Lizars (John)

SUBSTANCE OF THE INVESTIGATIONS

REGARDING

CHOLERA ASPHYXIA

IN 1832:

WITH CASES AND DISSECTIONS,

COMMUNICATED BY PROFESSOR DELPECH, AND DR. COSTE OF MONTPELIER,
AND DR. LOWENHAYN OF MOSCOW,
DURING THEIR RESIDENCE IN THIS COUNTRY.

TO WHICH ARE ADDED OBSERVATIONS ON

THE DISEASE IN EDINBURGH

AND THE NEIGHBOURING DISTRICTS,

WITH NUMEROUS CASES AND DISSECTIONS.

By JOHN LIZARS,

Late one of the Medical Officers to the Cholera Hospital, Drummond Street, Senior Operating Surgeon to the Royal Infirmary, and Professor of Surgery to the Royal College of Surgeons, Edinburgh.

SECOND EDITION.

When desolation and death begin to thicken around, reason becomes silent, and the phantom of CONTAGION, like ghosts in darkness, takes undisputed possession of the unconfirmed mind. M'LEAN *on Pestilential Diseases.*

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EDINBURGH:

W. H. LIZARS; SAMUEL HIGHLEY, LONDON;

AND ALL BOOKSELLERS.

Printed by W. H. Lizars, Edinburgh.

DEDICATION TO THE FIRST EDITION.

TO

PROFESSOR DELPECH,

OF MONTPELIER,

IN ADMIRATION OF THOSE TRANSCENDENT TALENTS

WHICH COMBINE THE ENLIGHTENED VIEWS

OF THE

PHILOSOPHER AND THE PHYSICIAN

WITH THE PRE-EMINENT SKILL

AND MANUAL DEXTERITY OF THE ACCOMPLISHED SURGEON,

THESE OBSERVATIONS

ARE INSCRIBED

BY

HIS SINCERE FRIEND,

JOHN LIZARS.

PREFACE TO THE FIRST EDITION.

So much has been written on this direful scourge of humanity, which has called forth the energies of the whole Medical Profession, that the Author would have paused before presenting his researches to the Public, had not his pathological investigations been confirmed by the indefatigable labours of the late eminent Delpech, of Montpelier, and his able coadjutors.

He hopes that their conjoint results will prove to the Medical Profession, and the Public at large, that Cholera is not a mysterious but an explicable disease, and that it is as free of contagion as a cut finger or an amputated limb.

Since these sheets have been sent to press, an apparently very liberal code of Regulations have been issued by the General Board of Health of London. The Author is gratified to find, that Cholera is acknowledged to be no longer a contagious disease; but he deeply regrets to read, that it is still classed with Typhus, and "that certain conditions may favour its spread from person to person."

Edinburgh, 9th October, 1848.

CONTENTS.

	Page
Professor Delpech's Communication on Cholera	1
Preliminary Views of Cholera	2
Cases of Cholera, with Dissections	3
Theory of Cholera	11
Professor Lizars' Cases of Cholera, with Dissections	19
Blood in Cholera	49
Theory of Cholera	50
Views of Contagion	57
Treatment of Cholera	68

RESULT OF INVESTIGATIONS

BY

PROFESSOR DELPECH, DR. COSTE, AND DR. LOWENHAYN,

COMMUNICATED TO

PROFESSOR LIZARS.

Edinburgh, February 22, 1832.

SIR,

I HASTEN to reply, in my own name, and in that of my colleagues, Dr. Lowenhayn of Moscow, and Dr. Coste of Montpelier, to the anxious request which you have made to us, to be informed of the result of our examination of the various bodies of patients who have died of cholera, which we have had an opportunity of dissecting. We reckon upon a similar communication on your part agreeably to your kind promise. The repeated marks of attention which we have received during our stay in Scotland give us assurance of continued good will, and by an interchange of the results of our labours, we may perhaps contribute to throw some light upon a practical question, the solution of which is of the greatest importance to all Europe. For my

own part, I am satisfied that our efforts have not been without success, since the results of our anatomical inquiries have fixed the attention of one so justly celebrated, and have already been verified by him. Your approbation of our pathological views, with reference to the subject in question, inspires us with a hope that they must be correct.

The opinion of the celebrated Loder of Moscow, that the central parts of the ganglionary nerve may be the seat of the essential morbid affections of cholera, had forced itself upon me before I was aware of its having been entertained by another. The nature and progress of the symptoms gradually led me to this conclusion as the most probable. I acquired great confidence in my opinion, when I learned that it had been entertained by a person of so sound judgment; although I resolved to be guided solely by observation, without favouring one opinion more than another, when I left the Continent, for the purpose of studying the disease in the British Isles. But in my anatomical researches, I could not neglect the attentive examination of an organic apparatus, to which my attention was so clearly directed by the general nature of the symptoms.

Having visited several patients at Musselburgh, we took advantage of the permission which we had received of inspecting the bodies of such as should fall victims to the disease. The first opportunity occurred on the 12th of February. Dr. Coste not having regularly visited the patient, has not been able to add the history of the disease to that of the

dissection, which was made by him in presence of Drs. Dunbar, MacColl, Ronaine, and Moir.*

The pleuræ without effusion.

The lungs in the natural state.

The pericardium distended by gaseous fluid, but without serous effusion.

The right cavities of the heart filled with black blood, partly liquid and partly coagulated. The left ventricle half filled by a single clot; the left auricle empty.

The venæ cavæ, and their principal branches, were only partially filled with black and grumous

* The history is here subjoined from the notes of my intelligent friend, Dr. Dunbar, house physician to the cholera hospital of Fisherrow.

A woman of the name of Donally, aged thirty-two, had been for three weeks labouring under diarrhœa, with occasional sensation of numbness and twitching pains in the legs. Early on the morning of the 10th February, she was seized with all the symptoms of malignant cholera. When admitted, at twelve next forenoon, her face was blue and collapsed, and the surface of the body covered with a cold clammy sweat. No pulse at wrist, and pulsation in carotids feeble. A draught of warm water, with three spoonfuls of mustard, with difficulty produced pretty copious vomiting. An injection of warm water, with brandy, was thrown up the rectum, and in the course of an hour, two more were administered without the brandy. During this time, we were endeavouring to restore the heat of the surface by the constant and repeated application of very hot linen cloths, and by the exhibition of stimuli by the mouth. In the course of three hours the woman had recovered, in some degree, from collapse. She put some questions to the nurse, addressed a prayer to God, and expressed herself relieved. The heat of body was in some degree restored, but still no pulse was perceptible. The above practice was repeated; but, towards the evening, she sank rapidly, and died about midnight of the 11th.

blood. No blood, fluid or coagulated, in the pulmonary veins.

All the arteries nearly empty, with the exception of the aorta, which contained a single clot.

The liver, spleen, and kidneys, in their natural state, only the veins of these organs were filled with black blood; the gall bladder contained a little bile.

The urinary bladder contracted and empty.

The stomach distended by a great quantity of fluid similar to that which the patient had vomited. This fluid was serous, with dense white flakes. The same fluid existed in large quantity in the large intestines. The small intestines contained but little of it, and were in a state of suffusion. The peritoneum without serous exhalation, but white, and not injected.

The mucous membrane of the alimentary canal without perceptible alteration.

The neurilema of the solar plexus of the ganglionary nerve infiltrated. The infiltration thick and shining; remarkable for these two properties. The matter with which the neurilema was infiltrated was dense, and did not flow under the application of suction. This infiltration was more abundant in the centre of the plexus than at its circumference.

This dissection having been the first, and, moreover, having been made in an inconvenient place, the inquiries were not carried so far as could have been desired.

The second case was that of a woman, named Janet M'Adam, aged seventy years, who had not been in extreme indigence, but who lived in an unhealthy quarter of Glasgow, named the Goose-Dubs. She was taken to the cholera hospital on the 13th February, at noon. Her state was deplorable. The disease had attained its greatest height; the evacuations and the cramps, with which she had been violently affected, had ceased. The body was cold, notwithstanding the heating produced by laying her on a tin case heated by steam. The chest was the only part that retained warmth. The pulse had sunk, so as to be scarcely perceptible in the right arm. The collapse was complete, and the treatment which she received entirely failed to improve her condition. She died at two in the afternoon. She had continually complained of pains in the epigastrium, even when no pressure was applied to that region.

The body was examined at nine in the evening.

The pericardium, pleuræ, and peritoneum, were without exudation, and in the natural state.

The heart empty and collapsed. It contained no gas. The right and left auricle half filled with coagulated black blood.

The lungs filled with black blood at their posterior edges only; the other parts natural.

The liver pale, shrunk, as if wrinkled, and not at all injected. The gall bladder half filled with green bile. There was no bile in the dejections.

The intestines white, transparent, and containing little gas.

In the stomach, transparent and adhesive mucosities. The mucous membrane slightly injected.

The same substances in the intestines.

The mesenteric vessels, even the venæ cavæ, venæ portarum, and mesenteric veins; the arteries, even the aorta, containing little blood.

The two semilunar ganglia large, injected, red, and infiltrated; shining and moist on their cut surfaces, although nothing flowed from them.

The nerves of the solar plexus tumid; their neurilema red and somewhat infiltrated.

The pulmonary and cardiac plexuses tumid and injected.

The third case was that of a man named James Philips, a labourer, aged twenty-three. He had been carried to the cholera hospital at Glasgow on the 14th February, at eleven in the forenoon. The disease was then far advanced. The pulse was firm and full; the tongue red and dry on the edges, which are unusual symptoms. At seven in the evening he fell into a complete state of collapse, and at five in the morning of the 15th he died. The body was examined at eleven.

The surface of the body cold.

Old adhesions between the two pleuræ.

Cadaveric sugillation at the posterior part of the two lungs; in all other respects these organs were healthy and crepitant.

The pericardium natural, without effusion.

The right auricle of the heart full of black blood imperfectly coagulated.

Under the auriculo-ventricular valves, a dense mass of fibrin, of old formation, but free. The right ventricle collapsed, half empty. It contained only black and fluid blood. A hard and white mass of fibrin extended from the ventricle into the pulmonary artery. The left auricle and ventricle almost empty, and containing no coagulum.

The liver adhering to the diaphragm and viscera. The gall bladder contained a considerable quantity of healthy bile.

The mucous membrane of the stomach injected and ecchymosed, covered with mucous matter, mixed in some parts with bile. It was not much softened.

The intestines did not contain air, and were not much injected at the outer surface.

In the upper part of the small intestine, a large quantity of white matter, tinged with green at intervals, creamy, and of more consistence than the choleric secretions. Near the cæcum this matter was paler, and similar to that passed by stool. In the whole mucous membrane of the small intestines, decided injections and ecchymoses of large extent; and near the cæcum, broad, granulated, hard patches, of a deep red colour, in consequence of injection of the vessels, as well as of deeper ecchymoses.

The large intestines, in the healthy state, filled with choleric fluids.

The pneumogastric nerves enlarged, but of a natural colour.

The solar plexus composed of thicker nervous bands and of a red colour. Their neurilema injected. The sections which were made showed the injected matter to be dense.

The two semilunar ganglia, especially the left, enlarged, injected, and softened.

The mesenteric glands white and natural.

The cervical part of the ganglionary nerve flattened in the form of a broad band.

The urinary bladder empty, contracted, and hard.

The meningeal vessels gorged with black blood. At each cut made in the substance of the brain, there issued a multitude of small bloody drops. The lateral ventricles contained an effusion of limpid serum.

In the vertebral canal, an effusion of four or five ounces of reddish serum.

The cortical substance of the brain denser than usual.

The fourth case was that of a child of seven years, named Mary Hardie. She was carried to the cholera hospital at Glasgow on the 15th February, at eight in the evening. Fifteen hours had elapsed since the commencement of the disease, and the child was then very severely affected. She died at two in the morning. The body was examined on the 16th, at half after twelve.

The shrinking of the body was extreme.

Injections of the vessels of the dura mater and brain. The sections of the brain presented numberless bloody dots. Effusion of limpid serum in the ventricles.

The lungs, charged with red blood, excepting their anterior edges, which were natural.

The right auricle and ventricle filled with fluid blood of a dark colour. In the same ventricle, a soft, vesicular concretion of fibrin.

The left auricle and ventricle almost empty of blood. A concretion of the same nature extended from the ventricle to the aorta.

The stomach and small intestines contained a creamy matter, of a grayish-white colour, mixed with green at intervals, fluid, pultaceous, more liquid in the ileum, and not adherent.

In the large intestines a more liquid substance.

The membranes of the intestines healthy; the mucous coat without injection or softening, excepting in a single point near the ileum, where there were thickening and redness, without ulceration.

In the ileum, an intussusception an inch in extent, easily drawn out.

The liver healthy; the gall bladder half filled with green bile.

The urinary bladder empty and contracted.

The semilunar ganglia thicker than usual, but white and not injected.

The solar plexus and the renal plexus somewhat injected.

The lymphatic glands large, but healthy.

The fifth case was that of a man of the name of MacDermot, aged sixty-five years, who resided in the Goose-Dubs at Glasgow. His son had died of cholera on the preceding night. He was admitted into the cholera hospital on the 16th February, at half after eight in the morning. His case was very severe, and was remarkable for the determination to the head, and especially the suffusion of the face and eyes, which at first presented nothing of the usual blue tint. The pulse was full and the body warm, although the previous symptoms, and what took place subsequently, left no doubt of the disease being cholera. This man died the same night at twelve.

The body was examined on the 17th, at half after twelve.

Great shrinking of the body, although it was very muscular; veins swollen over the whole surface.

General adhesion of the pleuræ on both sides; most of them old, some recent.

The posterior edges of the lungs filled with blood; anterior, white and crepitating.

The pneumogastric nerves visibly injected and thick.

The left ventricle full of black fluid blood.

The two auricles, and the right ventricle, contained a little blood of the same quality.

Very dense concretions of fibrin in the same cavities.

The right jugular vein enormous.

The vasa propria of the aorta injected.

The peritoneum of the stomach strongly injected, as well as that of the intestines.

The mucous membrane of the stomach injected, without ecchymoses. In the interior, a great mass of greenish serous fluid. In some points a green substance, precipitated, and attached to the mucous membrane.

Near the cæcum and ascending colon, numerous deep ecchymoses. In the interior, a greater quantity of fluids, similar to those in the stomach. Much air in the intestines generally.

The solar plexus and the semilunar ganglia were enlarged and red.

The renal plexus in the natural state.

The gall bladder full of bile of its natural appearance.

The liver in the ordinary state.

The urinary bladder contracted and hard, containing a few drops of urine.

The dura mater gorged with blood. A serous effusion in the arachnoid membrane.

The sections of the brain showed vascular congestion, and softening of substance.

A very large serous effusion in the two lateral ventricles.

