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OBSELY & SON
OF THE
PATHOLOGY & TREATMENT
OF
CHOLERA
—
MURRAY

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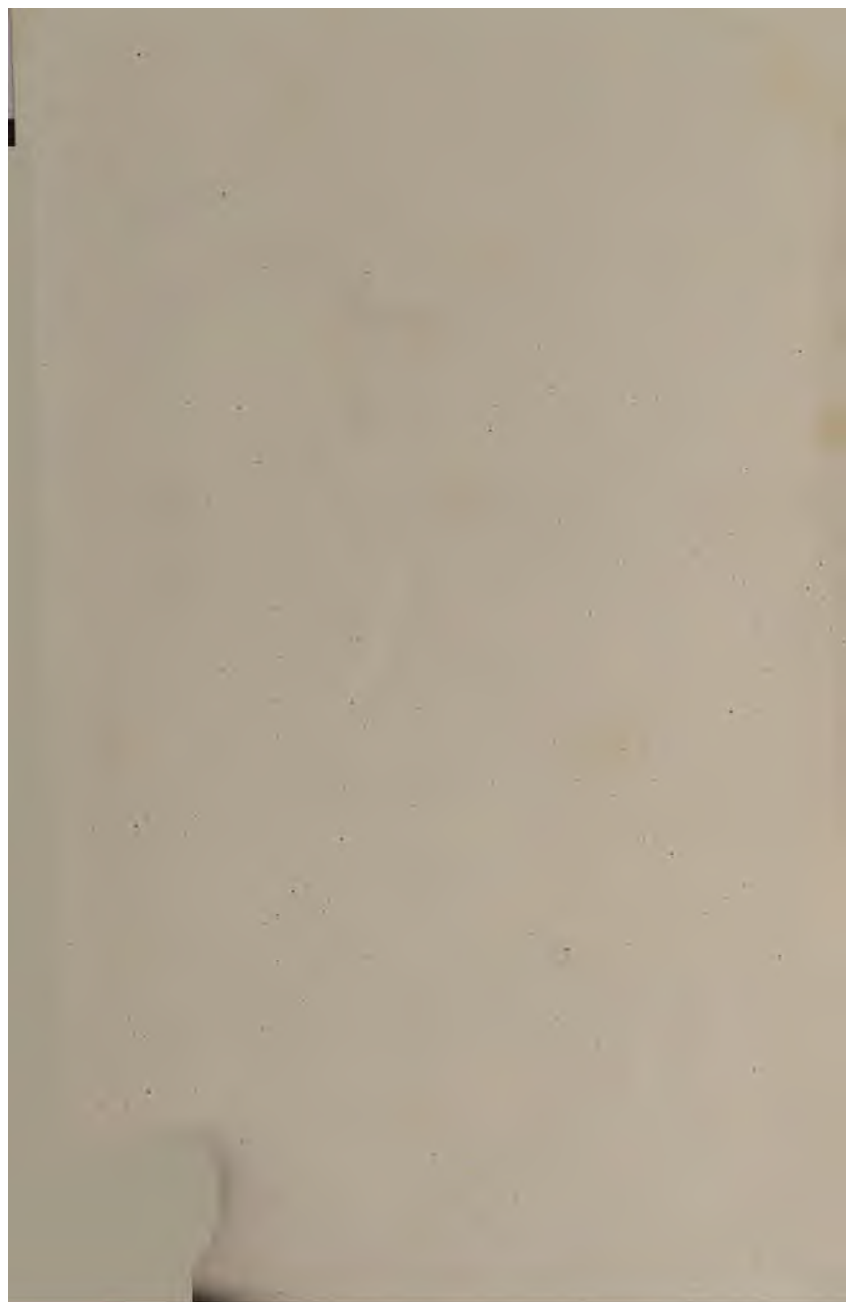
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CHOLERA

OBSERVATIONS
ON THE
PATHOLOGY AND TREATMENT
OF
CHOLERA

THE RESULT OF FORTY YEARS' EXPERIENCE

BY

JOHN MURRAY, M.D.

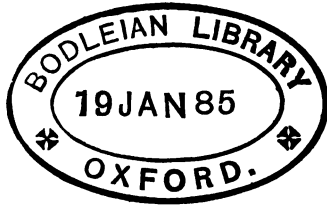
INSPECTOR-GENERAL OF HOSPITALS, LATE OF BENGAL

SECOND EDITION

LONDON
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1884

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PREFACE TO THE SECOND EDITION.

