to observe, that this did not arise from a conviction on my part that they were not cases of

Cholera, for, perhaps, a better marked case than the first was never witnessed; but I was anxious to try whether, while bile continued to pass into the duodenum, the diarrhoea and vomiting could not be arrested by any other means than the saline medicines, as recommended by Dr. Stevens, which I had seen used with so much success in the prison at Cold-Bath Fields. I think, however, you will agree with me, that I gave chalk and opium (the usual remedies) a very fair trial in the above cases. I am the more particular in pointing out this, as my belief now is that the non-purgative alkaline salts are, as Dr. S. asserts, more useful in relieving the sickness at the stomach, and checking the diarrhoea, than common astringent or absorbent medicines. I may also observe, that these cases show that the rice-water evacuations are not invariably present in the early stage of the Indian Cholera; and from what I have seen of this malignant disease, though I believe that no treatment will be successful in every case of collapse, yet my thorough conviction is, that a much greater number of patients will be saved by the saline treatment than by any other practice that has yet been tried.

I have been the more induced to communicate the above facts, as I observed that others (even the Central Board of Health) are still recommending the use of medicines which have been long used, fairly tried, and found to be not only useless but actually injurious.

I am, Sir,

Your obedient Servant,

HENRY WHITMORE.

Cold-Bath Square, May 21, 1832.

I may add, that on last Sunday night, just before midnight, I was called on to attend another female, who resides in the same parish, and at no great distance from the above patients. This woman had been suffering for two or three days from vomiting and purging, but when I saw her, for the first time, she was in a state of collapse, and was also exceedingly emaciated from previous bad living. She was immediately put under the saline treatment; reaction soon came on, with general amendment in all the symptoms. Ever since she has continued to improve; the kidneys are again acting, and I have now great reason to hope that she may recover. She is, however, in a very low state, not merely from the effect of the disease, but also from previous ill health. She is suffering also from great mental anguish for the loss of two children, one of whom had died on Saturday and the other on Sunday, the same day that she was herself attacked. I did not see either of these children, but both of them were reported as having died from confirmed Cholera.

Thursday evening, 9 o'clock.

The case last referred to in Mr. Whitmore's communication, is the patient on whom the saline treatment was first tried in the Free Hospital in Greville street; she has since been dismissed cured, and is now in better health than she had been previous to the attack.

Soon after this case occurred, seven other patients were admitted into the same hospital, six of them were from Blue-court, Saffron-hill, and one from Holborn; two of the nurses who attended these patients were also attacked. These patients were attended by Mr. Whitmore, Mr. Marsden, and myself; one man, who was brought to the hospital in the last stage of collapse, died soon after admission.

We also lost one of the nurses, a very stout woman, who was attacked most violently, on the 31st of May. She was put under the saline treatment, and on Monday, the 4th of June, was so far recovered from the state of collapse as to be considered out of danger. The same evening, about seven o'clock, she was attacked with a violent cramp in the stomach, which was probably followed by inflammation and organic disease in that organ. After this the irritation was so great, that even cold water could not be retained, and she died on the evening of the 6th. After her death it was ascertained, that almost immediately before she had been attacked with the cramp in the stomach, she had eaten a whole lobster (probably a bad one,) which had been brought in to her clandestinely by one of her companions. This woman, however, and the man, to whom I have referred, were the only two patients that were lost in the above hospital, from the period they commenced with the saline remedies. And I regret that in the first case which we lost we did not inject the saline fluid into the veins, nor try the effect of a very large dose of a saline solution given internally; for this I believe may be used, not only with impunity, but with great advantage in such cases.

The above cases occurred in a hospital into which the patients are generally brought very late, and often in the very worst forms of the disease; yet had it not been for the imprudent conduct of one of the nurses, out of ten malignant cases of Cholera we should have saved nine; but, even as it was, out of these ten, eight patients were saved; and this is very different from the result which attended the common treatment in the same hospital, for under that, I believe, more than one-half died.