I shall not here communicate more anatomical researches, because they refer to other points of the question which can only be considered as accessory, at least in comparison with those given. I would only direct your attention to the point which seems

to me the most important, and which is the one that more especially interests us at present—the morbid state of the semilunar ganglia, solar and renal plexus, of the lower part of the pneumogastric nerves, and sometimes even of the pneumo-cardiac plexus. These alterations, which had been anticipated by Loder, and which I and my companions have demonstrated by dissection, are rendered more important by the result of your investigations, undertaken at our request, and which have confirmed their existence. These researches are difficult, and are liable to be neglected amid the confusion always caused by a severe and extensive epidemic; so that the progress of science, with reference to this point, might be retarded, were not this fortunate discovery to receive the necessary attention from individuals of sufficient authority. Your extensive knowledge and ardent zeal give me entire confidence. If there be an important truth in what we have seen, it will benefit science, on those unhappily too frequent occasions which at this moment offer themselves to the medical men of a country so advanced in civilization, since you have become sensible of its value.

The entire theory of the disease may be conceived by viewing the morbid alteration of which we here speak, in connection with the symptoms of cholera.

An intense fixed pain, limited to a very narrow space, which corresponds exactly to the point of the linea alba, directly over the extremity of the ninth and sixteenth ribs, always precedes the manifestation of the other symptoms. You are aware, that

this point corresponds exactly to the situation of the central point of the ganglionary nerve.

The diminution of the circulation is the first phenomenon that succeeds. There are, as yet, no evacuations; the blood is still entire; yet the arteries pulsate feebly, their diameter diminishes, and these weakenings of the circulating power at first manifest themselves by alternations, corresponding to the transitory intensity of the epigastric pains, while, in the intervals, the pulse resumes strength and consistence. This phenomenon too closely resembles what takes place in strangulated hernia, or in peritonitis of any other kind, not to suggest the idea of a similar origin. In both cases, it is the ganglionary nerve that suffers, and the same influences may result.

An unusual and enormous secretion takes place along the whole alimentary passages. To supply it, the organs must have received a great impulse from the nerves on which they depend. Here still we are led to the ganglionary nerves as the certain source of the impression. Now, if this nerve be in a morbid state, is it strange that its functions should be vitiated?

A convulsive state manifests itself in the stomach and intestines. Now, you have just seen, and any one may verify the fact, that the lower part of the pneumo-gastric nerve is concerned in the affection, which is at first peculiar to the semilunar ganglia and their plexus.

The blood ceases to be *arterialized;* and this

keeping up of the dark colour precedes the cooling of the expired column of air—a phenomenon of a more advanced stage. But physiologists have long placed the liver at the head of the organs by which the blood is purified; as the solar plexus, common to the two ganglia, and which participates in their morbid affection, supplies the liver with the nerves by which it is animated, it cannot appear strange that the functions of this organ should languish or cease. Whether the abstraction of the principles of the bile contained in the blood, by the action of the liver, is the principal influence of that viscus with reference to the purification of the blood, or whether it contribute to this purpose in any other manner, it is not the less remarkable, that the venous blood passes through the region of the liver, without there undergoing any change; that the secretion of the bile ceases; and that, most commonly, the liver is found destitute of the full injection which constitutes its natural state.

The secretion of the urine ceases; and we have just seen, that the disease of the ganglia distinctly extends, in most cases, to the renal plexus. In those cases in which this circumstance is not so evident, there is nothing contrary to reason in the supposition of a morbid irradiation capable of producing the same effects.

The general temperature of the body is diminished first in the limbs and all the appendages; but it remains in the trunk and viscera, as shown by the thermometer, and, as might be presumed from the

testimony of the patients, their intense thirst for cold drinks, and the relief which they experience from the internal application of ice—as I have witnessed with my own eyes. Now, it is well known, that the nerves of the ganglionary apparatus accompany many of the arterial vessels of the limbs; that the temperature of the extremities is in the ratio of the intensity of the arterial circulation; that in cholera the circulation diminishes and ceases first in the limbs, and particularly in the extremities. This phenomenon, which naturally supposes a diminution in the influence of the ganglionary nerves which accompany the arteries, is easily explained by the morbid state of the central point of that apparatus.

There can be no exaggeration in seeking in the same conditions, the immediate cause of the cramps. They in fact keep pace with the progress of the disease, and of the abdominal symptoms.

One of the last results of this affection is the refrigeration of the expired column of air. Chemical analysis has shown, that from this moment there is no longer carbonic acid gas in the expired air. Now, if we do not admit the concurrence of the nerves of the pneumo-cardiac plexus for the combinations of which respiration is the medium, it cannot be conceived, why insufflation should not revive respiration in the dead body. Innervation has therefore ceased in the branches. Whence also the cessation of all chemical action in respiration, and the reduction of the expired air to the external temperature, as its proper constitution.

It appears quite reasonable to conclude, that since the communications of the pneumogastric nerve with the ganglionary apparatus, are the probable cause of the extension of the disease of the latter to the contiguous portion of the former, this extension may, and actually does, reach the pneumo-cardiac plexus. The pulsations of the heart itself are seen to fail at the period when the refrigeration of the column of expired air takes place.

This concatenation of physiological inductions would be of little interest were it not connected with a material and certain morbid condition. It is even of the greatest importance for the utility of what we have observed, that the first affection should be positively defined in its nature as well as in its seat. It is, in fact, an inflammation; and this kind of alteration, in itself essentially important, tending to a rapid increase, affecting one of the principal apparatus of the system, is more dangerous than in many other cases, both on account of the delicate and easily destructible texture of the organs concerned, and the necessity of their full and uninterrupted influence on the formation of the blood, nutrition, respiration, and circulation.

These considerations may, perhaps, lead practitioners to reflect on the advantage that might be derived, in cholera, from bleeding, when used at the commencement, or rendered possible and employed at a later period, by the preliminary use of exciting methods of various kinds.

They will, perhaps, enable them to perceive why

either of these methods, used by itself, and without modification, has little or no success. Perhaps the same considerations may tend to show why, in different places, and sometimes in places very near each other, during the continuance of the same epidemic, practitioners of equal respectability have been constrained by the result, some to bleed at the commencement, others to abstain from bleeding until the period of reaction.

I might infer from the same anatomical facts, and from some unusual circumstances, which cannot have escaped your notice, the necessity of varying the treatment according to certain complications, which these facts attest. Such an inference is so easily made by a mind so experienced and so enlightened as yours, that I shall refrain from adding by it to the already too great length of this letter. I shall, in conclusion, merely mention the importance which such observations must henceforth attach to anatomical researches, in the study of Cholera. But you are sensible that these researches can no longer be confined to the state of the membranes of the digestive apparatus, and the nature of the fluids which it contains. The inquisitive spirit of your countrymen, had already directed them to investigate the state of the altered blood and the chemical nature of the dejections. They had succeeded in discovering what is wanting in the one and what occurs in the other. It is now the duty of anatomists and physicians to follow up these views, and search out the organic principle of this chemical

dissociation. But, in the present state of the question, it is easy to perceive that the mere superficial examination of dead bodies can be of no value.

To you, Sir, belongs the glory of having shown to your numerous pupils, what enlightened use they may make of their courage, in a public calamity, in which so much is expected from the zeal of the members of our profession.

I expect with impatience, and shall receive with gratitude, the luminous communications which you have had the goodness to promise me; and

I remain,

Sir,

Your most obedient Servant,

DELPECH.

CASES BY PROFESSOR LIZARS.

CASE I.*

Feb. 16, 1832.—8 P. M. P. L——, aged forty, was seized this afternoon with vomiting and purging of fluid resembling rice water. At the commencement of the attack, he voided a little urine, but none since. His lips are blue; eyes sunk; countenance cadaverous; pulse very weak; hands blue, cold and shrivelled; arms cold. He is severely cramped in the legs, thighs, arms, and body; has been suffering from diarrhœa for two days; has had at intervals four pills, each containing two grains of calomel, two grains of camphor, and a quarter of a grain of opium, with a teaspoonful, every hour, of a mixture, consisting of tincture of capsicum, ammoniated alcohol, and ether.

Injiciat. stat. enema aq. font. lb. 5. in quo sint tabaci gr. xv. tinct. opii, 2 dr., aq. ammon. 4 dr. And every hour, two of the above pills, with a teaspoonful of the mixture, and occasionally brandy.

17*th.*—Ten pills taken. Has vomited none since he got the glyster, and since then the cramps have been also easier. Pulse imperceptible; tongue loaded, white, and dryish, and where uncovered, it is livid; breath cool; hands and lips blue; has voided a little urine.

One pill every two hours, with a teaspoonful of the mixture and brandy.

* I am indebted to my esteemed and talented friend, Mr. Steele, surgeon at Craighall, now at Montrose, for this case. I conducted the dissection myself, and devoted some hours to it.

Evening.—Lips are blue; face of a dark livid colour; hands blue and shrivelled: has been severely cramped in his hands and body; voice can scarcely be heard. Watery vomiting and purging continue. Voided a little urine at four P.M. Has taken four pills and some of the mixture. Rept. enema tabaci.

18*th.*—Moribund. Died at two P.M.

Post mortem Appearances, twenty-two hours after Death.

Brain and Spinal Chord.—When the integuments and muscles were divided and reflected, in order to examine the brain and spinal cord, dark pitchy blood exuded from arteries and veins. On removing the skull cap, the arteries of the dura mater were found turgid with the same kind of blood. On detaching the cervical vertebræ, the same dark blood and serum issued out in considerable quantity. The veins on the surface of the hemispheres of the brain were turgid with the same blood, and resembled those in apoplexy. Slight serous effusion between arachnoid and pia mater, especially anteriorly. The superior longitudinal, and all the other sinuses, were distended with the dark blood. When the brain was bisected, it presented numerous dark bloody points, indicative of great congestion, and was very firm in its structure. The natural quantity of serous fluid found in the ventricles; their vessels highly congested, especially the velum interpositum of Haller. Carotids and vertebrals gorged with the dark blood. The basis of the cranium, and anterior aspect of spinal canal, full of vessels congested with the dark blood—every trifling vein a large sinus. Considerable serous effusion within the theca vertebralis. Veins on cerebellum and spinal cord in the vicinity of former organ, very numerous, and turgid with the blood. The same vascularity observable between the dorsal and lumbar regions of the chord. On tearing away the theca vertebralis from the vertebræ, the rachidian veins were turgid with blood, and by compressing them, the blood oozed out like tar. Cerebellum peculiarly firm.

Abdomen.—The peritoneal surface of the intestines, especially the ileum, was studded with vascular patches; many points of this intestine highly vascular, and some approaching to a bluish green. A similar appearance, only more rosy, on caput cæcum and jejunum. Intestines throughout coated with viscid lymph, evidently albuminous. About a couple of ounces of turbid serum in pelvic cavity. Urinary bladder contracted and pyriform. Omentum rosy red colour in several places. Colon of its natural size throughout, and also the rectum; colon, near gall bladder, tinged with bile. There was the same offensive smell as in cases of peritonitis. Stomach of a rosy tint towards its pyloric orifice, with its blood-vessels arranged in patches. Mesenteric vessels moderately filled with the dark blood. Liver of natural colour; if any thing, inclining to yellow. Gall bladder very turgid with bile. Spleen natural.

Stomach—mucous tunic rugous studded with rosy maculæ, remarkably soft, breaking down under the fingers, with about four ounces of coffee-coloured fluid, as is seen in yellow fever. Duodenum filled with ropy, biliary fluid; the same continuous into jejunum, but becoming lighter and lighter along this viscus. Bile could be injected into duodenum by pressing on gall bladder. Bile, very dark coloured. Mucous tunic of jejunum studded with inflamed patches of blood-vessels, and about the middle of this intestine the contents had a more feculent appearance. Ileum contained a dirty greyish-brown, or earthy coloured mucous fluid, and its mucous tunic was vividly injected, together with patches of ecchymosis. Colon contained same fluid as ileum; in many points highly injected with blood-vessels, particularly caput cæcum, with broad maculæ of effused blood; and its mucous tunic was particularly soft. Rectum containing same fluid as ileum and colon; and its mucous tunic, equally soft and vascular, and studded with many ulcerated patches, the same as in dysentery. Kidneys slightly softened, and a little turgid with blood; the cellular tunic of the right kidney presented a vascular arborescence. When this tunic was removed, the surface had a marled appearance, the vessels arranged in patches. Towards the lower

apex, it was dark purple, approaching to gangrene. When bisected, blood issued out, and the whole gland was peculiarly soft. Liver—convex surface presented a similar marled appearance to kidney, and was peculiarly soft. Urinary bladder contracted, and contained two drachms of muco-purulent fluid; and its mucous tunic was highly vascular.

Thorax.—Pericardium thin and diaphanous, and resembled a dried bladder, and studded in some points with vascular patches. Heart—left ventricle empty, its walls slightly softened; left auricle filled with the dark blood, with a large fibrinous deposit extending into the pulmonary veins, and around mitral valves into the aorta. Right ventricle filled with the same blood, with a large fibrinous deposit extending into the pulmonary artery, and into the right auricle; the latter gorged with blood.

Aorta, from its sigmoid valves down to the iliacs and femorals distended with the dark blood. Vasa vasorum exceedingly numerous. Venæ cavæ gorged with blood. Cellular web of the æsophagus turgid with blood-vessels.

Lungs normal, pleura also healthy, with the exception of that portion of it on the diaphragm on the right side, the vessels of which were distributed in patches.

Nerves.—Nervus vagus, on left side in cervical region, but particularly in the thoracic, had its neurilema studded with vessels, and most remarkable where it gives off the pulmonary plexus. The æsophageal plexus, of a bright rosy red. The blood-vessels of the neurilema of the splanchnic nerves in thorax were very distinct. On tracing the left into the abdomen, the semilunar ganglion presented a bright rosy red, its neurilema being highly injected. The same vascular appearance was evidenced when bisected, and its vessels poured out blood when pressed upon. The neurilema of the recurrent nerve, also highly injected.

CASE II.

Feb. 17, 1832.—8 P.M. F. D——, about sixty-five years of age, was seized this afternoon, at four, with vomiting and purging; the evacuations reported to have been watery from the commencement of the attack. At present they resemble thin greyish gruel. She has little thirst, no spasms, and has voided no urine. The existence of any previous diarrhœa could not be ascertained. Is moribund.

Died at midnight, after eight hours' illness.

Post mortem Appearances, ten hours after Death.

Brain and Spinal Chord.—On reflecting back integuments and muscles from nape of neck, in order to examine the spine, dark grumous blood flowed profusely from the occipital veins. On tearing the skull-cap from the dura mater, the arteries of the latter were found filled with the dark blood. The dura mater being incised, the veins on the hemispheres moderately filled with the blood. Considerable serous effusion between the arachnoid and pia mater. On incising the hemispheres, structure of the brain natural, with no particular vascularity. The lateral ventricles distended with serum. The choroid plexus contained many small vesicles.