THESE observations were published in 1874, when an approach of Cholera was imminent. As the disease did not reach England, they were not at that time of much benefit to the public. I trust they may be equally superfluous now; but the presence of the disease in France, and the excessive panic which reigns over the Continent, lead me to suppose that the practical information gained by my long experience may be useful to some, should the disease spread to this country. I have had no reason to modify the opinions here expressed in reference to the treatment of the different stages of the disease, and the importance of early treatment.

The spread of Cholera in Egypt in 1882, and now in France, shows the total inefficiency of the present quarantine regulations in checking the diffusion of the disease in commercial countries; whilst the individual misery and commercial loss they occasion call for some modification of them. Quarantine was instituted in former times under very different social circumstances as a protection from plague and small-pox, diseases which are chiefly communicable by personal contact.

Precautionary measures for protection from the fatal scourge of Cholera should be framed with a due consideration of the changes in the modes of intercourse between different countries, and founded on a more complete knowledge of the channels through which it may be com-

PREFACE.

municated. Simple personal contact has been very rarely observed to spread the disease.

In reference to antidotes for the Cholera germ or microbe, and experiments on their microscopic cultivation or their destruction, the action of such antidotes on the living body must be taken into account; as most of the poisons that kill the lower vitalities would also destroy the life of the person suffering from the disease.

I do not consider the carminative pill, which has proved so beneficial in the earlier stages of Cholera, an antidote to the poison; but a stimulant to the depressed sympathetic system, encouraging the functions of the stomach in the secretion of the gastric juice, which has the acknowledged power of destroying ordinary putrefactive, or fermentative germs. This would account for this medicine being powerless in the advanced stage of collapse: when the sympathetic nerve is *paralysed*, and the stomach is insensible to all stimulants; and these are injurious, if administered in large quantities, should reaction supervene. In the prescription for these pills, which I have lately given to the daily press, the proportions of assafetida and pepper are reversed. A combination of red pepper or cayenne with the black is much commended by some; and I think it probable that the increased quantity of the stimulant ingredient may be an improvement in this cold climate.

JOHN MURRAY.

17 WESTBOURNE SQUARE,
26th July, 1884.

THE
PATHOLOGY AND TREATMENT
OF
CHOLERA.

THE knowledge that has of late years been ac-
quired of the course of the symptoms, has mate-
rially aided in the rational treatment of cholera ;
though in this alarming disease it is probable
that empirical remedies will still continue to be
extensively employed when ordinary medicines
appear to have lost all power. There are few
diseases more rapid in their fatal course than
cholera, or less influenced by medicine in the
advanced stage of collapse ; but it is more amen-
able to treatment in the stages of malaise and
diarrhoea than most other diseases that are more
violent in their earlier course. One of the most
characteristic peculiarities of this disease is the
suddenness of the change to antagonistic or

The
history.

reverse symptoms, indicating opposite remedies or modes of treatment; the general depression of malaise being followed by the increased action of diarrhœa, which is succeeded by the prostration of collapse, and subsequent excitement of reaction. In ague there are analogous sudden changes; we know that the hot will follow the cold fit, and that this will be succeeded by the sweating stage, and regulate the treatment accordingly. So in cholera, the treatment during the individual stages should be modified by the symptoms which are to be anticipated in subsequent stages. Those who do not recognise the presence of the disease till collapse has supervened, have some reason for saying that medicines are useless, if they mean powerless for a time; when the pulse is imperceptible, and the body merely a breathing corpse. But should reaction take place, at which nature makes an effort in nine out of ten cases, and sometimes succeeds, the remedies employed resume their ordinary action, and those indicated in collapse are not what are required in the subsequent stage of the disease. On the contrary, in the stage of collapse the remedies are usually stimulant or narcotic, while the danger now is from fever, or from head symptoms, the aggravated forms of which may

in many instances be attributed to the previous free exhibition of spirits, chloroform, or opium.

As the disease is caused by the presence of The cause. the cholera poison in the system, health cannot be restored till this is removed or destroyed. The first stage, which I have called *malaise*, is frequently unnoticed by the patient; it is rarely seen in hospital practice, and it is ignored by those who consider collapse an essential part of the disease; but it has been recognised by some of the most intelligent observers, from the time of the outbreak in India in 1817. It was overlooked when the disease appeared in Europe in 1830, and for many years after not only this but even diarrhœa was disputed as a stage of the disease. It was not till 1865, after the meeting of the Constantinople Congress, that diarrhœa was generally allowed to be a stage of cholera, and capable of communicating it in its most intense form.

