its immediate neighbourhood many more, from causes which I shall presently detail. This sewer runs its course along the lowest ground between two hills, Ludgate-hill on the one hand, Fleet-street on the other. When the sun shines upon the hills the air becomes warmer and specifically lighter, and hence, according to immutable physical laws, a circulation of air laden with the hurtful gases is produced in a direction from the river to these streets, and with a magnitude of current directly proportionate to the imperfection of the trappings of the sewers. This life-destroying blast is perceptible to the olfactory organs of the most indiscriminating person.

The cholera does not necessarily follow water, because no case has occurred along the New River, which is a pure, pellucid stream, running at a considerable altitude along the hills, and which therefore does not impede the drainage in the neighbourhood. At Highbury-vale a foul ditch runs, and there I am informed the malady has occurred. From these facts we learn that water without a sewer is hurtless.

The non-diffusive theory, which I submit is competent to account for the facts of cholera, shows that the public have incurred a grave responsibility for not having removed effectually the excrementitious matter from London, as it points out that every death from cholera is a homicide which might by proper management have been prevented.

The most indifferent person must have observed that noxious vapours do not diffuse with equal rapidity at different times, and a question naturally arises, how far electricity may be supposed to influence that state. When particles of matter are electrified similarly, they repel each other; when dissimilarly, they are mutually attracted. As far as gases are concerned, I do not know of any experiments which bear upon the matter, and so far as my own attempts have at present gone, I do not feel at present satisfied upon the results. During the prevalence of cholera, the electrical state of the atmosphere has been neutral, and when thunder-storms have occurred, the electrical disturbances have only been manifested for a few hours. This neutral state is probably most favourable for the non-diffusion of gases.* It is probable this non-diffusive state does not altogether depend upon electrical conditions, as we have neutral electricity for days together when cholera does not appear.

The absence of diffusive power may not be for all gases equally, and if subsequent experiment confirm this idea, a cause for each specific epidemic may be ultimately ascertained by the medical practitioner having proper recourse to chemistry and natural philosophy.

Within the last month I have had many inquiries upon the possibility of the disease being due to the direct action of electrical states upon the human frame. Upon this matter, I can only say, that having kept small animals under electric tension for weeks together, I never could observe any very appreciable effect, and I do not believe myself that electricity in any form could give rise to cholera. With respect to the statements which have appeared in the papers, of the non-action of an electrical machine, under French auspices, when the cholera raged, I may state that it is contrary to my own experience, and so opposed to physical laws that it partakes rather of the romantic than the real.

With respect to the effect of electricity as a remedial agent for cholera, there are not sufficient physiological reasons for supposing that in any form it can be applied with great success; yet as a stimulus, Dr. Peacock has employed it usefully, and by using the intermittent current of the electro-magnetic, or magneto-electric machines, the asthenic and dynamic pole of the great peripheral battery may be excited to action, and according to the experiments which I have elsewhere described, the entire capillary system of the surface and extremities of the body would be stimulated, and the blood thereby drawn off from the interior. There would be no difficulty in keeping a cholera patient under electrical tension, by simply placing the legs of the bed on blocks of glass, and connecting the bed with the conductor of an electric machine, but upon physiological grounds I do not apprehend that much benefit would arise in so severe a disease as cholera.

I invite the attention of our profession to the non-diffusive theory, for its universality or its uncorrectness can only be proved by a multitude of observers. At present, it appears to me to express the greatest number of facts, and to be the

most useful for practical application, as it declares that cholera may be avoided by pure air, proper ventilation, and perfect drainage.

The practical man is never contented without inquiring into the best mode of action. It is clear that in a few days we cannot alter our gigantic sewerage works, and therefore the best preventive which can be adopted, is to cause the flow of such a great abundance of clear water that the poison may be retained in the sewers. Clear water contains oxygen to combine with the noxious products, and it is found that, up to a certain state, water takes from the atmosphere gases to which it has an affinity, instead of yielding them to it, to spread abroad the poison.

The supply of water in London must in great measure be procured from the New River, though thousands of tons might probably be thrown into the sewers by employing the waste labour of workhouses and prisons to pump water from such wells as already exist.

Finsbury-Circus, March, 1849.

ON THE PATHOLOGY OF CHOLERA, AND ITS TREATMENT BY STIMULANT REMEDIES.

By HENRY HANSON DEARSLY, Esq., M.R.C.S. & L.A.C.,
Paddington.

CHOLERA, in my opinion, is mainly a loss of power, and sometimes of prostration of the sympathetic system, caused by a particular electric state of atmosphere, the consequences being cessation of absorption, secretion, and circulation, to variable extents.

From the lost power, and extreme relaxation of the absorbents, we have, instead of their proper functions, a copious and rapid exudation of their contents and serum.

The loss of secretion is seen in the absence of saliva and urine, and as regards bile, I believe the secretion of it, as well as of the others, ceased during the severer stages of cholera; and from want of power and nervous influence in the gall-bladder and ducts, the latter have become incapable of expelling their contents.