Spine being laid open, the theca vertebralis particularly white and leathery like, and containing a considerable quantity of serous effusion. Slight turgescence of blood-vessels in the cervical, and between the dorsal and lumbar regions. The arachnoid membrane studded in various places with white flakes of albuminous or ossific deposit, of old formation.

On taking out the brain, dark blood, somewhat thinnish, issued from the carotid and vertebral arteries. On removing the spinal cord from its seat, the anterior surface presented the same vascularity that was observed posteriorly.

On slicing the cerebrum and cerebellum, the latter felt a degree softer than the former.

Abdomen. — On first inspection, every thing appeared natural. Ileum and colon whiter than natural. Colon contracted from the commencement of its transverse arch downwards to the rectum; and the rectum itself also contracted; the urinary bladder also contracted, and resembling in shape an inverted uterus; the fundus looking sacrad, and the mouth pubic.

Liver, natural; gall bladder, two-thirds filled with bile; stomach, blanched, as if boiled; spleen, natural.

Stomach, when laid open, partially filled with thin, gruelly looking fluid. The mucous tunic presented the rugous pentagonal folds strongly developed, nearly as much so as the omazum in the cow, with slight efflorescent patches. This tunic adhered but slightly to the subjacent tissue; pancreas natural; mesenteric veins not distended: duodenum containing the same gruelly fluid that was observed in the stomach; the mucous tunic thickly coated with adhesive mucus; the tunic itself easily removed from the subjacent tissue. *Gall bladder.*—On being pressed, the bile contained in this viscus was readily ejected into the duodenum; the bile of its natural amber colour, and limpid. Jejunum contained the same fluid as in the duodenum, and its mucous coat presented the same characters. Ileum contained a large quantity of fluid, thinner than in the other intestines, and more like rice water; its mucous coat adhered much more firmly. *Colon.*—Caput cœcum, and ascending portion, distended with thin gruelly fluid. The transverse arch, sigmoid flexure, and rectum, which, *in situ*, appeared contracted, admitted of easy distension when removed from the body, from the gravitation of the gruelly contents. Vena cava contained a moderate quantity of dark blood; spleen bisected, presented nothing unusual; liver, on being cut into, presented no engorgement, and the biliary ducts could be distinctly traced from their containing bile; kidneys, when bisected, paler than natural; bladder contained about two drachms of fluid; the internal coat rugous.

Thorax.—On first inspection of this cavity, the lungs and

heart appeared natural; but on examining the cavities of the pleura, particularly the left, there was found some recently effused coagulable lymph. Left cavity of thorax contained about two pounds and a half of turbid serum. Right side contained about four ounces.

Heart.—Right auricle and ventricle collapsed, and containing a small quantity of the dark blood, with some fibrin in the former. Left ventricle contained no blood; left auricle a little of the blood, and with fibrinous deposit.

Lungs, when cut into, perfectly healthy; no congestion.

On slitting open the aorta, dark blood was found; and beyond the left subclavian, a large fibrinous deposit, extending along about nine inches of the vessel. The same dark blood found in all the abdominal arteries, in the common, external, and internal iliacs; likewise in the femoral and brachial arteries.

Nerves.—The splanchnic nerves on both sides were traced to their junction in forming the great solar plexus; the left semilunar ganglion of which had a reddish tint, which was found to pervade its structure, while that of the right side, together with the other ganglia, was pale, both externally and internally.*

CASE III.

M. P——, aged sixty, given to dissipation, was first seen about eleven o'clock A.M. of Friday, 9th March, 1832, affected with malignant cholera, of which she died about seven o'clock in the same evening.

Sectio Cadaveris, fifteen hours after Death.

When the body was undressed, it was very stout; the skin presented, in many points, even the most elevated, a marled

* I am indebted also to Mr. Steele for this case. I conducted the dissection myself, and devoted some hours to it.

appearance of blue and white, evidently not the effect of gravitation, and it felt warmer than an hour before death.*

Brain and Spinal Chord.—On incising the integuments and muscles, to examine the brain and spinal chord, the muscles were of a dark colour, and turgid, with vessels pouring out dark black blood. When the theca vertebralis came into view, the veins were found turgid with the same blood. No effusion in spine between the vertebral column and the theca vertebralis. On removing the skull-cap, the blood vessels of the dura mater were turgid with the dark blood. The dura mater being inadvertently punctured at the atlas, much serous effusion poured out. The blood-vessels of the dura mater were turgid with the dark blood. The superior longitudinal sinus contained little blood, but this became more and more profuse towards the lateral. When the dura mater was reflected off, there was a little serous effusion under the arachnoid membrane, particularly anteriorly. The blood-vessels of the pia mater were natural. The head being depressed, the blood rushed in great quantity out of the incised lateral sinuses and veins of the neck. The pia mater of the spinal chord was congested with the dark blood. In the lumbar region, there was a great quantity of serous effusion; and the blood-vessels going out of the spinal canal, along the individual nerves, were much enlarged. A few patches of lymph were observable on the surface of the arachnoid, on the cerebrum. The brain, when incised, presented pretty numerous red dots, showing a good deal of vascularity. The arachnoid membrane, covering the lateral ventricles, appeared thicker and tougher than usual; and there was rather more than the usual quantity of serous fluid in these cavities, the vessels of which were nearly natural. The choroid plexuses were blanched, but the vena Galeni turgid. The cerebellum was softer in consistence than the cerebrum.

* One patient was placed on her face, half an hour after death, and, as far as regards the congestion of blood-vessels, the same appearances, on the skin, brain, and spine, as in the others, were observable.

When the brain was removed, the sinuses at the base were not very conspicuous, much blood having escaped.

On separating the nerves forming the cauda equina, the neurilema of each small nerve was vividly injected; and, on tearing away the theca vertebralis, the rachidian veins were turgid with the dark blood.

Nerves. — On tracing the eighth pair of nerves down the neck, there was slight injection of neurilema observed. On tracing the sympathetic nerve in the neck, its neurilema was in the same condition. There was injection of the pleura, investing the pericardium and the phrenic nerve; when the pleura was removed from the nerve, the neurilema presented the same injected appearance; and the neurilema continued injected all the way to the diaphragm. The sympathetic nerve, on the left side of the neck, with its inferior ganglion, was tumid, and its vessels vividly injected. The cardiac plexus presented similar appearances. The posterior mediastinum was injected. On tracing the nervus vagus into the posterior mediastinum, it was found also much injected, and was equally distinctly injected in the formation of the pulmonary plexus. The œsophageal plexus was injected, as were also the vessels of the æsophagus itself. On tracing the sympathetic along the heads of the ribs, its neurilema was vividly injected, especially at the respective ganglia; but most however, at the seventh, where it began to give off its contributions to form the splanchnic nerve. This ganglion, when bisected and squeezed, gave out small drops of blood. The ninth ganglion appeared very dark; and, when removed and bisected, it was found to contain ecchymosed blood. When the splanchnic nerve was traced into the abdomen, its neurilema was found still more injected, and its semilunar ganglion of a ruddy colour, and the filaments originating from it were also injected.

When the pleura was reflected off, the nervus vagus was spread out like a broad band, in consequence of its vessels being so numerous as to run down between its respective filaments, but particularly where it began to give off the pulmo-

nic plexus, the filaments of which were very much injected. The œsophageal plexus, on its approach to the diaphragm, was still more injected. The splanchnic nerve was in the same condition as that of the opposite side — its sixth, ninth, and tenth ganglia being most conspicuous, and it continued vividly injected towards the abdomen; the neurilema of the ganglion being less injected than that of the left side. The whole solar plexus was more or less injected.

Thorax.—On the right side, the mediastinum was fully injected, particularly at the roots of the lungs. The lungs were healthy, there being less congestion at the posterior aspect than ordinarily. The heart was flabby and collapsed — its right side being partially filled with the dark blood, its left side having also the dark blood, with coagula in the pulmonary veins, and a small quantity in the left ventricle. The pulmonary artery, traced into the lungs, was partly filled with the dark blood.

Abdomen.—The vessels of the small intestines presented a delicate red tint—white, where the intestines were applied to each other; and the intestines, when freely handled, felt soapy, as if covered with albumen; and the hands, on drying, felt as if covered with glue.

The small intestines, throughout, presented a delicate rosy red; the large intestines the same appearance — and all of them were of their natural calibre. There was the same soapy feeling of pleura as of peritoneum.

Liver, when bisected, exhibited the yellow deposit of Bright.

The stomach was rather of a white colour externally, and partially distended with gas, and contained a light brown or earthy coloured fluid. The mucous tunic softened, and tinged here and there of a brown colour. The pancreas was healthy, and, when bisected, was turgid with the dark blood. The duodenum, when opened, presented a pallid appearance, containing a gruelly fluid. On pressing the gall bladder, which was moderately distended with bile, it flowed into the duodenum. The jejunum the same as the duodenum. The fluid in the ileum resembled panada, slightly tinted with port wine.

The colon was filled with red watery fluid. The glands of Brunner largely developed. The kidneys, externally, slightly vascular, and slightly congested internally: the left kidney more congested than the right. The spleen healthy, only a little larger. The urinary bladder contracted, and of a pyriform shape, aud contained a little muco-puriform fluid, but no urine. The blood was fluid in the femoral and brachial arteries; and blood was found in the vena cava and mesenteric vessels.*

CASE IV.

February 24, 1832.—9 A.M. Mrs. M——, about forty years of age, had been complaining of diarrhœa for thirty-six hours. Was attacked this morning with griping pains in the belly, and spasms in the feet and legs. Copious dejections of light brown watery coloured fluid, mixed with flocculent matter. Voided her urine about an hour ago. Great sickness, with inclination to vomit. Thirst urgent. Skin warm. Pulse 84, little affected. Took calomel, gr. x., colocynth, gr. v., gum opii, gr. ij.; had mustard poultice to abdomen, turpentine frictions to the legs, and assiduous application of external heat.

1 P.M. — Countenance livid. Eyes glazed and turned up. Pulse 100, and scarcely perceptible. The hands blue and cold. Thirst urgent; and every thing vomited. No evacuation *per anum*. Much cramped in feet, legs, and thighs. Severe spasms are also felt about the jaws, throat, and neck. The tongue livid and loaded. No urine. A vein of arm opened, and only eight ounces of dark blood obtained. Two injections of hot water—the first at five, and the second at ten o'clock. First injection retained for half an hour. Calo-

* For this case I am indebted to my intelligent friend, the late Dr. Thomas Sanders. I conducted the dissection myself, in presence of him, Dr. Dunbar, and Mr. Lawrie, and devoted several hours to it.

mel, gr. xx. by the mouth; opium gr. iii. *per anum*. Sinapisms applied to the nape of the neck and the region of the stomach.

Feb. 25.—10 A.M.—Skin cold. Hands blue and shrivelled. Countenance blue. Eyes turned up. The breath cool. Tongue livid. The belly pained on pressure, which excited violently the tetanic symptoms of the muscles about the jaws, throat, and neck. Feels a deep seated pain in the lumbar region. A small dejection, about six ounces of bloody yellow, or cream-coloured fluid, resembling pus, tinged with blood, with an offensive putrid odour. She vomits every thing she takes. Thirst urgent. Pulse imperceptible. Spasms in legs and feet. Sinapisms to belly and lumbar region of spine.

6 P.M.—Skin of body and legs of natural warmth. Pulse distinct at the wrists, and 100 in number.

10 P.M.—Pulse still more distinct, and 100. Heat of the body natural throughout. The lips natural. The lividity of the face had disappeared. Other symptoms the same. Calomel, gr. x., opii, grss. in powder.

Sunday, Feb. 26.—10 A.M.—No pulse, even in carotids. The skin of natural colour, particularly that of the countenance; but warm and clammy, and presenting a marled appearance of arms and hands—indications of cessation of capillary circulation. The tongue almost natural. The eyes turned up. Dejections as yesterday. Continues to vomit every thing she takes.

She became gradually worse, and died about six o'clock of the evening of the following day.

Dissection, fifteen hours after Death.

Thoracæ. — Pleura healthy. Lungs natural, but dry, where it covered the pericardium. The pericardium dry, and resembling paper, and injected with blood-vessels, and extremely red. No serum within. The heart flat, and the coronary vessels injected. The right side filled with blood, partly liquid and partly fibrinous. The left ventricle contained a

small quantity of dark fluid blood and small coagulum. Left auricle empty. The venæ cavæ gorged with dark blood, even to the internal jugulars. The cellular tissue of aorta injected. Aorta contained a little dark blood.

Abdomen.—Vena portæ almost empty. Liver pale and flabby, especially its right half; when bisected, almost void of blood. Gall bladder full of bile. Peritoneum dry, injected, and ruddy, and covered in several points with light coagulable lymph. Small intestines inflamed, and very red in colour. The mucous tunic, having various ecchymosed spots, was softened in several points. The stomach and large intestines pale and uninjected, and as if boiled but not softened: they contained a fluid of a greyish or earthy colour. The stomach contracted. Spleen compressed and void of blood. Urinary bladder contracted, and contained a drop or two of urine. The kidneys and pancreas natural.

Nerves.—The pneumogastric nerves and their distribution red and injected with blood-vessels, particularly where the right unites with the solar plexus, the ganglia and filaments of which were inflamed and softened. The cardiac and pulmonary plexuses red, and highly injected, but firm.

This woman had laboured long under organic disease of the uterus, and was affected with leucorrhœa. The catamenia were lately always menorrhagic.*

CASE V.

J. H——, thirty-six years of age, had been complaining of diarrhœa for five days past (being attacked on Sunday last), and was seized at six o'clock this morning, Thursday, March 1, 1832, with vomiting and purging, which soon became very severe, and terminated fatally about eight o'clock on the evening of the same day. He had made no urine since the

* For this case I am indebted to Mr. Steele at Craighall, now of Montrose.

preceding night about eleven o'clock. He was first seen at four P.M., when he complained of most acute pain in the epigastric region, aggravated on pressure, and accompanied with slight headach and drowsiness. The skin of the trunk warm, but that of the hands cold and livid; his countenance was sharp and anxious; his eyes suffused; the tongue moist, but furred in the centre, and of its natural colour at the tip and edges. Pulse weak at wrists, and only 72, but pulsation stronger in the region of heart and carotids. He was ordered a mustard poultice to the region of stomach, and half drachm doses of aromatic spirit of ammonia every three hours.

Appearances on Dissection, eleven hours after Death.

Brain and Spinal Chord.—When integuments of head and spine were reflected, the dark blood flowed profusely.

On sawing cranium, the sinuses were accidentally wounded, and much blood flowed.

Slight serous effusion between arachnoid and pia mater, the latter membrane highly injected, and the veins on the convolutions tinged with the dark blood. Considerable serous effusion in basis of brain and in spinal canal. The brain, when incised, exhibited marked vascularity, and there was a little more than the usual quantity of serous fluid in ventricles.