In 1868 it was given as the general opinion The stages. of the profession in India that *malaise* indicated Malaise. the first action of the poison on the system. In all severe epidemics malaise from this cause is very prevalent, but it disappears in a large proportion of cases, without any active symptoms, under the influence of the natural secretions by

which the blood is purified in the healthy system. Malaise is produced by many causes independent of the cholera poison, such as fatigue, or excess in healthy people; or, in those who are delicate, by over-excitement, bodily or mental; depression from misfortune, or even by improper food; but during a cholera epidemic we know that when it exists a very slight cause may develop the disease, which otherwise would not have appeared. Therefore, to the experienced physician, the appearance of malaise indicates approaching danger, as the fall of the mercury in a barometer indicates it to a sailor; and he takes warning and treats the symptoms with attention, especially if the person has recently been in contact with cholera cases. It is highly probable that malaise, induced by any of the ordinary causes, strongly predisposes to the action of the specific poison, by diminishing the power of resistance of the system. It therefore requires attention, though at any other season the feeling might safely be left to itself.

The treatment in the stage of malaise.

The indication of treatment in the stage of malaise is to remove the poison by those means which nature uses to purify the blood, and so relieve the system without the disease advancing to diarrhœa; because, when looseness has once commenced, it is apt to induce watery congee

stools, and to run beyond control. Improper food, over-fatigue and exposure, exhaustion, mental depression, and purgative medicines, all tend to develop the second stage of the disease. In those cases in which the invasion of the disease is tided over until the poison is thrown out or destroyed, fresh air, generous food, gentle exercise, and useful or agreeable occupation are the remedies employed, and where available they are generally successful. Our care should be to sustain the strength, promote digestion, and keep up the spirits, avoiding exhaustion, and particularly avoiding purgative medicines.

In this stage, there is no appreciable elimination or discharge of the poison; but when its action disappears it may be inferred that the poison no longer exists in the system. It has probably been decomposed or digested by the vital action of the stomach, and then been eliminated through the excreting organs. It may have been eliminated by these organs in an entire or viable form; but there is no proof of the disease having been transmitted previous to the stage of diarrhoea.

No appreciable discharge.

In many instances of malaise I have heard expressions of relief from oppression, and of improved spirits, immediately after removing into camp from an infected cantonment. In civil life, or

Removal.

in epidemics in large cities, such a change of air can only be partially employed ; but much good may be done by improved ventilation, and by keeping the air uncontaminated by decomposing matter.

Digestion. To promote a healthy digestion of food is of the utmost importance, as its interruption not only diminishes the working power of the system, but allows other forces to come into action, such as fermentation and putrefaction, by which the food is rendered irritant, and acts on the intestines, inducing looseness and vomiting. That the food in this stage often remains one or two days undigested, is shown by the matter vomited in many cases of cholera having been eaten one or two days previously, instances of which I have frequently seen. There is here a clear indication to assist nature in promoting digestion by all ordinary means, aided by those that have been found useful under particular circumstances, and at various seasons.

Stimulants. There is a feeling of lowness in the stage of malaise which naturally longs for stimulants. This must be carefully controlled in reference to such alcoholic compounds as spirits, wine, or ale ; as the excitement of stimulants, if at all in excess, is followed by depression, which predisposes the system to the attack of the disease. In modera-

tion, and at the usual periods during meals, such stimulants are valuable ; but they are objectionable on an empty stomach. Instances of the disease developing itself during the depression following a debauch are numerous, and this must be guarded against in civil as well as in military life. But during an epidemic of cholera it is not safe entirely to cease the use of spirits, when too large an indulgence in them has been the habit. The European troops in India are aware of this. In a severe epidemic at Agra, one of the men told me he could not leave off drinking till the attack had passed over, as if he did he was sure to get the disease and die. Panics at such times have occurred in all parts of the world, and they will ; and to resort to spirits is one of the first refuges of the frightened ; but they should be warned of their danger in so doing. Spices and aromatic stimulants are useful and not dangerous, and even the idea of using some remedy does good. Quinine is a medicine which has been of most marked benefit in India, especially when the epidemic has occurred in the rainy season ; and it should be equally valuable in Europe in the autumn. I have found it most efficacious, and seen it extensively used with great advantage. I always took it myself at that season, to a small

extent, viz., 2 grains two or three times a day. I think it merely acts indirectly, in promoting digestion and counteracting the miasmatic influence of the season. I have seen no bad effects from its use, and I consider the neglect of it culpable.