I know that it has been stated, that the congestion of the liver with bile, and the portal veins with venous blood, prove it the source of the disorder. Now, in the closing of the gall-duct by inflammation or stone, which sometimes continues for weeks, we have no such symptoms as cholera, though not a drop of bile has escaped into the intestines for a lengthened period. In cholera, the gall-ducts are not closed, and the gall-bladder is usually surcharged with bile. Why is it that the bile is not poured into the bowels? My answer is, from want of nervous power.

The vomiting and purging, I think, is caused, not only by the absence of proper nervous stimulus to the stomach and bowels, leaving them intolerant and irritable, but from the discharge of serum loaded with the salts of the blood upon their surfaces, acting as a violent irritant to them, and being highly offensive to their diseased intolérance.

Cramps and spasms are the consequences of the great reduction of circulation and animal heat, and from the loss of the fluids of the body. They do not originate from any specific poison. Sudden reduction of animal heat by very profuse perspiration will often produce as violent cramps and spasms as cholera, as I have often seen in men working very hard before large furnaces in steam-vessels, in a hot atmosphere, and, at the same time, drinking largely of cold fluids. In such cases, the cramps and spasms have been so great all over the body that the patients have been drawn double, with many of the muscles in hard knots, and have shrieked with agony. The treatment in these cases was stimulating and anodyne, and always with success.

I have brought forward this exemplification, because I attribute the cramps and spasms in cholera to precisely the same cause—namely, sudden reduction of nervous energy and animal heat. They always occur in an asthenic, never in a sthenic state.

If ever stimulants were intended for the service of mankind, in my opinion it is during an attack of cholera that they are most needed. What is the state in which we find the patient? Is he strong, or faint and exhausted? Common sense will answer—In the latter state. He is of an earthy paleness; has icy cold, clammy surface; is pulseless, or almost imperceptible; vomiting and purging incessant; says he feels as if everything had sunk away within him; or, in other words, extreme prostration, almost to death. There is evidently a mighty flagging of vital energy. To me, such a state

* Connected with this subject, we must not forget the presence of ozone in the atmosphere. It has the properties of a highly oxygenated substance, and hence would enter into combination with mephitic bodies. This curious substance is produced whenever electricity is passing through water or aqueous vapour, and is, perhaps, identical with the peroxide of hydrogen.

would appear evidently to require instant support and stimulation.

How to administer relief where the stomach will not bear burthen, and is so irritable and intolerant, is a great consideration.

To give much of anything is poisonous, and will be rejected, and cause vomiting, which is attended with additional expenditure of nervous energy.

The first grand principle is warmth; perfect quiet in the horizontal posture; and stimulants, aromatics, and anodynes, in the fluid state, given in mouthfuls at a time, allowing a space between each sip.

To warm, to soothe, and to stimulate is our object, bearing in mind that the stomach will not endure quantity or irritants.

Notwithstanding the great number of anathemas passed upon it, I have found opium a grand auxiliary in subduing cholera. In large or narcotic doses it is injurious, causing vomiting; or if retained, rather deadens than excites vital action. Small and repeated doses, not to be carried to narcotism, will allay sickness and purging, stimulate the heart's action, and promote animal heat. It never should be given in narcotic doses.

My favourite medicine for an adult (which has been successful in every case in my hands) is, tincture of opium, eight drops; compound tincture of rhubarb, twenty drops; tincture of capsicum, three drops; compound tincture of cardamoms, twenty drops; aromatic confection, five grains; mixed with two or three tablespoonfuls of water, and to be taken by a little at a time. The dose to be repeated soon at the commencement, to the extent of three or four; after which it is to be given cautiously and gradually, but not continued so as to produce narcotism. At the same time I administer this, I mix a glass of one-third brandy and two-thirds boiling water (sometimes stronger) with sugar and plenty of nutmeg, to be drank in mouthfuls. Where I cannot administer brandy-and-water, to relieve thirst and stimulate, I allow the patient to moisten the mouth and throat with frequent mouthfuls of cold water; but never to take a draught of anything.

Common sense ought to guide us in the use of stimulants, and not allow us to carry them to extreme intoxication. The irritant stimulants should be avoided, and the astringent and soothing ones used. In very young children, of course opium and stimulants must be most cautiously administered. I give as little as one-fourth of a drop of laudanum in some cases. Warmth and aromatics, with perfect quiet, must be the chief treatment of infants.

The patient should be kept warm by folding blankets about him, and if the spasms cause him to throw them off, they are gently to be replaced. Bottles of hot water, or bags of sand or bran, should be applied to the feet, and a large mustard poultice to the abdomen, till the surface becomes red and irritable. The cold moisture should be rubbed from the surface with a warm cloth.