Muscles of spine rigid and dark coloured, and full of dark blood. Blood-vessels of spinal chord and canal highly congested. Arachnoid membrane studded with several white flakes of albuminous or ossific deposit of old formation. The blood-vessels of spinal chord more congested anteriorly than posteriorly. In the lumbar region of the spinal canal, a profuse quantity of serous fluid, both within and without the arachnoid membrane. The sinuses of brain and rachidian veins of spine gorged with blood, and also the blood-vessels of spinal chord accompanying the spinal nerves.

Thorax and Nerves.—The pleura highly injected; lungs and pericardium natural; right side of heart contained less of the dark blood than the left; the pulmonary veins distended;

a small coagulum in right ventricle; left phrenic nerve healthy; the cellular tissue in vicinity of left pneumogastric nerve highly injected, and also its neurilema, especially the pulmonic plexus; the substance of the nerve firm; the splanchnic healthy, from its origins to the semilunar ganglion, and to left half of solar plexus. While the origins of the right splanchnic (although the pleura was less injected on this side than the opposite) were highly vascular, yet the nerves and neurilema continued pale and natural, until it formed the semilunar ganglion, which was slightly injected, both in its tissue and neurilema; and the nervous threads proceeding therefrom to form the solar plexus, but particularly those extending to the supra renal capsule, were very vascular, evidently inflamed from the appearance of patches. The pneumogastric nerve healthy.

Abdomen.—The peritoneum, in many parts, especially where it envelopes the small intestines, was of a livid colour, but in other parts, injected with blood-vessels in patches, and of a bright red; liver of a yellow colour; gall bladder distended with bile; omentum highly injected, and of a red colour; stomach white; colon white; bladder contracted; kidneys lobulated, and of a livid blue colour; stomach, when opened, presented its mucous tunic rugous, with many vascular patches and ecchymosed points, and softened in its tissue. It contained some solid ingesta; duodenum very vascular, its mucous tunic of a deep red purple, with extensive ecchymosed patches. The duodenum contained viscid yellowish or cream-coloured fluid.

When the gall bladder, full of bile, was squeezed even forcibly, no bile flowed into the duodenum; but on dividing the duct about its middle, bile escaped, which was inspissated.

The jejunum the same as duodenum.

The ileum fully more vascular and inflamed than the jejunum or duodenum, and contained bloody viscid fluid, resembling panada mixed with port wine.

Colon.—Its mucous tunic less vascular, and having fewer ecchymosed patches, was distended with gas. Urinary bladder very thick, and containing a few drops of a flocculent fluid

almost muco-purulent. The kidneys, externally, were of the same colour as the spleen.*

CASE VI.

March 11, 1832.—Mrs. J. C——, aged fifty-eight, of dissipated habits, was seized at nine o'clock this morning with severe cramps in legs and arms, accompanied with violent vomiting and profuse diarrhœa, great thirst, and coldness of extremities; in which state she continued until two o'clock P.M. Along with the above symptoms, she had blueness of the face, hands, and nails; the skin of the hands was wrinkled, and the pulse imperceptible at wrists and ankles. A vein was opened in the arm, but blood could not be obtained in a stream; only six ounces were abstracted. A large mustard sinapism to spine, and about two ounces of whisky toddy were given.

5 : 30 P.M.—Complains of great thirst, general uneasiness, cramps in the arms, and slight cramps in the legs, with coldness in both extremities. The hands were particularly shrivelled and blue; the countenance was collapsed; the pulse imperceptible at wrist and bend of arm. There was pain in back, but no vomiting or purging.

To have warm spiced wine and water occasionally; legs and arms to be well rubbed with a mixture of oil of turpentine and ammonia.

6 P.M.—Pulse still imperceptible; complains much of thirst; very restless; great pain in back; has neither vomited nor purged; has retained the wine. Let her have immediately three grains of calomel and six of rhubarb, to be repeated every hour until her bowels are opened; large mustard poultice to be applied to spine.

8 P.M.—Pulse occasionally perceptible, fluttering; countenance more collapsed; eyes more sunk; less restlessness,

* This dissection was performed by Dr. Coste and myself, to which some hours were devoted.

but complains much of thirst; has cried out for air once or twice; no dejections; the wine, which was repeated, is retained, as well as about a pint of warm gruel, which she took at different times; no urine; cold sweat on face. A turpentine injection immediately; cont. pulv. A dose of castor oil about twelve, if necessary; repeat sinapism to spine, and apply a large one to abdomen.

10 P.M.—A short time previous to the administration of the enema, she passed a small qnantity of reddish-coloured fluid; she has attempted occasionally to raise herself up suddenly in bed. Countenance not so collapsed as at last report; hands continue cold and shrivelled; forehead warm, but lower part of face cold, and covered with a clammy sweat; body and feet warm; much external irritation, produced by the sinapisms; complains constantly of pain in back and belly; voice stronger; pulse can be felt, small and very compressible; slight cramps in legs; has taken the powders regularly, but they have produced no effect; no urine; is restless, and complains of being hot. Continue powders and frictions.

An hour after last report vomited about half a pint of fluid, which, on examination, appeared to be the gruel that had been given her occasionally. As she complained greatly of pain in back and abdomen, the sinapisms were removed.

12 midnight.—Is much the same as at last report. She has occasional retchings, and vomits a little; the matter vomited is only what she takes to allay thirst; has passed a very little urine; bowels not moved. Continue as before; apply mustard poultice to abdomen; give another injection.

12*th*.—1 A.M.—Has become very restless; no pulse at radial or brachial arteries: complains greatly of belly; passed about a pint of fluid from bowels, resembling water in which fresh meat had been washed, and containing flocculi. Two table spoonfuls of strongly spiced wine every quarter of an hour; continue frictions.

From this period she began to sink rapidly, became very restless, turning from one side to the other incessantly, and looking wildly about; body and feet continued warm, but her

hands and arms were cold and very blue; almost constant retching, with occasional vomiting of watery fluid; respiration quick and laborious; a convulsive shutting of the lower jaw took place from time to time, and she died at half-past two A.M.

Dissection, twelve hours after Death.

Head.—Meningeal arteries somewhat distended with dark coloured fluid blood. Very considerable serous effusion between the arachnoid and pia mater. Veins of pia mater much engorged with dark coloured blood, and considerable arborescent vascularity on the surface of the convolutions. No unusual quantity of serum in ventricles; arteries at the base of the brain much distended with black blood.

Spine.—A considerable quantity of serous effusion within the theca vertebralis. All the vessels ramifying upon the chord, and upon the origins of the nerves accompanying the latter out of the canal, filled with darkish coloured blood; this appearance was most remarkable between the dorsal and lumbar regions. Rachidian veins much distended with black blood.

Abdomen.—Minute injection of peritoneal vessels, particularly in the neighbourhood of the bladder; numerous red spots on its surface; two or three ounces of turbid serum, mixed with flakes of yellowish lymph, in the pelvis. Small intestines moderately distended with greenish semi-fluid matter. Stomach externally whitish, contained a good deal of white fluid with flakes; its mucous membrane much softened and easily scraped off, and upon its surface a large patch of ecchymosis. Large intestines much contracted, and could not be distended by insufflation. Bladder contracted and empty. Liver of a pale yellow colour; vessels somewhat injected; its surface in several places had a puckered appearance. Gall bladder large and distended with green bile, which by pressure could be forced into intestine. Right kidney sacculated, otherwise healthy in structure.

Chest and Nerves.—Old adhesions of pleura, its vessels generally minutely injected; intercostal veins much engorged with black blood. Sympathetic nerves in chest and par vagum of healthy appearance; semilunar ganglion of left side of the same colour as the crus of the diaphragm; that on the right red, but rather paler than its fellow; the other ganglia entering into the formation of the solar plexus as red as the semilunar of the left side; and the filaments proceeding to form the right renal plexus were arranged into two bundles, and so red as to be at first mistaken for arteries; vasa vasorum of aorta and pulmonary artery much injected; right auricle and ventricle contained a large fibrinous clot; the ventricle flabby and somewhat softened; small clot in left auricle; left ventrical exceedingly contracted, hard, and its parietes about an inch in thickness; it contained about a drachm of black blood. Left auriculo-ventricular opening would scarcely admit the introduction of the little finger.

Arteries of lower extremities filled with black blood; those of the upper but little distended.*

CASE VII.

March 4, 1832. S.—— A——, aged fifty, ten A.M. was attacked with dysentery, in November, 1831; and since that period his bowels have never perfectly recovered their tone. Last night his stools became more relaxed than usual, and about five this morning there came on a vomiting and purging of a thin gruelly fluid, accompanied with spasms in the feet and legs; his hands and arms are now cold; pulse very weak, about 130; tongue white and moist; features pale and con-

* This dissection was performed with dexterity and neatness by my young friend Mr. Fearn, who conducted several of the *post mortem* examinations at the Drummond Street Hospital; and I am indebted to the liberality of my scientific colleagues of the Drummond Street Hospital for this account of it, along with the history of the case.

tracted; knees cold; has urgent thirst, and whatever he drinks is immediately vomited; frequent dejections of thin gruelly fluid, with occasional spasms in the lower extremities, and severe pain across the epigastrium, extending back to the spine; has voided no urine for several hours. Hab. quampr. calomel. 1 scr., adhib. enema aq. calid in quo sit infus. fol. tabaci. gr. xv.

2 P.M.—About six pounds of water were thrown into the intestines, and retained for half an hour, and since the clyster came off has had no dejection; vomiting continues; no spasm; pulse scarcely perceptible; pain of epigastrium much complained of.

App. sinapism. parti dolenti. Let him have a little brandy in warm water occasionally, and external heat be assiduously applied.

6 P.M.—Is now much weaker; speaks only in a whisper; breast cold; lips and tongue are livid and cold; no vomiting. Rep. submur. Hydr. 1 scr. R. Tinct. Opi. 2 dr. Capsici. Spt. Æther. Nitr. ā ā 3 dr. Sumat. 1 dr. omni semihora ad quartam vicem.

10 P.M.—Moribund.

March 5.—Died at 10 A.M.

Post mortem Appearances, six hours after Death.

Abdomen.—Upon opening the abdomen, the omentum was observed, on its anterior aspect, and particularly on the right side, to present a considerably reddened appearance; elsewhere, its veins were tinged with dark blood. Stomach much distended; its external appearance natural. Liver natural. On the omentum being lifted up, the colon was observed contracted; the small intestines, particularly the duodenum and jejunum, somewhat vascular. Gall bladder about two-thirds filled with dark olive coloured bile; spleen shrivelled and softish.

Stomach contained a large quantity of gas, and about six ounces of gray flocculent gruelly fluid; the internal coat pale

and eroded, with here and there, particularly above the cardiac orifice, patches of tenacious coffee-coloured matter adhering to it. The small intestines contained throughout a small quantity of pale reddish coloured water, of a slightly sanguineous appearance ; their coats felt thickened, the internal tunic soft, and presented in a few places marks of slight congestion, but was generally pale, and throughout lined with a viscid grayish coloured substance, of the consistence of thick cream. Colon contained a considerable quantity of dirty brownish-gray gruelly fluid; internal coat particularly pale. Rectum much thickened in all its coats; the internal one highly ecchymosed and ulcerated. Kidneys healthy; no congestion; urinary bladder contracted and empty. Liver exhibited no change of structure, or any unnatural appearance.

Thorax.—Lungs collapsed and dark coloured; exhibiting no marks of sanguineous congestion; the superior portion of both lobes tuberculated.

Pericardium, of natural appearance, contained a very little serum.

Heart, small, natural, and all its cavities empty, excepting the left ventricle, which contained a fibrinous deposit extending into the aorta. It is proper to remark here, that previous to the examination of the heart, a considerble quantity of blood had escaped from wounds made in the superior and inferior cavæ. The superior surface of the diaphragm over the liver had its vessels highly and beautifully injected.

Nerves.—The phrenic nerve on both sides was traced from the origin in the neck, and presented no unusual appearance; in the thorax on the right side the fibrillæ were parted about two inches by a blood-vessel.

The nervus vagus on both sides presented no appearance of vascularity in its trunk, but all the plexuses, into the formation of which it enters, were highly vascular; this was particularly remarkable as regards the pulmonic plexus; on the left side it was very highly injected.

The splanchnic nerve, on the right side, presented a highly vascular spot, about an inch and a half above the solar plexus;

the left semilunar ganglion of a reddish hue throughout, on the right side of a pale grayish colour.

The solar plexus natural.*

CASE VIII.

W. J——, twenty-five years old, had a severe attack of Cholera, which lasted three days. He was seen in the state of collapse, and died on 29th February. The body was examined two hours after death.

Brain and Spinal Chord.—The whole venous system of the brain gorged with the dark blood; the pia mater injected, and of a highly red colour throughout; the substance of the brain, healthy; ventricles, also natural; the tunics of the spinal chord, the same as those of the brain; the spinal chord inflamed, particularly between dorsal and lumbar regions. At the last dorsal vertebra, the inflammation extended some distance into the substance of the spinal chord.

Thorax.—The right side of the pleura presented old adhesions; the left side natural; lungs natural; pericardium natural; heart pale and flabby; right auricle and ventricle, and venous system in general, gorged with dark blood, partially coagulated. The left side and arterial system, empty.

Abdomen.—The liver, the spleen, pancreas, and kidneys, natural; urinary bladder, contracted and empty.

Nerves.—The pneumogastric nerve, natural. The pulmonary and cardiac plexuses, natural.

The solar plexus and semilunar ganglion, red, injected, and inflamed, but not softened. When bisected, glistening, and no blood flowed.

* For this case, and dissection, I am indebted to Mr. Steele, at Craighall, now of Montrose.

CASE IX.

M. C——, eight years old, was attacked with severe Cholera on the 15th February, for which she was bled, and much relieved, but always experienced acute pain in epigastric region for four days afterwards; and on the 22d, the symptoms returned in a more aggravated form than at first, and ran into collapse. She died on the 24th, at two o'clock in the morning.

Dissection, ten hours after Death.

Abdomen.—Peritoneum and intestines injected; the intestines distended with gas; the mucous membrane injected and ecchymosed, especially in the small intestines; only one ecchymosed spot in stomach; stomach and large intestines filled with white flocculent fluid; the liver pale and flabby; gall bladder full of bile; pancreas, spleen, and kidneys, natural; urinary bladder contracted and empty.

Nerves.—Solar plexus inflamed, the redness intense; plexus softened and pulpy, crumbling under the fingers; the semilunar ganglia red and injected, but not softened; when bisected, no blood flowed.*

CASE X.