I may here observe that the saline treatment was adopted in this hospital in direct opposition to the opinion of the medical gentlemen of that establishment. The remedies previously used had not been so successful as expected, consequently the saline treatment was adopted. Mr. Whitmore, who lives in the neighborhood, was called in for the express purpose of seeing that the plan was properly pursued. This gentleman requested me to attend the cases along with him, which I did. Mr. Marsden, the surgeon to the establishment, also attended the cases with us. This gentleman was evidently opposed, at first, to the saline practice, and, perhaps, the more so, as the treatment had been in some measure forced upon him, by some of the governors of the hospital, I had, however, the satisfaction of hearing Mr. Marsden make the following manly declaration in the presence of four other medical gentlemen. He stated firmly, "that no person could have thought less of the saline treatment than he did, until he had seen it tried; but after what he had witnessed in that establishment within the last fifteen days, that a man must be more than a skeptic who would refuse to admit the evidence of his own senses; and from what he had now witnessed, he was willing to admit that the saline practice was decidedly the most successful that he had seen tried."

The saline treatment has now been used, in that part of London, in about two hundred and twenty-six cases of Cholera. Out of this number there have been about twenty deaths, and upward of two hundred recoveries. It is true, however, that many of these were not cases of collapse; for this, where we saw them early, was generally prevented, by the immediate use of the saline treatment; but from what I have seen, my conviction is that, if these cases had been treated with the common remedies, the one-

half of them would have been lost. Or, when we compare the result even in the most malignant cases with the average mortality not only in London, but in other places, it will be found that the balance is greatly in favor of the saline treatment.

I might bring forward many additional facts on this subject, but I trust that I have already said quite enough to induce any impartial practitioner to give the saline treatment a fair trial in Cholera; but as I have said before, my belief is, that there must be a very material change, both in the theory and the practice of medicine, before either this, or any other treatment, will be generally successful.

I should feel myself wanting in a proper sense of gratitude were I to omit this opportunity of expressing the deep obligation which I feel to Mr. Wakefield, whose conduct has been beyond all praise; and were it not for this gentleman, it is very probable that I should not have had an opportunity of trying the effect of this practice in the treatment of Cholera. I had previously made several attempts toward giving it a trial, but in some of them I met with such discouragement, that I was compelled to give it up almost in despair.

I must also take this opportunity of returning my sincere thanks to the magistrates of Middlesex, for the liberal and kind manner in which they have been pleased publicly to express their approbation of the success of the treatment that was used in the prison which is under their care. I have also to thank them for their kindness to Mr. Crooke, who having seen the saline treatment extensively used in the West India fevers, was anxious to see it get a fair trial in Cholera. When the first opportunity occurred he relinquished, for a time, his studies as a student; and though he had a firm belief that the disease was contagious, yet he cheerfully volunteered his services, and remained almost constantly in the prison, both day and night; and to his unwearied attention to the sick, but above all to the exemplary conduct of Mr. Chesterton, the governor of the prison, I believe we were indebted, in no small degree, for the success of our practice.

I have also to express my thanks to Mr. Whitmore, as well as to Mr. Marsden, Mr. Spencer, and other gentlemen, not only for their having given this practice a trial, but also for the manner in which they have expressed their conviction of its superiority to the methods of treatment in general use. I may add, that the candid and manly conduct of Mr. Wakefield, Mr. Marsden, and the whole of the gentlemen whom I have met in that quarter, is to me some consolation for the illiberal and unfounded attacks to which every individual must expose himself who ventures to appear before the public, even when he is actuated by the purest motives, or when that which he states is most strictly correct. But as I have formerly said, truth, whatever may assail it, will ultimately maintain its course, and those who attempt to impede its progress, though they may succeed for a time, yet they will at last find it as hopeless a task as it would be to prevent the mountain torrent from finding its way to the sea, into which it is ultimately to be received.

ON THE INJECTION OF SALINE SOLUTIONS IN CHOLERA.

The injecting of medicated substances into a vein is neither a new nor a difficult experiment, and when we once find out the proper remedies to use for curing a disease, the mere act of throwing it into the vessels is exceedingly simple.