The treatment in the stage of diarrhœa.

The second stage of cholera commences with the development of active symptoms, viz., *diarrhœa*. This stage varies in duration from two or three hours to two or three days; occasionally it is wanting altogether; the first or second loose stool being followed by collapse. The evacuations, at first natural, gradually become more and more liquid, light coloured, copious, and often frothy, unattended with pain, and passed with a feeling of relief. They then become watery and colourless, with lightish *floculi*, like congee water; and they are ejected forcibly; with burning pain in the epigastrium, cramps in the extremities, and frequently vomiting. In some cases, which have rapidly proved fatal, the congee fluid is found in the large intestines, and in the lower part of the small, gradually becoming thicker and more consistent or creamy to the duodenum. It is more watery, and mixed with ingesta, as food and medicine, in the stomach. In several of the most intense cases which had

proved fatal without any purging, the natural solid fæces were found in the rectum, whilst thin, whitish, creamy fluid was found in the duodenum, and more watery fluid lower down. In some cases the looseness commences with pain and symptoms of dysentery, the evacuations being at first mucous or bilious, or mixed with undigested food, then suddenly becoming watery and congee-like. In some rare instances the bilious stools are accompanied by fever; but this form is seldom met with, and I consider it a complication or combination with bilious fever.

During epidemics the exhibition of purgatives, more especially saline, or hydragogue, is almost certain to be followed by congee stools and collapse. Occasionally the mildest laxative, as castor oil or seidlitz powder, will be followed by similar dangerous results, if not checked by anodynes.

Purgatives
dangerous.

All forms of diarrhœa or looseness appear at such a season to predispose to collapse, either by allowing the poison already in the system to run into active action, or by predisposing to the admission of the poison pervading the air or water of the locality. The modification of the treatment, if the disease be considered as the second stage of cholera, is not injurious to the real disease should it prove to be simple diarrhœa.

Looseness.

It only entails the loss of a few hours in adopting the proper treatment, whilst, should the disease be cholera, the loss of a few hours may lead to fatal results.

The indications.

The indications of treatment are therefore to soothe the irritation of the bowels and stop the diarrhoea, and thus reverse the course of the disease to the previous stage of malaise ; the treatment of which has then to be pursued as previously indicated.

Remove irritants.

When the irritation of the intestines arises from ordinary irritating substances, as undigested food, arresting them in the bowels by opiates will merely protract or prolongate their injurious action on the mucous surface. They should be removed, but with extreme caution, checking the further action of the bowels when they are evacuated. A dose of castor oil to which a few drops of laudanum are added is the safest medicine, and the removal of the cause cures this complaint.

Creamy matter.

When the irritation arises from the peculiar creamy grey matter found in the upper part of the small intestines, and which is not found in any other disease, the treatment is different. This peculiar discharge appears to be repeated, or reproduced, after being freely evacuated, and its source is uncertain. It appears to be secreted

when all other secretions are suspended, except that of the mammary glands, and possibly there may be a similar exception to the secretion of the pancreas; but it is not of much practical importance whether it proceeds from this or from the duodenum. It is alkaline and acrid, causing a peculiar burning pain in the epigastrium, and a copious watery discharge from the mucous membrane on its passage downwards.

In cases which recover without the use of medicine, the first favourable change occurs in the colour of the motions, when the liver and kidneys resume their free action, and the digestive powers are restored. The great danger is from the purging increasing and becoming uncontrollable. This must therefore in the first place be arrested, and by remedies which are not contra-indicated by their action on the stomach, liver, and kidneys, which furnish nature's curative agents in malaise.

The remedy in which I have most confidence, and which I have found most convenient, is an anodyne carminative, composed of opium one part, black pepper two parts, and assafoetida three parts, divided into five-gr. pills; and given with a little cold water, after every second stool. In India these pills are kept in bottles at all hos-

Spontaneous cure.

Cholera pills.

pitals and dispensaries. They are distributed in all barracks under charge of a sergeant, and in all police stations over the districts, and in the towns, under charge of the head policeman. They have been used most extensively since 1856, and the reports of their efficacy, when they are taken in time, are most satisfactory. Red pepper, camphor, and soda, are sometimes substituted for the black pepper, but I do not think this an improvement.

Diarrhœa
frequent.