T. B——, aged five and a half years, was first seen February 26, half-past ten P.M. States he was attacked this forenoon at eleven o'clock, while taking his porridge, with vomiting and purging, which have continued up to this time; great coldness and lividity of the surface; no pulse perceptible

* I am indebted to Dr. Coste for the history of this and the preceding case, and the descriptions of the dissections.

at wrist. In the afternoon complained of pains in the epigastrium.

12 : 30 P.M.—Has had sinapisms applied to the abdomen and feet, and a small quantity of mulled wine at intervals. Two hours afterwards the pulse became perceptible at the wrist. To have a blister applied to the spine and a sinapism to the abdomen.

8 : 30 P.M.—Died.

Dissection, twenty-nine hours after Death.

Spine.—On removing the integuments and muscles from the back of the neck and head, much very dark coloured blood escaped from the divided vessels; all the veins within the spinal canal were exceedingly engorged with black blood, and presented a very beautiful and intricate network of vessels. There was considerable serous effusion beneath the theca vertebralis, and between the arachnoid and proper membrane of the spinal marrow.

Head.—Calvarium exceedingly vascular; vessels of the dura mater much engorged with black blood; all the sinuses filled with dark coloured blood, and in the superior longitudinal, a large fibrinous coagulum; vessels of pia mater highly injected; arachnoid membrane had a dry appearance, no effusion between it and the pia mater. Brain generally of a dark colour, and exhibited numerous bloody points when cut into; no effusion into the ventricles; arteries at the base of the brain turgid with black blood.

Chest.—Pleuræ of both sides highly injected, particularly at the roots of the lungs; no effusion either into the bags of the pleuræ or pericardium; coronary arteries much injected; right side of the heart contained black blood and a large fibrinous clot; in the left side, very black blood, and a small clot of fibrin; vasæ vasorum of aorta and pulmonary artery much injected.

Nerves.—Par vagum, splanchnic, and semilunar ganglion on each side examined, but no very unusual appearance

observed in them, except that the small vessels supplying them partook of the general injection; lungs of rather a dark colour.

Abdomen.—Intestines generally appeared bleached, and were moderately distended; mucous membrane of stomach granular, and so much softened as to be quite pulpy. In various parts of the alimentary canal, patches of incipient ulceration, and the mucous follicles every where large and conspicuous; slight enlargement of mesenteric glands; bladder contracted and empty; liver studded with yellow spots on its surface and its interior; left lobe of a pale clay colour, and numerous red spots on its under surface; gall bladder distended with green bile; no apparent obstruction in its ducts; no bile in intestines; kidneys both affected with Bright's disease; aorta and cava, and all the large vessels of abdomen, filled with black blood; all the arteries of the extremities filled with dark coloured blood.*

CASE XI.

Thurday, February 16, half-past one A.M. G. E——, aged forty-six, was attacked yesterday at two P.M. with pain in the epigastrium, and purging of white matter, which continued till midnight. At nine P.M. forty drops of laudanum were given by his wife, and subsequently an injection, containing two teaspoonfuls of laudanum. Said to have been quite well previous to the attack. Surface cold, and of a dark blue appearance. No vomiting up to this time, when the respiration became laboured, and the pulse in the extremities imperceptible. In a few minutes his jaw dropped, and he was unable to swallow some cordial mixture that was offered to him. The extremities continued cold and blue; and he died without having exhibited any signs of sensibility.

* This dissection was conducted by Mr. Fearn.

Dissection, five hours after Death.

Head and Spine.—On removing the calvarium, much dark coloured blood issued from the vessels of the dura matter. Some slight effusion of serum between the membranes. The vessels of the pia mater much gorged with black blood, as were also the arteries at the base of the brain. No unhealthy appearance of the spinal marrow or its membranes. Several ounces of black fluid blood flowed into the skull from the spinal canal, apparently from the divided vertebral arteries. No unusual quantity of serum in the ventricles.

Abdomen.—Stomach of rather a pale colour, and very much distended with flatus and the white fluid. Its mucous membrane had a granular appearance, was much softened, and could be easily peeled from the subjacent tissue. The small intestines contained a large quantity of red currant jelly looking matter, mixed with white flakes, such as are seen in the fluid vomited. Their inner surface exhibited numerous red points; and the mesenteric vessels, even to their minutest ramifications, were filled with dark coloured blood. The descending colon, sigmoid flexure, and rectum, were much contracted, as was also the lower ends of the ileum; the bladder contracted and empty; kidneys of a darker colour than natural; no bile in the intestines. Gall bladder three-fourths full of dark green bile, which, by pressure, could be easily forced into the duodenum; liver somewhat engorged with black blood; the abdominal aorta, vena cava, and iliac arteries, filled with very dark coloured blood; femoral artery contained black blood, and a string of fibrin; the brachial artery was much distended with black blood, so that when exposed it looked like a vein.

Upon farther examination, small patches of ulceration were found upon the mucous membrane of the jejunum and ileum.

Chest.—Coronary vessels of the heart much injected; a large fibrinous deposit in the right auricle, extending to the ventricle; left ventricle contained a large quantity of black

blood, and a small clot of fibrin; some reddish frothy matter in the trachea; several ecchymosed spots found upon the aorta, near the heart; one of these spots involved the anterior coronary plexus of nerves; the vasa vasorum of the aorta were much injected.

Nerves.—The cardiac nerves, on the back of the aorta, had a vascular appearance; and, when the cellular membrane was detached from them by the scalpel, numerous red points showed themselves. The par vagum was of a redder colour than usual.*

SUMMARY OF TWENTY DISSECTIONS.

BRAIN.

Of this number twelve had this organ examined, and in all, the arteries and veins of the integuments, and muscles covering the cranium, were distended with the dark blood, which, in some, flowed like tar.

In ten, the blood-vessels of the dura mater were turgid with this blood; and, in three, there were fibrinous coagula.

In seven, there was serous effusion under the arachnoid membrane.

In four, the pia mater was congested with blood-vessels.

In seven, the cerebrum was highly vascular; and, in one, slightly softened.

In seven, the cerebellum was very vascular; and, in three, its substance was slightly softened.

SPINE EXAMINED IN TEN.

In six, there was serous effusion between theca vertebralis and arachnoid membrane, and in one of these the fluid was bloody.

* This dissection was performed by Mr. Fearn.

In two, the serous effusion was between the arachnoid and pia mater.

In six, the blood-vessels of the spinal chord were highly injected with the dark blood; and in one there was evidence of inflammation between dorsal and lumbar regions.

In six, the spinal or rachidian veins were turgid with dark blood.

GANGLIONIC SYSTEM EXAMINED IN SEVENTEEN.

In ten, the neurilema of pneumogastric nerves was injected with blood-vessels; in one, the nerve was enlarged; in another, it was thickened; and, in a third, the neurilema was inflamed with ecchymosed patches.

In six, the neurilema of splanchnic nerves was vascular; in two, the ganglia at their origins were vividly injected; and one ganglion was ecchymosed.

In sixteen, one or both of the semilunar ganglia were vascular; in one, it was inflamed; in three, it was enlarged and infiltrated with blood or serum; and in two softened.

In eight, the solar plexus was highly vascular throughout; in three, the ganglia and nerves were enlarged, and one infiltrated.

In four, the renal plexus was very vascular.

In four, the œsophageal plexuses were vascular.

In one, the recurrent of the pneumogastric nerve was vascular.

In five, the cardiac plexus was enlarged and very vascular.

THORAX.

Heart.—In three, the heart was flabby and pale; in two, collapsed; and many of them had the left ventricle so contracted and firm, as to contain only a drachm of blood. In thirteen, the right side was full of the dark gory blood, part of which was generally in the state of a fibrinous coagulum.

In three, the left side was full of the same blood with coagula.

In three, the right auricle was full of dark blood and coagula.

In six, the left auricle was also full of dark blood and coagula.

In four, left ventricle was moderately filled with blood and coagula, and one affected with softening; in two, coagulum extended into aorta.

In five, right ventricle was full of blood and coagula. In one, coagulum extended into pulmonary artery. In two, the parietes were softened.

Pericardium.—In one, this sac was distended with gas; in two, it was dry, like paper, and vascular; and, in a third, dry, vascular, and diaphanous. In four, it was vascular. In all, the coronary vessels were more or less injected with dark blood.

Venæ Cavæ.—In all, more or less of the dark blood was found.

Pulmonary Veins.—In six, these veins were turgid with the dark blood.

Lungs.—In four, these organs were congested with the dark blood.

Pulmonary Artery.—In one, there was a large coagulum, which extended into its two large branches. In three, it was full of the dark blood; and, in three others, the vasa vasorum were highly injected.

Pleura.—In five, highly injected; and, in two, there was effusion of lymph.

Aorta.—In all, it contained more or less dark blood, with fibrinous coagula; in six, the vasa vasorum were highly injected — the dark blood, and occasionally coagula, extended into the carotid, brachial, femoral, tibial, ulnar, and radial arteries.

ABDOMEN.

Peritoneum.—In nine, this membrane was highly injected; in six, evidently inflamed; and in three, there was albuminous effusion, with some turbid serum. In one, the omentum was very vascular; and, in another, it was inflamed.

Stomach.—Generally of a white colour, both on its peritoneal and mucous tunics, and containing more or less of the rice-water fluid

In seven, there were distinct vascular patches on the mucous coat, with several ecchymosed spots, varying in size from that of a sixpence to that of a half crown; and, in all, there was manifest softening. In one, the mucous tunic was eroded.

Small Intestines.—In twelve, there were evident marks of high inflammation, and vivid and extensive injection; in nine, ecchymosed patches; in four, mucous tunic softened in many points; and, in one, incipient ulceration. Contents of a viscid white mucous or greenish colour; and, in two, they were bloody.

Large Intestines.—Transverse arch and sigmoid flexure of colon, commonly spasmodically contracted. In five, vascularity, with ecchymosis. Two were in an inflamed state with softening; and one had ulceration. Two had dark venous congestion, similar to intestine in strangulated hernia.

The contents were generally rice-watery, or gruelly and flocculent, occasionally greenish and viscid. In many, the colon, with the exception of the caput cæcum, was empty.

Liver.—Very various in colour; two with Bright's yellow deposit. In some, the vena portæ were moderately congested; and, in one, the biliary ducts were full of bile.

Gall Bladder.—Generally two-thirds full of rather inspissated olive green bile. In the twenty cases, ten were full of this fluid; the others varied from a little bile to two-thirds.

Pancreas.—Generally healthy.

Kidneys.—Commonly healthy; but varying, like the liver, according to the habits of the individuals. Three were slightly congested; one gorged with the dark blood; and another presented a livid appearance.*

* According to some authors, the kidneys exemplified every change described by Bright. By the same authors, there were few fatal cases without a disease of some important organ, which had existed some time previously to the attack of Cholera.

Urinary Bladder.—In all, contracted, and almost empty. When any fluid was present, it was muco-purulent, and did not exceed a drachm in quantity. One, however, was contracted horizontally, and contained five ounces of limpid urine.

BLOOD IN CHOLERA.

From chemical analysis, it was found, that the serous portion of the blood was deficient in the albumen and salts which it holds in solution, and that these principles were detected in the evacuations. It was observed, that in those individuals who had laboured long under the diarrhœa, their blood had lost its aqueous and saline proportions, according to the amount of the evacuations.

The change from venous to arterial blood, in the healthy body, is effected by two processes essentially distinct—the one is a chemical change essential to life, occasioned by the absorption of oxygen and evolution of carbonic acid; the other depends on the saline matter of the blood, which gives a florid tint to the colouring matter, after it has been modified by the action of the oxygen.

As the symptoms run on to collapse, the serum of the blood being evacuated by the capillary exhalants of the intestinal canal, the blood becomes more thick and inspissated, first in the cavities of the right side of the heart and lungs, next in the left cavities, and lastly in the whole circulating system, especially the capillaries. When it begins to coagulate in the capillary net work of the lungs, the air inhaled by the windpipe is prevented from permeating the branchial ramifications, to stimulate the blood.

THEORY

OF

CHOLERA ASPHYXIA.

FROM the histories and autopsies of the preceding cases which I have carefully detailed, two most important conclusions cannot fail to be deduced. First, in reference to the nature, causes, and seat of the disease itself; and secondly, in reference to the remedial means necessary to be resorted to, for the prevention, mitigation, and removal of the morbid symptoms in their different stages of progression; and both those practical points have been, in my mind, satisfactorily explained.

I consider the constitution of the individual has been modified, or rendered predisposed, by the state of the atmosphere, to an attack for some time previous to the commencement of the disease.

The atmosphere is unseasonable—it is generally warm, damp, and always surcharged with the electric fluid;* it hence

* From the examination of the atmosphere by Mr. Losh of Jesmond, an able meteorologist, near Newcastle, the weather, during the prevalence of Cholera at that city, abounded more with thunder and lightning than in preceding seasons. (See Greenhow on Cholera, p. 90.) See also, "Some Facts of Electricity observed in Spasmodic Cholera. By a Member of the South Shields Board of Health." "Thunder clouds, charged with electricity, frequently take a particular course, without soon wasting or expanding themselves, in a direction along the

impairs the whole nervous system, but especially the ganglionic system of nerves. The pulmonary plexus is, therefore, unable to endow the lungs with power to oxygenate thoroughly the blood—the cardiac plexus to enable the heart to circu-

banks of rivers, or attaching themselves to a particular district or mountain." "Electricity rises out of the earth at particular points, being perfectly local in its operations." In 1832, "Cholera broke out in all parts of the parish of Gateshead (near South Shields) simultaneously) a surface of five miles in length and two in breadth." "In six days 250 were attacked, and 75 died." When Cholera raged at Jassy, a terrific storm dispelled it for a time; and the cannonading at Warsaw also averted it for a time. In India, atmospheric and terrestrial influence alone can account for its rapid progress. Dr. Young observes, that "In the space of a few days only, it spread through many hundred miles, over the unconnected and far distant districts of Behar and Deccan." Mr. Orton says, "The most obvious, and apparently the only feasible way of accounting for the visitations of Cholera, is, that they depend primarily on some disordered state or states of the atmosphere—that there is a diminution of the free electric fluid in the atmosphere, which is the great cause of the epidemic." Dr. W. Ainslie, in his able Letter on Cholera, favours this view of the subject. Dr. Christie, of the India Service, states, "It is a curious fact, that the Cholera has often been cut short by a thunder storm." "An instance occurred in Madras, in 1818; another fell under my own observation at Kulladghee, in 1824." "Unusual and disturbed states of the atmosphere have generally been found to precede its appearance." "The epidemic influence is capable of spreading, in all directions, over great tracts of country, and across a wide expanse of ocean, without being conveyed by individuals in the form of contagion, or wafted in the form of gas or vapour by the air." "When spreading across a tract of country, Cholera has often been known to spare one or two towns, and to appear in the next." "Detachments of a regiment," says the Madras Report, "arriving from a particular place, suffer severely; while the rest of the regiment, which has remained stationary, shall hardly furnish a single case, although the former may be living in the same barracks, and their sick in the same hospital." Forster, in his work on the casual and periodical influence of atmospherical causes on human health and disease, states, that through the medium of his electroscope, he has observed an irregular distribution of the atmospheric electricity, during what is termed unhealthy weather by medical men.