The operation of injecting a saline solution into the veins in Cholera was, I believe, first proposed by Mr. Smart, in a letter which is dated Cranborne, November 14th, and published in the Medical Gazette for the 26th of November, 1831. Mr. Smart appears to have had but little faith in the common remedies; for he asks, 'What are venesection and calomel expected to effect? means, the best adapted, in my opinion, to finally extinguish the still flickering flame of life?'—and after alluding to the action of the salts on the blood, as stated in the paper which was read at the College of Physicians, he then adds, 'I would therefore propose, not only to try the injection of the above (namely, the saline) remedies into the veins, but also the transfusion of pure blood.' Mr. Smart also announces his intention of trying the saline injection, should circumstances render it necessary. I must observe, however, that in his hands it would not have been successful, for he appears to have but very confused ideas on this subject, and being misled, as it would appear, by the opinions of Dr. Clanny, he actually proposes to inject carbonic acid at the same time, *into the veins*. He also recommends the use of brandy and opium, so that what he would have gained by the saline injections in the treatment of Cholera, he would have lost by the carbonic acid, the opium, and the other improper remedies which he proposes to use.

On the 3d of December, that is a week after the above letter had been published, a similar proposal was made by the Editor of the Medical Gazette, only this better informed individual did not recommend the injection of carbonic acid into the veins, for the purpose of giving an arterial color to the black Cholera, which is so invariably met with in cases of Cholera.

REMEDIES TRIED AT SUNDERLAND IN CHOLERA—OTHERS SUGGESTED

'We mentioned last week, that a hogshead of brandy, already mixed with laudanum in due proportion, had been furnished by government for the use of the Cholera patients at Sunderland. We regret to say, that little benefit has been derived as yet from this, the volatile oils, or any other method of treatment which has been tried; nor has any thing occurred to throw any additional light, either on the nature or treatment of the disease. The inhalation of oxygen has been tried in several cases without any apparent advantage; the pulse, indeed, rose a little during the inhalation of the gas, but immediately on leaving it off, the sinking of the pulse was found to be greater than before its use. Some nitrous oxide was in preparation a few days ago, and ere this, we doubt not, has been tried. We must confess, however, that we entertain little hope from this class of remedies, because the lungs do not act upon that portion of oxygen which the air naturally contains, it having been long ago ascertained, by Dr. John Davy, in India, that only from one-fourth to one-third of the proper quantity of carbonic acid was found in the air expired by those lying under Cholera. A galvanic battery has been ordered to be sent to Sunderland, and the effects of this most powerful agent are to be ascertained. The experiments of the late Mr. Finlayson, at Ceylon, though too limited to warrant any general inference, were certainly such as to justify further trial: in one of his patients, who was "Moribund," a galvanic current from a small battery was passed through the chest, the man immediately revived, and ultimately recovered. The

same gentleman also states, that in two out of three cases, the functions of the lungs appeared to be restored by stimulating them with ammonia, volatilized so as to impregnate the atmosphere with its fumes.

'We earnestly recommend a trial of injecting medicated solutions into the veins, particularly some of the neutral salts, as moriate of soda. No one who ever saw a leech disgorge its black blood upon salt, can fail to have observed its instant conversion into a brilliant scarlet. That the change of color carries with it a corresponding change of character, we do not venture to assert; but it is at least worth ascertaining; and we think that the views of Dr. Stevens, as to the effect of salts on the blood, to which we have repeatedly called attention, ought to be put to the test as speedily as possible. It affords no mean claim to the investigation of these doctrines, that a man of Dr. Prout's high character should have declared the essay containing them, and which was published in this journal, to be one which, spite of some imperfections, seems to contain the germs of discoveries of the last importance to mankind.'

In the paper which was read at the College of Physicians, I had stated that the natural salts of the blood were not merely the cause of its red or arterial color, but the chief cause of its stimulating power. There were some who denied that this was the fact, but did so without taking the trouble of performing a single experiment with a view of putting to the test whether the facts which I had stated were correct or not. There are others, however, who have gained great credit to themselves by having acted differently.