Drunkards, and those of very debilitated nervous system, stand the worst chance, the former often never surviving the first great shock of the malady. Their nervous system cannot recover the first blow. The advantages of temperate habits was never more strongly exemplified than in cholera. In the case of drunkards, stimulation must be carried to a much greater extent; indeed, without it we have no chance. To move about or much disturb such a patient, would be to shake out the flickering spark of vitality. In any case of cholera, motion is bad.

From such a tremendous shock to the system as that given by cholera, we must look for after-consequences. These vary. Sometimes we have congestion about the stomach and bowels; sometimes of the brain; sometimes diarrhoea; and always great lassitude and debility, continuing for some time, and occasionally terminating in typhus. I have always found a blister over the abdomen, with gentle purgatives, remove the congestion in the first case; and also in the head affection, with the exception of the blister being applied to the back of the neck, instead of as in the other case. The treatment of fever must be the usual one after great debility.

Patience and perseverance are required in cholera, as in the treatment of other diseases; and Nature will have time, as well as assistance, to work round its own restoration.

These opinions I have not stated from mere theory, but from the most positive practical proofs. I have, at this moment, a patient less than four years old, in a healthy slumber, who was brought to me three days ago, vomiting and purging as it lay in its mother's lap; the white fluid running from its bowels; pulseless; breathless, (to observation;) blue and icy-cold, moist surface; and, to appearance, beyond re-

suscitation. It may now be declared well. I have had many cases, all of which have recovered, and most of them now in perfect health.

I cannot tolerate the use of calomel to the amount almost of filling the stomach, although it is a powerful stimulant, (particularly to secretion.) To use the language of an eminent surgeon of my acquaintance, "I think mercury has much to answer for." That large quantities of calomel should not have a prejudicial influence on the constitution is beyond my credulity.

The system of treatment I advocate is decidedly stimulant, and I should have every confidence in its success in every case where cholera attacked the previously healthy, if administered with proper judgment and discretion. *Prostrata sympathetica* would be a much more appropriate name than cholera.

Bridge-terrace, Harrow-road, Aug. 1849.

ON THE EMPLOYMENT OF FRIGORIFIC MIXTURES OR EXTREME COLD IN CHOLERA.

By JAMES ARNOTT, M.D. &c., Brighton.

My communications to *THE LANCET* of the 21st July and 4th August, on the treatment of cholera by the application of intense cold to the digestive canal, were defective on a point, which the experience of a case of this disease since treated on that plan has shown the necessity of elucidating—I mean, the mode of exhibiting the remedy.

The case alluded to was that of a boy, fourteen years of age, who had refused to take, or had immediately rejected, the medicine which had been prescribed before he came under my care; and who afterwards could not be induced to swallow pounded ice in sufficient quantity to be of any service. Under these circumstances, I prepared a draught of about six ounces of a weak solution of salt, of the temperature of 20° Fahr., by placing a tin canister, containing it, in a frigorific mixture of ice-and-salt, and keeping it there until the solution had acquired the consistence of jelly. This consistence a solution of either salt or sugar will acquire under a low temperature, and more certainly if it be continuously stirred while exposed to the frigorific; and if a little salt be added to it immediately before it is exhibited, its temperature will be much further reduced, and continue so until the semi-fluid ice is completely dissolved. The patient took several large draughts of this frigorific in succession; and although they were generally soon vomited, they were retained in the stomach long enough for the cold to produce its full influence. Instead of salt, a small quantity of brandy was substituted on two occasions, not to act as a stimulant, (for in the condition of the stomach in an advanced stage of cholera brandy is probably powerless in this respect,) but to answer the same purpose, of retarding the freezing of the draughts. It is worthy of observation, that the ices prepared by confectioners may be much colder and more useful in medicine than common ice usually is; and if stirred or broken up, in order that they may be more easily swallowed, they would constitute a remedy of cholera as useful (if taken in sufficient quantity) as it would be agreeable. An enema of about a pint of the saline frigorific solution was administered after the draughts.

The effect of this treatment was, the speedy cessation of the rice-water vomitings, the brightening or reanimation of the countenance, and the raising of the pulse from that almost imperceptible state in which it is generally found in the stage of collapse. This amendment took place before the expiration of two hours from the time the frigorific draughts were first exhibited. The frequency of the stools continued, but they were not so copious; and they soon became coloured with vitiated bile, and not long afterwards feculent. The secretion of urine was likewise soon restored.

No other remedy was employed during the more dangerous stage of the disease, excepting the external application of heat by the method described in my letter of the 21st, which enables the practitioner to apply the appropriate heat for any required period, without disturbing the patient or further exhausting his energies. Calomel and opium were afterwards exhibited during the stage of reaction, and they may have been of service. At an earlier period, or during the profuse serous exudations from the mucous membrane, these medicines would probably have had no more effect than the "antimonial powder" used to have in fever, though so long and so generally confided in as a potent febrifuge, before the discovery was made that it is a substance totally inert.