In India, and even in this country during the Cholera epidemic, many

late perfectly the blood—the gastric plexus to empower the stomach to digest the food—the hepatic plexus to influence the liver to secrete the bile—and lastly, the renal plexuses to give energy to the kidneys to secrete the urine; the atmosphere stimulates imperfectly the cutaneous nervous filaments, and capillary blood-vessels. I have left out the pancreas, considering it of minor importance in digestion.

The consequence of this deficiency of nervous energy to these important organs, is, that the chylopoietic and assistant chylopoietic viscera become deranged. Of the truth of this, we have many examples in those who have been victims to Cholera. Colliers, from their working under ground, and being thus excluded from the atmospheric air—being in a manner etiolated, have been frequently sufferers. The same result was remarked in the cases of the poorer inhabitants of Sunderland, Gateshead, and Newcastle, who resided in hovels shut out from the light of day.

When an individual, thus conditioned, with his digestive organs deranged—but much more so with these organs overloaded with indigested food and feces, which have irritated them or produced diarrhœa—is exposed to cold, so as to check the cutaneous functions, a two-fold disease is produced,—a violent cholic, and fever.

The expansive cutaneous filaments of the nerves are chilled, excited, and the cutaneous capillary exhalents shut up; these extreme branches of the nerves and arteries produce a concentration of the nervous and circulating systems; proper reaction

have complained of slight twitchings or cramps in the toes or fingers, and even in the arms or legs. I have lately been often consulted for such feelings.

The state of the atmosphere before the irruption of Cholera at Dumfries, was vividly painted by Mr. M'Diarmid, in the Galloway Courier. Dumfries was the last town affected in Scotland; but the pestilence was so dreadful, that the inhabitants fled like the Israelites out of Egypt. Dumfries resembled the city of Oudeypore, in India.

cannot be restored, because their cutaneous branches being reduced to a torpid and inert state by the cold, cause a determination to the ganglionic system of nerves, and the organs they supply, both of which have been previously impaired and rendered excitable.

An inflammatory spasm of these nerves and their organs is the natural result, and hence the sluggish respiration and circulation—the non-oxygenation and decomposition of the blood—and the non-secretion of the bile, the pancreatic juice, and the urine. The decomposition of the blood is greatly accelerated, no carbon is elicited from it, either in the lungs or in the capillary cutaneous system; or, in other words, the lungs is unable to decompose the atmospheric air—unable to separate the oxygen from the electric fluid with which it is united, so that it may combine with the carbon of the blood, and allow the electricity to enter the blood; for the mere inhalation of air into the lungs can neither excite them nor effect the change on the blood. This is dependent on the living action of the lungs, the main spring of which is the nerves.

Again, each act of inspiration requires a special impression through the nerves upon the muscles which dilate the chest. Sir Benjamin Brodie's experiments prove, that any diseased condition of the pneumogastric nerves reduces the strength and frequency of respiration; diminishes the quantity of carbonic acid evolved; and renders the blood in the arterial system dark like venous. No caloric can be generated in the lungs, or even throughout the whole body, and no bile or urine seems to be removed from the blood; so that the active ingredients of these fluids are mingled and circulated with it.

It is an acknowledged fact among physiologists, that black blood soon impairs the action of the heart. The blood thus vitiated is circulated in the brain, spinal chord, and ganglionic

system of nerves, and will impair their functions, and react particularly on the circulating and respiratory organs.

The vomiting and purging are consequent on the inflammatory spasm, combined with the overloaded condition of the whole alimentary canal, which must be severely irritated by these ingesta; and hence diarrhœa is almost always a precursor of the violent symptoms.

To prove that inflammatory spasm is the cause of the vomiting and purging (independent of what has been seen in dissection), we find, that as the disease advances—as the inflammation continues, and destroys the nervous and circulating systems supplying these organs—so the vomiting and purging, or dejections, cease.

The profuse rice-watery or gruelly dejections, according to Delpech, consist chiefly of the serum of the blood poured out by the mucous exhalants of the intestines; and, in proof of this, the flocculi are fibrinous.

The cramps are consequent on the same inflammatory spasm being communicated through the medium of the ganglionic nerves along the arteries, and from the communication of these nerves with the spinal chord and nerves of volition. This is beautifully but painfully exemplified in Mrs. M., Case IV., where pressure on the abdomen produced tetanic convulsions of the muscles of the neck and lower jaw.

The blueness of the skin is consequent on the blood not being propelled by the heart through the lungs with its accustomed vigour and frequency, and also and chiefly by its not being duly oxygenated.

The coldness is consequent on the more or less imperfect generation of caloric in either the capillary pulmonary tissue, or the cutaneous capillary tissue, and on the capacity of the blood to retain heat being affected, from not being arterialized, but remaining carbonized.

This is corroborated by the body becoming warmer some

hours after death than it was before; and is ingeniously explained by Dr. Kirk, by carbon being a bad conductor of caloric — the internal heat in the body taking six or seven hours, before it advances to the skin, to equalize itself with the circumambient atmosphere. The extent of organic disease, seen in the ganglionic system of nerves, will be found to depend on the duration of the symptoms of Cholera, and also on the patient having been previously affected with visceral complaints.

In the preceding symptoms, we have a train of phenomena similar to those of violent, continued, or intermittent, or remittent fever; for Cholera I believe to be nothing more or less than fever superinduced on diarrhœa, or fever attacking a constitution with bowels deranged or predisposed from atmospheric influence.

The preceding mode of accounting for Cholera appears to me natural and consistent.

If I had invented a theory, and then searched for data to support it, I might be accused of having indulged in delusive speculations, and of having made the morbid phenomena correspond with my own preconceived views.

Dr. Loder of Moscow, we find, is the first to consider the ganglionic system the chief seat of this disease.

Dr. Lichenstadt favours this theory; for, in some of his cases, he talks of the pain on pressure exciting the splanchnic plexus of nerves.

Mr. Orton is of opinion, "that the proximate cause consists in a diminution of the energy of the nervous system; and that this extends, in various directions, to all the functions." Mr. Andral considers "the nervous system to be chiefly engaged in producing the phenomena."

Mr. Baird, of Newcastle, talks of the action of the ventricles of the heart being arrested by spasm, and that the general suspension of the secretions depends upon the branches of

the ganglionic system of nerves supplying the organs of secretion being in a similar condition.

Dr. Greenhow states, that the efficient cause of Cholera consists in an impression made first upon the nervous expansion of the alimentary tube, and that on this is ultimately dependant the series of phenomena which follows: that the deprivation of nervous energy is rapidly communicated from the extreme branches to the trunks of the nerves, and thence to the other organs connected with that part of the nervous system.

Mr. Hamilton Bell considers, that to the suspension of the power of the great ganglionic or sympathetic system of nerves, is to be ascribed the disease which has obtained the name of Cholera Asphyxia.

We find that Professor Delpech, Drs. Coste and Lowenhayn, and myself, therefore, have only been travelling in the beaten track; and that we have been forced to do so, from a careful exploration of the morbid phenomena exhibited during life and after death in this disease. All the merit we can lay claim to, is an attempt, by minute dissection of the fatal cases of Cholera, to explain its nature, and we trust we have succeeded in showing that it is not an incomprehensible malady. Whatever may be our opinions, it cannot be denied, that we have commenced at the origin of the disease; and we must be permitted to hope, that others more enthusiastic and able than ourselves will prosecute dissection with still greater minuteness, in order either to the detection of our errors, or the confirmation of the truths which we have advanced. In my humble estimation, Cholera Asphyxia is a disease much more capable of being satisfactorily explained by morbid appearances, than either intermittent or typhus fever. I may add, that the preceding *modus operandi*, or theory and causes of Cholera, affords a more rational and demonstrative explanation of their effects, than the incom-

prehensible influences ascribed to contagion, malaria, and all unknown and latent causes.

The Madras Report shows malaria to be untenable in producing the disease, " Cholera has raged among troops," says Dr. Christie, " in a town, while the town's people have escaped, and *vice versa*." " Not one of the other patients, who lay in the same ward with those labouring under Cholera, were attacked."

I feel confident, then, that the evils of this disease have been tenfold aggravated by the mistaken dread of contagion; and this circumstance imposes on me the public duty of fearlessly delivering my sentiments on a much agitated question, in regard to which, I must say, the public mind appears to have been egregiously abused. One can scarcely imagine, that a man openly charged with *procuring* evidence in favour of contagion being a vital accompaniment of the epidemic fever of Gibraltar, would have been appointed by the enlightened government of Great Britain, to examine into, far less to decide on a point, of such vital interest and importance to this commercial country, before Cholera had made its appearance among us in 1832. Supposing the allegations as to the self-interested motives of this individual to be utterly unfounded, they ought to have been held as an insuperable objection to his being employed on this occasion, so long as they remained uncontested and disproved; while, on the other hand, it might have been expected, by an unbiassed mind, that the special influence of his committed opinions, if allowed to operate, would give rise to some such uncalled for and oppressive regulations, as were entailed upon us, in 1832, by the Central Board of Health, and the late act of parliament relative to Cholera.*

* Mr. Fraser, late surgeon to the Civil Hospital, Gibraltar, in his review of the *facts* brought forward by Dr. Barry, relative to the late epidemic fever of that garrison, thus expresses himself:—" Dr. Barry

The effects of the theory of contagion are not yet fully felt by the British public, who, unless their better judgment surmount their fears, will sink under its terrors. At Gibraltar, all who were attacked with the epidemic fever, were expelled

has so misstated facts, and so darkened many of the most important truths, relative to the history of the epidemic in question, that I fear it will be impossible to enter into an analysis of his paper, without the appearance of personality. I shall only observe, once for all, that my object is *truth;* and if *this* is not to be found (as some have stated) in the arguments, either for or against contagion, to whom are we indebted for so grave a charge? Certainly, not to the non-contagionist. Before the arrival of Dr. Pym in the garrison, towards the termination of the malady, the word contagion had nearly become obsolete. So clear and satisfactory were the proofs of the endemic origin of the disease, to those who had witnessed its rise and progress, that no one doubted the accuracy of this doctrine; and Dr. Barry himself, soon after his arrival, drew up a paper, setting forth a variety of arguments corroborative of the same." What motive could have induced the latter gentleman to change his mind? When were quarantine laws made in this country? When was a quarantine board established? Who are its members? Men are fallible mortals. Self interest, pride, vanity, "vaulting ambition," will make medical men rat like politicians.

Mr. F. proceeds to prove that Dr. Barry perverted facts in order to support his own doctrine:—"That a species of evidence," says he, "is admitted as proof, when it favours his doctrine; but is refused, when it has a contrary tendency." "Such," observes Mr. F. "is the front and bearing of the channel on which Dr. Barry rests his proofs of the introduction of a contagious distemper into our garrison. One man '*said*' to have had '*ague*' at the Havannah, but who showed no symptoms after his admission, and was discharged in three days; a second, a '*contusion of the arm;*' and a third, 'constipated *bowels!!!*'" "The whole evidence is so truly contemptible, and so much at variance with truth, that it disgusted every honest man who heard it." "It would lead me," concludes Mr. F. "far beyond the limits I have prescribed to this paper, were I to enter into the detail of all the means practised to fix the blame on this ship. Suffice it to say, that the board of commission already alluded to, after wading through a mass of evidence, and listening to the stories of *witnesses got up for the occasion*, came to the conclusion (the majority at least), that there was not the slightest proof for referring the introduction of our epidemic to the ship Dygden, or to any other vessel. I subjoin the opinions of Colonel Chapman, civil

the garrison, and encamped on the neutral ground. At Malta, those attacked with the plague, were dragged from their houses, and sent to the Lazaretto, or pest-house, where they were attended only by hired slaves. Some British naval surgeons volunteered their services to attend these unhappy wretches, but their application was treated with contempt.

secretary, and of Judge Howell, both of whom may be supposed capable of weighing evidence as fairly as any other of the members of this board. They are as follows:—

" Colonel Chapman.—' Judging from the evidence produced before the board, the manner in which it has been given, together with the description of persons who have been brought forward as witnesses, I am decidedly of opinion, that the late epidemic disease is of local origin. As to the importation of the late epidemic, I am of opinion, that the attempt to prove the introduction of the disease, after months of previous inquiry by those who wish to prove it, has totally failed.'

" Judge Howell.—' Upon a careful review of all the proceedings before this board, I am of opinion, that the evidence brought forward has totally failed to prove, that the late epidemic disease was introduced from any foreign source, either by the Swedish ship Dygden, or by any other means; and I am farther of opinion, that the late epidemic had its origin in Gibraltar.' "

Mr. Wilson, another surgeon of Gibraltar, and Dr. Chervin, a French physician, confirm these statements of Mr. Fraser.

Dr. Greenhow incontestably proves, that Cholera began sporadically at Sunderland, even from the words of Mr. Green, a contagionist. Mr. Green thus observes, " there was no case of sickness on board the vessel when the pilots went on board." Again, says Mr. Green, " I find that the widow and friends of one of the pilots (Henry) tell two stories about it, totally at variance with each other." Drs. Lorimer and Burton prove, that the " first case in Haddington was sporadic," and that the three shoemakers, Frazer, Gow, and Walker, never saw a Cholera patient in Newcastle—never saw this man in Haddington—and never have been attacked with Cholera themselves. Cholera is proved to have broken out at Hamburg, in 1832, " in a miserable resort, named the Deep Cellar, frequented by beggars, vagrants, and other abandoned wretches." Dr. Hamett says, that " Cholera made its appearance in Dantzic without communication with any unhealthy place."

In Edinburgh, in 1832, the first patient, in Adam Street, had no communication with Fisherrow or any of the other infected towns.

If the public, however, dispassionately examine the writings of those who have seen this disease, they will find a huge preponderence in favour of NON-*contagion*. The majority of the Indian medical gentlemen are *non*-contagionists, as may be seen by consulting the Bengal and Madras Reports. "In India," says Dr. J. Johnson, "the contagious nature of the disease was denied by ninety-nine out of every hundred medical men in those parts of the world." Dr. Hamett, who visited Dantzic, is a *non*-contagionist. Almost all the medical gentlemen of Sunderland, Gateshead, and Newcastle, are *non*-contagionists.* Many who left Scotland contagionists, and visited these districts, have returned *non*-contagionists—as Dr. Kirk of Greenock; and Dr. Laurie, Dr. Thomas Molison, Mr. H. Bell, and Mr. Dickson, who have all lately published on this disease, are all *non*-contagionists; also Dr. James Johnson, in his very able number of the *Medico-Chirurgical Review* for January, 1832. Drs. Lorimer and Burton of Haddington, who have just published an interesting Essay on Cholera, are also *non*-contagionists. At Musselburgh and Fisherrow the majority are *non*-contagionists.† None of the

* GREENHOW *on Cholera.* WHITE *on Cholera.*

† Dr. Sanderson of Fisherrow, at the first meeting of the Medico-Chirurgical Society on this paper, related some interesting facts connected with the non-contagious nature of this disease, and among others, its having broken down the intrenched barriers of the Lunatic Asylum, and attacked one of its unfortunate inmates. Dr. Hamett says, that at Dantzic "It did not spare institutions, as the Jail and Orphan Hospitals, which were perfectly shut against all communication with the town."