In a paper which was read at the Westminster Society, on the 3d of December, and published in the Lancet of December 10th, 1831, Dr. O'Shaughnessy states that 'about three months after Dr. Stevens's researches and experiments were laid before the public,' he had injected a solution of certain salts into the veins of inferior animals, and found that they not merely give a florid color to the darkest blood, but enabled it to increase the excitement in the whole system, by adding to its power of stimulating the vascular organs. From these facts, Dr. O'Shaughnessy inferred, that as the Cholera is more rapid in its progress than the yellow fever, that benefit might be derived, in certain cases, by injecting a solution of certain salts directly into the veins. The salts, however, which Dr. O'Shaughnessy recommended have not yet been injected into the veins, for at that period he recommended the oxygenated salts in preference to those that have been used, from a belief that they arterialized the blood by communicating oxygen; but this opinion he has since retracted with a degree of candor which does him great credit. There are, however, more important facts than one for which the profession are under great obligations to this gentleman, who has already commenced a brilliant career, and we have much to hope from his future labors.

About a week after Dr. O'Shaughnessy's paper had been read, another letter was published in the Medical Gazette. The following is an extract:—

'EXPERIMENTS ON THE BLOOD.

'To the Editor of the London Medical Gazette.

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Stevens, regarding the effects of some of the neutral salts on the blood, have naturally directed attention to this point, at a time when the failure of all ordinary methods of treatment in Cholera has almost unavoidably led practitioners to inquire, whether there be yet any untried expedient which might by possibility be useful. About a month ago, having procured successive supplies of newly-drawn blood, I mixed it with different substances, obtaining the now well-known general result of rendering the fluid dark and thick by means of strong acids, and of a bright scarlet by means of the neutral salts. The transition from the Modena hue of venous to a vermilion resembling that of arterial blood, is certainly a remarkable phenomenon; and those present agreed, that if any thing was to be hoped for from effecting a similar change in urgent cases of Cholera, it was most rationally to be attempted by direct injection into the veins—a process which Mr. Arnott undertook to perform, should circumstances occur to render the preceding feasible,* &c. &c.

The above letter was written by Dr. Macleod; and it is to be regretted that this proposal was not sooner put into practice, for if it had, there is little doubt that many individuals would have been saved who have since fallen victims to the disease. But, unfortunately, the benefit which has since been derived from the saline treatment was prevented for a time, partly by a circumstance already referred to; for the Editor of the *Medico-Chir.* Review not only denied my statements in the public journals, but he candidly confesses that previously to their publication he had sent a copy of the Trinidad documents to Dr. O'S., for the express purpose, as he says, of preventing this gentleman from leaving to my side.

The proposal for injecting a saline fluid into the veins was first put in practice by Dr. Latta, of Leith. We are not informed at what date it was first tried; but the letter communicating the first information on this subject to the Central Board of Health is dated Leith, May 15th, 1832. The result of Dr. Latta's experiments is well known. It has also been since tried by others. In these also there has been some recoveries*, and several deaths; but I sincerely trust that the failures in future will be less frequent. The Albumen which has been used is altogether unnecessary, for the blood in Cholera has more consistence than the blood in health. The sharp-pointed silver instrument which is generally attached to Read's apparatus is too sharp at the point to be introduced with safety into a vein; and my conviction is, also, that the saline fluid which has been used is too large in quantity and not sufficiently strong; and this, in all probability, has been one chief cause of the many failures. We know it to be a fact, that when animals are killed in a state of exhaustion, or immediately after they have been taking very hard exercise, a very large portion of salt is then required, on purpose to preserve them from the putrefactive process, and when the blood, as in Cholera, is not merely deficient in saline matter, but is also in a diseased condition from other cause. It is then essentially necessary not only to supply the blood with the natural saline ingredients which it

has lost, but to throw into the current a larger proportion than usual, for the purpose of enabling it to resist the destructive effects of the morbid poison.

The injection, however, of saline fluids directly into the blood is as yet only in its infancy. I have no doubt that it will be the means of saving many lives; but it will seldom be required where the patients are seen early in the disease, and properly treated; consequently, where one individual will be preserved from Cholera by this operation, a thousand will be saved by the internal use of the energetic nonpurgative salts. There is one point of view, however, in which I consider Dr. Latta's experiments as possessing an intense value—and that is, inasmuch as they afford the most unequivocal evidence in favor of the opinions with respect to the effects of salts on the blood, which were first publicly communicated to the profession in the paper which was read at the college of Physicians.