The frequency of the applications for medicine is strong presumptive evidence of the cause of the diarrhœa. During the prevalence of an epidemic in cantonments, I have seen forty or fifty applications in a day for medicine, when under ordinary circumstances there would not have been more than four or five in a month. To tell these men that they are not suffering from cholera is highly reprehensible. It has been done from the dread of alarming the patients and thereby favouring the action of the poison; but, in my experience of severe epidemics, I have found this fear groundless. The patients themselves are suspicious, and the confidence infused by the assurance that the disease is recognised, but in a stage in which it is easy curable, removes alarm instead of inspiring it; and the results are satisfactory.

Tell the
truth.

Time is an important element in the consideration of the general treatment of the disease in this stage, as remedies which would check it at the commencement may be powerless after an interval of one or two hours. It is, therefore, necessary that the remedy on which we place reliance should be very generally distributed, and its exhibition entrusted to persons little skilled in the treatment of disease; but endued with common sense and energy, and capable of carrying out a few simple instructions. The medicine should be in a form that will not deteriorate by keeping, and it must not be dangerous if given needlessly or ignorantly. It also should be cheap, and not likely to be demanded for other reasons than relief from disease; which might be the case if alcohol predominated in the ingredients. All these advantages are combined in this simple cholera pill.

Early
treatment
important.

The remedy which was at first generally employed in India, is a combination of calomel and opium; and in the hands of a physician this is a powerful antidote and often used with advantage; but it does not readily restrain the purging, and, unless it promotes the flow of bile, its action is questionable. It is not a remedy that can be trusted to unprofessional hands. Opium alone,

Calomel
and
opium.

or combined with alcohol, is often given with decided advantage in checking the purging or vomiting; but in many cases its action merely restrains the looseness, whilst it tends to suppress the secretions of the stomach, liver, and kidneys, the re-establishment of which is essential to recovery.

Quack
medicines.

A combination of opium with essential oils, camphor, aromatic spices, and soda in various forms, constitute the chief ingredients of numerous quack medicines, which are not without power in arresting the symptoms. These forms are agreeable but expensive, and therefore not adapted for general distribution. Chalk mixture, infusion of capsicum, camphor dissolved in alcohol, diluted sulphuric acid, &c., &c., have all been much praised by some writers, but they are not generally relied on.

Astrin-
gents.

There is one class of remedies much used by many and highly praised by some in this stage; viz., astringents, as acetate of lead, gallic acid, sulphate of iron, &c. In my opinion, and that of the most experienced Indian surgeons, they are useless if not injurious. They may restrain the number of the evacuations, but they do not change their character; and they tend to suppress the natural secretions; and possibly may allow time

for the development of the germ of the poison in the system.

In some experiments conducted by Drs. Lewis and Cunningham in Calcutta in 1870, the lower vitalities which were developed in cholera evacuations were reproduced, and multiplied more rapidly in solutions containing acetate of lead than in any other. These were not the specific cholera germ; but it is probable they were of an allied genus or species. Medicines which restrict the number of the evacuations, by removing spasm or relieving pain, or restoring the natural secretions, are not astringent, though they are sometimes called so.

Acetate of lead.

When the looseness has been checked for six or eight hours a favourable result may be anticipated; as it shows that the system is under the control of ordinary medicines. Relapses may be induced by improper food, or excess, or fatigue; but, in general, nature resumes its ordinary course, with merely the feeling of malaise and want of appetite for a few days. In some cases the motions continue light coloured, occasionally nearly white, and the urine is scanty. Three grains of calomel with one of opium, or one of the cholera pills, followed in six hours by a tablespoonful of castor oil, will be found very useful

Relapses.

Calomel.

in restoring the secretions. It should be given so that the purging is over before night; but should it show any tendency to persist, one of the pills should be repeated at bed-time.

Quinine. Small doses of quinine are very valuable in restoring the appetite, and guarding against a recurrence of the symptoms, which is not unusual during the rainy season in India.

Periodical type. I have sometimes seen the disease assume a distinctly periodical type, and I have received numerous reports of similar types having been observed in various parts of India. The peculiarity of this type is the profuseness of the cold perspiration, which looks as if water had been poured over the patient. I called it the Malwa *sweating sickness*, from some cases I saw at Mhow in 1839, and I have occasionally met with it during epidemics elsewhere. Here quinine is the sheet anchor of hope, given in large doses, with opium, two hours before the exacerbation comes on. In all cases I think quinine does good in assisting other remedies.