At Newcastle, "the disease broke out within the walls of the prison, constructed upon the most approved principles, and where all communication from without was carefully guarded against." Mr. Dick, Professor of Veterinary Surgery, stated at the same meeting of the Medico-Chirurgical Society, that horses and cows had, for some months past, been affected with Cholera, and that he could trace no contagion. In stables with twelve horses, only one or two had suffered; and some died in the spasmodic stage.

medical officers, attendants, or nurses attached to the Fisherrow Hospital were attacked with the disease, which, perhaps, existed there in a more malignant form than in any other locality since its irruption in Great Britain; while, on the admission of a typhus fever patient, one surgeon, one male, and three female attendants, were attacked with this fever.*

The resurrectionists of this city, about twelve in number, have escaped the disease, with the exception of one man, who, having received his share of the booty of one body on a Tuesday, kept drinking and debauching until the following Thursday, when he was attacked with Cholera, and died. The Tuesday completed the fifth week from the first body which he had disinterred of Cholera, and he confessed to having raised six during that time. All the while he was leading a most debauched life, and troubled with diarrhœa. The result of a careful inquiry, which I made among medical students who had been dissecting Cholera bodies, was, that not one out of upwards of a hundred had been affected.†

From my conversation with medical men, I found, that the majority, who have not seen this disease, are contagionists; that many who have seen a little of this disease are moderate contagionists; while most who have seen a great deal of this affection are *non*-contagionists, simply, I conceive, because the latter have examined it in all its practical bearings; because they have traced its natural course, seen unbiassed by its

* White of Gateshead, and Greenhow of Newcastle, mention the same immunity of the medical gentlemen and nurses, male aud female, at Sunderland, Gateshead, and Newcastle. At Moscow, persons put on the clothes of those who had just died of Cholera, lay in their beds, and even alongside of corpses; they bathed in the same hot water that Cholera patients had just bathed in before, and all with perfect impunity. I know individuals of Fisherrow, Craighall, and Edinburgh, who have done nearly the same deeds with equal impunity.

† The scientific and invaluable Anatomy Bill of Mr. Warburton has happily done away with the horrid nuisance of resurrecting.

operations, and witnessed relatives humanely and fearlessly attending their friends, mothers suckling their dying infants, and infants sucking their dying parents, with impunity. * I have been wounded in the greater number of my dissections of Cholera subjects, and once seriously with a chisel, the wound of which I treated with neglect, and inflammation of the lymphatics of my arm followed; but no Cholera symptoms supervened, although I laboured under slight diarrhœa at the time, and my mind was naturally uneasy regarding the danger of a punctured wound, having previously suffered severely from similar accidents, on more occasions than one.†

* At Craighall colliery, in the vicinity of Musselburgh, I witnessed these interesting circumstances; and my friend Mr. Steele, the surgeon of the village, states, that five mothers, affected with Cholera, suckled their children; and that not one of these children has been attacked. The same interesting circumstance is mentioned by Mr. Frost and Mr. John Fife, in Greenhow's work on Cholera. The same has been the immunity with the mothers suckling their dying children. At Craighall, the houses are low cottages, with generally two families living under the same roof, and entering by a common door, the air of the one room communicating freely with that of the other. In each of these rooms there is commonly two beds; and the families consist of from two to ten. The most free communication was allowed, and one or more of the families occasionally slept in the same bed; and yet Mr. Steele could detect no contagion. Drs. Lorimer and Burton state, that their most malignant cases occurred *in an isolated form*, in the bosom of large families, without any extension. The same has been my own experience and observation in the Canongate, &c., of Edinburgh. Mr. Steele has been most successful in his practice, having only lost twenty-four out of seventy-two malignant cases, a proportion unequalled in any returns, thirty-nine in a complete state of collapse, entirely pulseless. These were all treated in their own houses, although there was a neat and comfortable hospital in the village.

† The same immunity followed the wounds received in dissection by Dr. Coste, Mr. Steele, and Mr. Fearn. At Moscow and Dantzic, where many hours were daily devoted to dissection, the same was the case; and at Newcastle, says Dr. Greenhow, " surgeons have spent hours in the examination of dead bodies; have plunged their hands into the several cavities with perfect impunity."

It was proclaimed by the Board of Health, in 1832, that the doctrine of the contagious nature of Cholera not only confines the disease to the person and place where it has broken out, but assists in promoting those precautionary measures of insulation used to prevent its spreading to other places. I ask, Were these expectations realized? I answer, They proved utterly abortive.* The feeding and clothing of the

* The facts already mentioned regarding Behar, Deccan, Dantzic, and Fisherrow, prove this. Orton says, "Besides those who died, above 500 were admitted into hospital that day. On the two following days the disease continued unabated, and more than one-half of an army, 5000 strong was then ill." "In fifty different points," says Dr. Greenhow, "cases occurred almost at the same instant." Mr. Brady thus observes:—"We were assailed by a third and fourth example of the disease, and before the next morning at ten o'clock, considerable numbers had fallen sacrifices to its pestilential ravages." "Within a space of twelve hours it spread itself over a diameter of two miles, in situations as different in their external characters as can well be conceived, all were indiscriminately exposed to its fury." At Newburn, a village distant fram Newcastle five miles, "every dwelling was visited by the disease nearly at one time." "The same was the case at Gatesfell." "South Shields, only six miles distant from Sunderland, and on the opposite side of the Tyne to North Shields, where the river is merely 100 yards broad, remained free of the disease for some months, although the communication had been free and constant all the while." Drs. Lorimer and Burton state, that "the disease had not attacked the village of Linton, five miles east of Haddington, yet it had prevailed at West Barns, four miles farther east, but had not attacked Belhaven or Dunbar, both within two miles of West Barns. Neither had it attacked Beanston Mill, Knowes, Whittinghame, Athelstaneford. Whitekirk, nor Gladsmuir, all situated within two or three miles of Haddington, and with which the inhabitants of Haddington were in daily communication." Gladsmuir is situated between Haddington and Tranent, and Linton between West Barns and Haddington. The manner in which Cholera in 1832 attacked successively, and occasionally simultaneously, the different cities, towns, and villages, since its appearance in Great Britain, ought to convince every unprejudiced mind, that contagion could not be the cause. The same eccentric dancing of the malady, if I may use the expression, was witnessed in India. In Edinburgh we had several cases, in defiance of all our terrified and absurd restrictive regulations.

poor did ten times more good in checking the propagation of the disease, by improving their general health, and thus rendering their bodies better prepared to resist its attacks.* The records of our hospitals and dispensaries during the latter months, afford a gratifying proof of the altered condition of the poor of this city.

I consider the pernicious doctrine of contagion has let loose upon the public mind one of the strongest auxiliaries to the propagation of the disease, viz., fear,† than which there exists not a more powerful agent, by acting and reacting on the nervous system. This is well known, on ordinary occasions, to produce the premonitory symptoms of Cholera, or diarrhœa.‡ The doctrine of contagion hardens the heart—destroys the finer and more amiable feelings of our nature. The kindly affection of the father for his family is blunted or destroyed; the still stronger link of nature between the

* The reader is referred to some valuable observations on this point by Dr. Greenhow, in his able work, p. 85.

† Many, according to Lefevre, died of pure fright at St. Petersburg; and Dr. Greenhow relates several remarkable instances in pp. 32, 83, 84, and 101. Dr. Dickson, in his work on Cholera, relates the following interesting anecdote:—"In the outward voyage to India, we experienced a severe hurricane, soon after doubling the Cape. The howling of the wind, the creaking of the masts and the cordage, the dash of the sea over the deck, and the occasional flashes of lightning, were terrific. The passengers were all in a state of great alarm; and thirteen, of a pack of thirty dogs which we had on board, were attacked the day after with spasms, sinking, and vomiting. They all died in a few hours. In this instance, the disease might be fairly attributed to terror." Dr. Dickson concludes—"How much the passion of fear disposes to Cholera, I have had many opportunities of observing." The influence of the mind over the body is beautifully described by General Stewart, in his interesting sketches of the Highland regiments in the West Indies.

‡ Dr. M'Cann, and Dr. Kirk, of Greenock, have proved, that the much greater number of cases of Cholera are preceded by diarrhœa. Dr. Kirk deserves the warmest thanks of his countrymen, for his indefatigable researches after this valuable fact, and many others connected with Cholera.

mother and her offspring is broken, and she looks upon her innocent children as sources of danger; the hitherto affectionate children, in their deceptive agonies of self-preservation, abandon their parents to perish in the hand of the stranger, and to desert them in the last necessities of mortality. No tear of sympathy or compassion falls to soothe the agony of departure from all we hold dear; no kindly hand is raised to close the eye in death. In this selfish and cowardly contest for life, the ennobling attributes of benevolence and education are disregarded, and civilized man becomes a savage. *

These considerations come home to the bosom of every man: but there are others not less worthy of inquiry. The minds of the vicious are lulled into fatal security; so long as the drunkard avoids the infected district, he considers himself beyond its influence; and, in desperation, consoles himself in the certainty of his escape, and halts not in his reckless revelries. The weak and the vacillating flatter themselves with the same reasoning, and heed not the warning of the medical man to attend to their general health while the epidemic is raging around us, and hence become the hapless victims of their deceptive credulity.

The medical man who *conscientiously* believes in the contagious nature of this appalling disease cannot perform his duty zealously or effectually. He is only mortal, and, in this enlightened age, he knows that no spell or charm can guarantee him from the demon contagion which his terrified

* The Kirghis Kaisaks, residing on the banks of the Ural, have a very effectual mode of purifying their camps, and extinguishing contagious diseases in the bud, viz., by instantly abandoning their sick to the grim tyrant Death, and moving off to a distance of fifty or sixty miles. The inhabitants of the Polynesian islands, when suffering under sickness, more particularly if they consider the disease irremediable, remove the sufferer to a separate tent, where he perishes from neglect; or they despatch him with their clubs and spears, and even bury him alive. I ask, Are we more civilized?

imagination has conjured up. Instead of manfully remaining with his patient, he looks at a distance upon the dying wretch writhing under the agonies of the disease.*

Let us next examine the subject of contagion in a national point of view. Here we find it still defended and protected by the bigotry of antiquated laws, which are a disgrace to the government of this enlightened period. If restriction is to be imposed on the intercourse of the people of this country, I say, let it be done effectually, and in every quarter; and I call upon the most unflinching contagionist to answer, on what ground can the restriction by sea prevent contagion, while the public conveyances by land are unfettered, and teeming with the daily transportation of thousands and tens of thousands to and from every portion of the United Kingdom. In the meanwhile, I am convinced, and the fact is notorious, that while not a vestige of benefit can be adduced, commerce is retarded to the ruin of thousands; and that the fear of contagion is fostered by the absurdity and barbarity of the quarantine laws, under the superintendance of interested individuals. Innumerable instances can be adduced to prove this, but I shall content myself with one. While Cholera in 1832 was at its acme or zenith, at Fisherrow, and when the most unrestricted intercourse by land and by foot passengers was allowed, a solitary boat, with two men, touched at Leith Harbour from Fisherrow. The poor fishermen had no sooner

* I have witnessed many a contagionist medical man feeling the skin and pulse of the patient with gloves on his hands, a handkerchief over his mouth, and a scent bottle at his nose, and stopping as short a time as possible with him. To do justice to a Cholera patient, the medical attendant must remain with him for an hour or two, and put his own hand to the work. Can the contagionist do so? I reply, No. On this point Greenhow thus observes:—"We must take a leading part in the administration of remedies. We must direct, superintend, and assist in all. We must be content to perform not only the part of the physician, but of principal nurse also, perhaps for many hours' continuance."

landed, than they were hurried away, under guidance of a guard-boat, to perform quarantine at St. Margaret's Hope! I ask, Was there more danger from contagion proceeding from these men, exposed in an open boat for six miles to the keen penetrating sea breeze, or from the stage coach passengers, issuing from the pent-up atmosphere of the stage coaches, into which some of these very passengers—a medical man probably—may have proceeded, direct from the house of death?

That the opposite doctrine of *non*-contagion would have secured all the precautionary measures which had been adopted, and that in a much more effectual manner, I am thoroughly convinced. Every medical man, whatever may be his opinion as to contagion or *non*-contagion, must admit that this disease is epidemic. Had the public, therefore, in place of being terrified with the bugbear contagion, been warned, by the same authorities, of this undisputed fact, that Cholera is epidemic—that it had been cast upon us by the inscrutable workings of Divine Providence, which no human power can avert; and that no man could tell who would be affected or who would escape, the same precautions as to health, temperance, cleanliness, and attention to the wants and comforts of the poor, would have been observed. The demoralization of the public mind, which exhibited itself in terrible array at Glasgow, Paisley, and Greenock, and even to a moderate extent at the Water of Leith and Fisherrow, would have been avoided. The kindly intercourse and best affections of the people would have been preserved. Hundreds of miserable creatures, the hapless victims to antiquated prejudices, might have been preserved, or their last moments solaced, by those endearing attentions of kindred, which render death itself less terrible. Commerce would have been left unrestricted, and the ruin of thousands averted: the laws of nature and of Providence are as clearly defined in this and in other diseases, as in the return of the seasons. And,

lastly, though not least, the minds of a Christian people would have learned to bow with submission and humility to the inscrutable wisdom of HIM, whose decrees they have vainly attempted to counteract.

TREATMENT.

FOR the sake of arrangement, I shall divide the disease into three stages.

1. Ordinary diarrhœa, or premonitory symptoms, raging epidemically, or occurring under epidemic influence, and which, if neglected, runs into fatal collapse.

2. Well marked Cholera.

3. Cholera rapidly advancing to collapse.

Some authors adopt a different classification or division, making No. 2, or well marked Cholera, the first stage; No. 3, Cholera running into collapse, the second stage; and the re-action or fever, the third stage.