When the Cholera is left to itself, or even where it is treated in the beginning with improper remedies it is almost incredible, to those who have not seen it, how rapidly it runs its course to a fatal termination; but it is equally incredible, when the disease is properly treated, how very soon it may often be arrested in its rapid progress. I have seen, in some of the very worst cases, where, when a few doses of the saline mixture could be retained in the system for a sufficient time to enter the circulation, the fatal symptoms were almost immediately arrested; and even when the collapse has commenced, after a short period, the pulse can be felt beginning to creep, animal heat begins to be evolved, and though the patients continue weak for a time, yet they gradually recover from the state of collapse.

In two of the most malignant cases which I have seen, there was no premonitory diarrhoea; and in one of them the bowels had not been open for three days previous to the attack; consequently, Cholera is not merely an excessive diarrhoea, for neither the bowel complaint, the rice-water ejections, vomiting, nor cramps, are essential to this disease; and where these symptoms do exist, they are merely the effects of the poison—for they are merely accidental; but a sudden coldness of the blood, and of course of the whole body, without any obvious cause, is, perhaps, the best characteristic symptom of this pestilential disease.

In the first stage of Cholera, the ejections are, in general, passed with great force; but as the disease advances, the intestines become cold, and frequently so torpid, that even hot saline enemata can be retained with great ease; consequently in such cases, there is no necessity for plugging the rectum, as recommended by Dr. Clanny.

The rice-water ejections, which are generally passed so copiously in the first stage of Cholera, are, like every other secretion in the body, derived entirely from the circulating current; and as the coloring matter of the blood is, perhaps, the only ingredient which is not drained off in this way, it naturally follows that a given quantity of black Cholera blood must be more dense, and contain more coloring matter, and less serum, than is met with in the

† The following is one of the many facts which may be brought forward to prove that the stronger salts are essentially necessary in the treatment of Cholera. I saw one most interesting case of a fine little girl, about nine years of age, where the physicians who attended her had trusted the cure merely to the carbonate of soda combined with laudanum. Under this treatment, the stage of collapse came on so suddenly, and to such a degree, that it was judged necessary to inject a saline fluid into the veins. This was done, and the child recovered.

* See Wilson on the Blood.

red blood of a healthy person. † It is also a fact, that the arterial blood contains less air : there is also less carbonic acid in the venous circulation, as was ascertained many years ago, by Doctor John Davy.

We have seen that, in the early stage of Cholera the contents of the stomach and intestines are ejected from the system with great force. This sudden and forcible contraction is probably caused by the poisoned or acrid quality of the secreted fluids, which are in this way removed from the body. The urine which is secreted at this period is also expelled with considerable force, even though it is not secreted in such quantity as to stimulate the bladder by distension ; and this firm contraction of the bladder, even on the last drops of the acrid fluid which is expelled, is probably the chief cause why this organ is so firm and contracted after death.

We have seen that animal heat is generated and evolved in the extreme texture all over the body, consequently, every thing that increases the action of the extreme vessels, adds to the quantity of animal heat. It is for this reason that I consider frictions

with hot dry flannel, but particularly the application of large sinapisms to various parts of the body, of great value, not only in Cholera, but also in the malignant cases of the African typhus, and all other diseases where it is an object to increase the quantity of animal heat as much and as suddenly as possible.

During the convalescence the patients had generally a craving for salt food. This was remarkably the case with one boy, who had been in a state of complete collapse for nearly twenty four hours. When the reaction commenced, the first one that he made of his species was to beg for some salt mackarel. As this could not be obtained at the moment, he was allowed a part of a salt herring, which he ate with avidity, and wanted more.

I have written some further observations on Cholera, which go far toward confirming the opinions on fever which I have already advanced in this work ; but, as the present volume has already attained a size much larger than was originally intended, the observations which I intend to make on this subject will probably be published in a separate form.

† The following are the proportions betwixt healthy blood and that in Cholera, as given by Dr. Thomson in the former.

Serum.....	55
Crassamentum.....	45
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Cholera Blood.	
Serum..	32.34
Crassamentum.....	67.66
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