1. Almost all the cases I have witnessed myself, and many which have occurred in England and Scotland, as proved by the indefatigable researches of Drs. M'Cann, White, and Kirk, have been preceded by diarrhœa, or what is termed the premonitory symptoms, for a longer or shorter period. The greater number of cases, therefore, are within reach of being successfully treated; and, as Dr. White of Gateshead observes—

"If, after these warnings, in any place where a proper municipal authority is established, the Cholera should burst forth with unabated violence, I should at once consider that there had been some dereliction of duty. The blood of the sufferers will rise in judgment against the apathy, the ignor-

ance, and the cruel neglect of those who should have been, at so awful a crisis, their natural protectors."*

This stage, then, is characterized by the individual having had indigestion for some time, and great oppression and distension of the epigastric region, more or less mental anxiety and depression, along with a feeling of difficulty of inflating his lungs. He has had loose feculent stools for some days past, with occasional griping.

The treatment of this stage of diarrhœa consists in confining the patient to bed, and administering calomel in three or four grain doses, combined with three grains of the aloetic or colocynth pill mass every three hours, until the alimentary canal is thoroughly cleansed of the undigested food and accumulated *non*-bilious feces, and until the stools are perfectly bilious. Then the astringent draught may be given, and repeated every three hours, according to circumstances.

In very mild cases, one dose of calomel, of three or four grains, combined with half a grain of opium, is sufficient. This, followed in three or four hours afterwards with a draught of one drachm of the electuary of catechu, five grains of prepared chalk, half an ounce of the syrup of ginger, one ounce of cinnamon water, and ten drops of laudanum, will generally check the diarrhœa; if not, let it be repeated after every loose stool. But it is indispensable, that the patient confine himself to bed and live on farinaceous food, with animal soups. In the premonitory stage, confinement to bed is nine-tenths of the

* Dr. White here alludes to the division of cities and towns into districts, and which should be visited daily by a medical man. He here follows what Dr. Kirk has now established in Greenock and elsewhere, and which was originally and successfully practised by Mr. Steele. Let our sage Board of Health imitate so praiseworthy and useful an example. Hospitals proved a deathbed to the sufferers in 1832, since the majority ran into collapse during transportation from their own houses to the hospitals. The same fatality attends the transportation of those affected with scurvy.

cure. I have known many a patient slightly affected with diarrhœa, induce confirmed Cholera with fatal collapse, by getting out of bed, and going to a cold water-closet. I have assisted servants to lift up their masters, lying in the last stage of collapse, on the floor of such cold places.

When we examine the feces of a patient in this stage, we find them semi-bilious, with a good deal of undigested food.

The diet should be afterwards regulated, and the bowels carefully watched.

The individual should live on plain boiled and roasted meat, with bread and rice, for two or three weeks—tea, coffee, milk, soft boiled eggs, and all the farinaceous substances. Wine, especially port, may be gradually indulged in, and afterwards brandy or whisky, very sparingly. As a relapse is so readily induced, he ought therefore to be careful not to get out of bed too soon, or to venture abroad too early.

2. When the patient is attacked with vomiting and purging, with or without cramps, and the pulse is felt at the wrist and temple, he should have administered an enema of four, five, or six pounds of hot water, with forty drops of laudanum in it. Or the rectum and colon should be filled with this, administered as hot as the hand can bear, and kept up with a folded towel and the hand, for an hour, in order to subdue the inflammatory spasm. He ought to drink large draughts of hot water; for my late friend, Dr. Carruthers, of Dundee, observed, that after the first effort of vomiting, the water remains on the stomach, and the patient expresses himself relieved. I have since prescribed it with advantage. Sinapisms ought to be applied to the epigastric and renal regions, and bags of hot sand, or bottles of hot water, to the hands, feet, sides, and every part of the surface of the body, in order to keep up the heat. The tin cases, or beds, invented by my late ingenious and talented friend, Dr. Mackintosh, in the Drummond Street Hospital, are admirable contrivances for this purpose. These

were flat cases, of the length and breadth of an adult, and about six inches deep, filled with the vapour of boiling water. Each case was open at both ends, was laid on a loose straw bed, and covered with a folded blanket. Pipes furnished with stop-cocks communicated with a boiler, and the hole at each end of the tin case, so that the case could be heated in three minutes, either before or after the patient was laid on the blanket, and covered. It was rather a hard bed, but patients could generally bear it for two or three hours, and this period of time was commonly found sufficient to answer the purposes required.*

* Mr. Grant's caloritor is a most useful adjuvant. In private houses I have found it raise the temperature of the skin, and restore the pulse in half an hour, in cases of complete collapse. It is about twenty inches in height, formed like a chimney-can, but tapering towards the top, from which there is a tube three inches diameter, that projects in a horizontal direction about eighteen inches. The caloritor consists of two chambers; the external one has a door which slides up and down so as to regulate the admission of atmospheric air; the internal chamber, which is of the same shape, rests upon the bottom, but there is a portion cut out to admit of an iron cap three inches diameter, for holding the spirit of wine, which serves as fuel. When the machine, thus described, is used alone, merely heated air is thrown up; but the vapour of turpentine, spirit of wine, water, &c., may be thrown up in a rarefied state; and to accomplish this, there is a small boiler, or still, in the curved top of which are inserted three copper tubes. The middle tube ascends to the height of about twenty inches, on the top of which there is a funnel with a stop-cock; and the turpentine or water is poured in at this funnel when required. At the side of this tube, near the top, is another small tube, with a whistle attached to it, as an indication to tell when the boiler below requires a fresh supply.

The two other tubes rise a little above their insertion in the boiler, and, taking a curve, descend in different directions, and pass below the bottom of the boiler, directly through the flame of the burning alcohol, and ascend again, and join into one tube, which arises with the middle tube, and passes out at the head a little above the before mentioned three inch tube, running horizontally, and terminating at its mouth. The next is a reflective box, lined with sheet iron, having a hole in the side, into which the tubes are inserted when going to be

Twenty grains of calomel are to be given, in the form of bolus, with half a grain of opium and aromatic confection. The less opium the better. After three hours, if there be no relief, one grain of calomel should be given every hour, but no opium, until the evacuations assume a dark gray colour. Calomel combined with opium relieves spasms. Calomel increases the secretion of a mucous membrane, renders it healthy, and produces an increased flow of bile; when given in small quantities, it communicates general vigour, increases the force of the circulation, equalizes it, and promotes all the secretions. When given in repeated large doses, it was found not to leave the stomach, and to excite inflammation. In India, examination after death, showed that in many the medicines had proceeded no further than the stomach. The same was observable in this country.

If the patient be not sensibly relieved by these remedies in an hour, an enema of plain hot water should be exhibited, and repeated every hour until relieved.

The common effervescent draughts soothe the pain in the stomach and quench the thirst, and may be given with marked

used. There is also a damper to regulate the heat, which slides into the larger tube, and a wire cradle to support the bedclothes. The mode of using the machine is as follows:—The cradle is placed above the patient, and the bedclothes over it; the reflective box can be put either at the foot or side; and the two tubes then introduced at the side hole in the box, and the damper adjusted, when spirit of wine is put in the cup and set fire to. Whatever substance is to be used is to be poured into the funnel, and the stop-cock turned. It descends into the boiler already mentioned, and is there converted into vapour, which, passing through the curved tubes, receives an additional portion of caloric, and becomes highly rarefied, ascends and passes through the small tube, and intermingles with the heated air which is rushing through the larger tube of three inches, and by that means the vapour is diffused over the surface of the body.

The turpentine should be combined with lime water, in the proportion of one part of the former to four of the latter.

advantage, especially during the intervals of the administration of the one grain calomel doses. Draughts of cold water may be permitted *ad libitum*, even ice in the mouth. The effervescent draughts were found to answer better than Stevens' saline solution. The diet should consist of rice gruel, oatmeal gruel, panada, tea, or coffee.

3. If the patient have incessant vomiting and purging of whitish, gruelly, or rice watery fluid, with cramps, cold skin, shrunk countenance, livid hands, and no pulse, even at the carotids—the last arteries commonly which pulsate in this disease—he is to be treated nearly in the same manner as in the preceding, only a little more actively. I have employed at first, the same hot water enema, with forty drops of laudanum, kept it up only half an hour, and then repeated the hot water, without the laudanum, every half hour, until the patient was resuscitated. Let the first dose of calomel be only five grains, with half a grain of opium; but let the one grain doses be commenced one hour after this, and the effervescent draughts after the first dose of calomel. When he is unable to drink the hot water, decomposition of the blood has either commenced, or is on the verge of undergoing that process, and in such a desparate state, nothing can save the patient but injecting the veins with a saline solution. It should be used as follows—let a solution be prepared, consisting of 10 ℔s. of hot water at the temperature of about 110°, in which is dissolved a drachm and a half of bicarbonate of soda, and half an ounce of the muriate of soda. This solution is to be strained through leather. One of the veins at the bend of the arm of the patient is then to be opened, as in phlebotomy, into which is inserted a common injecting pipe of the dissecting room, and then the elbow put in a basin of warm water to exclude the atmospheric air. The common enema apparatus was employed, the tube extremity of which was adapted to the small dissecting room pipe, and now held

under the water in the basin: the syringe was now plunged into the saline solution, and two or three syringefuls pumped out at the extremity of the tube still held under the warm water. The tube was carefully inserted in the nozle of the injecting pipe, and the pumping begun, and performed slowly. After a few ounces were injected, the pulse became perceptible, the breathing stronger, the skin warm, the countenance natural, the eye lost its ghastly sunken appearance, the face full and plump and even rosy—old age assumed the expression of youth. The cramps, the restlessness, and the thirst disappeared. It now became critical how much more saline fluid should be injected. As far as my experience goes —whenever animation, or the springs of life were fairly set agoing, then stop, for on injecting too much, the saline solution was pushed through the exhalent capillaries of the stomach and intestines, and killed the patient, by reproducing the disease, of which I have seen many instances. See M'Intosh's Practice of Physic, vol. i., page 369, 4th edition.

If possible, there should be two medical men engaged in this operation; but I have witnessed it done with great science and success, by Dr. Sibson of the Nottingham Infirmary, and Dr. Robertson, surgeon of the 1st Royals, then enthusiastic pupils at this school of medicine. We are indebted to the late Dr. Latta of Leith for this discovery; but to the great Delpech for proposing the injecting fluids into the venous system—the latter erred in employing too stimulating fluids. During the injecting this solution, the dissecting room pipe should be carefully held by one assistant, while the other slowly works the syringe, holding it perpendicularly, and steadily watching the extremity of the tube inserted in the injecting pipe.

The enema apparatus should be carefully examined and cleaned, as the salts corrode the brass, and form a poisonous solution.—See Macintosh, page 366.

Some state that rigors invariably followed this operation; but when judiciously performed, they never occurred to my knowledge.

The albumen of eggs was tried in combination with this saline solution, as also the solution of morphia and quinine, but they did not improve it. Alcohol and other tinctures were tried, but did not answer so well.—See Mackintosh, p. 370 and 371. Sangnineous transfusion failed.

In such cases as these, galvanism may be had recourse to, with the view of keeping up life until the other remedies have had time to act. But if the blood has begun to be decomposed, it will, I fear, rather increase than retard this change. For, according to the experiments of Priestley, Brugnatelli, and others, both venous and arterial blood are rendered darker and thicker when subjected to the positive pole of the galvanic battery. My friend Mr. Steele has employed it in two or three cases with apparent advantage. The positive pole should be applied to the nape of the neck, and the negative to the loins or region of the stomach.* In one case, the face changed from blue to a natural red colour.

With respect to the employment of oxygen, or nitrous oxide gas, to the lungs, I apprehend, that there is not time for their administration; or, in other words, the time when oxygenation of the blood, would have been of utility, has passed away. I am of opinion, that the inhalation of the vapour of water by the lungs would be of more use; and, on conversing with my late friend, Dr. Carruthers, on this point, he stated, that in some of the hospitals which he visited, where there was moisture combined with the heat, the patients expressed themselves relieved by it. The vapour ought to subdue the inflammatory spasm of the pulmonary plexus.

* For farther information on this subject, the reader is referred to the writings of Greenhow, Lorimer, and Burton, on this disease.

Probably, the inhalation of tobacco fumes might be beneficial in this view.

Our success in the stage of collapse must greatly depend on the idiosyncracy of the patient, and whether or not he has previously laboured under visceral disease.

Regarding the fever, or re-action, which follows, I have treated it with sponging the skin with hot water and vinegar once or twice a-day—continuing the effervescent draughts, farinaceous diet, keeping the bowels open, by mild aperients, as rhubarb, and cautioning the patient against rash exposure to cold, or irregularity in diet, and too great exertion before the constitution was re-established.

Cerebral affection is very common, indicated by vertigo, and even coma. This should be treated by shaving the head, applying cold water, leeches to the temples, and blisters to the nape of the neck. The saline carbonates were found useful both in this and the bronchitic affections. When the chest is affected, leeches, blisters, and tartrate of antimony, in water solution, are to be relied on. Bronchitis is the most common sequence. When we consider the engorgement of the capillary vessels, during the stage of collapse, we can readily understand the difficulty in curing bronchitis, pleuritis, and pneumonia. It was remarked, in one of the hospitals, that pneumo-bronchial congestion followed cerebral congestion in twenty-four or thirty-six hours.

When the abdomen is the seat of the sequence, there is commonly peritonitis, which is to be treated with leeches, fomentations, and blisters. Irritability of stomach not unfrequently follows, which generally yields to the application of leeches and blisters, and occasional doses of effervescent draughts or bismuth mixture. Mild turpentine enemata afforded relief. In order to restore the action of the urinary bladder, spirit of nitrous ether, camphor, hyosciamus, and laudanum, should be given, a mustard poultice applied over

the pubes, and the catheter inserted, as there is occasionally a considerable quantity of urine collected.

The constitution, from the quantity of calomel given, is generally under the influence of mercury for some days, which is rather favourable than otherwise. It keeps up the biliary secretion.

From the rapid decomposition which takes place in the blood of Cholera patients; from the insulation of the different portions of this fluid, if I may use the expression, the capillary cutaneous circulation being soon separated from the general mass of the circulating system; from the vascular engorgement of the capillary vessels in every organ; from the rapid insulation of the portions of the nervous system, the ganglionic being soon unable to keep up a unity of action with the sensorial and voluntary systems of the general nervous mass —I am decidedly of opinion, that all patients, when once vomiting and purging of the gruelly or rice watery fluid have begun, with a shrunk face and merely a *cool* skin, and even a pulse distinct at the wrist, should remain where they are found, and ought not to be removed from that bed or floor on which they lie—not even from a worse to a better bed in the same room. And, during the treatment, they ought to be warned, that even sitting up in bed to make water, or to have motion in the bowels, is attended with the greatest danger.*

* At Craighall, I witnessed many serious and some fatal consequences, where patients were inattentive to these regulations. Dr. Greenhow states, "that he has witnessed fatal effects from the departure from the horizontal position."

Dr. Thomas Molison cites cases where they expired while sitting up in bed to take a drink.

Similar results were witnessed at Hamburg.

Printed by W. H. Lizars, Edinburgh.