Diet. The diet must be very guarded during the continuance of looseness; no solid food beyond farinaceous, such as bread, arrow-root, or sago, should be allowed; with milk and tea in the morning and evening, and soup with a glass of

wine in the middle of the day. Those in the habit of using much wine should repeat this in the evening; or for these, perhaps, a little brandy and water would be better, as these habits must not be suddenly changed at such a crisis; but I do not consider it necessary for those unaccustomed to spirits to commence using them now. Exercise in the fresh air is to a certain extent desirable; but fatigue is dangerous, and very apt to be followed by collapse.

It must be borne in mind that the evacuations in this stage of cholera contain the active germs of the disease; and they are capable of being disseminated, and of communicating it to others. This danger should be carefully attended to in all hospitals during epidemics, and disinfectants should be freely employed with the evacuations, and with all articles stained by them. It is during this stage that the disease is most generally spread over the world. It is so seldom recognised as cholera until it advances to the stage of collapse that precautions regarding its transmission are frequently neglected.

Dissemination.

We have now reached the most difficult part of our subject, viz., the treatment of *collapse*. There are several degrees of collapse, and it will

Treatment in the stage of collapse. 1st degree.

materially aid our investigation of the treatment to consider it under three heads.

Incipient
collapse.

1. *Incipient collapse*.—Here there is great prostration of strength; but the voluntary life of the body is active, and the involuntary life only partially suspended. The intellect is clear, vision and hearing little affected; the voluntary muscular power continues; the pulse is distinct; the respiration is slow and the breath cold; the voice is husky; digestion is suspended, and the liver and kidneys have ceased to secrete. There is burning pain in the epigastrium. The stools are watery and congee-like, with a mawkish odour. They are copious and passed with great force, and generally accompanied by vomiting of a similar fluid, and by cramps in the extremities. Danger here is imminent, and the favourable diagnosis depends on the strength of the pulse. From this state recovery sometimes takes place without the exhibition of medicines; or only the use of cold water. The burning pain in the epigastrium subsides; the stools become coloured and less frequent, the urine flows, and all the symptoms of collapse gradually disappear.

Indica-
tions.

The indications of treatment are to alleviate the symptoms, and aid nature in restoring the secretions. This is rendered difficult from the

partially paralysed state of the internal organs rendering them little amenable to the ordinary action of medicines. In the treatment during this stage the vital importance of avoiding fatigue cannot be too strongly enforced ; as even assuming the erect posture, or sitting up in bed, is often followed by fatal syncope. This renders some remedies dangerous which might otherwise be indicated as valuable.

The constant cry of the patient is for cold water, and it should be supplied in small quantities and at short intervals. It should be iced if practicable, and medicated by the addition of an acid, either sulphuric or acetic : alternated with an alkali, either carbonate of ammonia or soda : these alternations being regulated by the feelings of the patient. The addition of a small quantity of brandy or wine is strongly recommended by many of the most intelligent physicians in India, who condemn its use in large quantities ; but, in my opinion, the less alcohol that is given the better prospect the patient will have of recovery.

When the hour of exacerbation approaches, which may be anticipated at intervals of twelve hours, one or two grains of quinine should be added to each glass of the water, followed immediately by a large dose of ten grains, should return-

ing warmth and subsidence of the burning pain in the epigastrium indicate an effort at reaction. The second or third dose of water is frequently vomited soon after it is taken; but this should not prevent its being repeated. In some cases I have viewed the act of vomiting as beneficial in rousing the torpid senses; and there is the hope of some of the fluid being absorbed, and of its passing downwards and rendering less irritant the contents of the intestines.

Auxiliary remedies.

In addition to this, the auxiliary remedies exhibited by the mouth on which I have most reliance are the anodyne carminative (the cholera pill) and calomel. The former should be repeated when rejected by vomiting; but never so that more than two should be in the stomach at the same time, and the latter in two-grain doses every two hours.

Promote the secretion of the eliminating organ.

The treatment here recommended is in great measure expectant; to gain time to allow nature to eliminate the poison through the individual secreting organs, by the power of the *vis medicatrix naturæ*. Many individual remedies have been recommended to promote the action of the paralysed organs; but they labour under the disadvantage of their ordinary influence being suspended by the diseased state of these organs;

whilst their favourable action on one of these may be of an injurious character on the other equally important eliminating organs.

For example, the medicines most generally used to promote the flow of bile, as calomel and ipecacuanha, act by restraining the secretion of the gastric juice; digitalis, which promotes the secretion of urine, depresses the action of the heart; opium, which allays the vomiting and purging, arrests the secretions of the liver and kidneys. Some other remedies are not obnoxious to these counteracting influences, and in many instances their action appears to be satisfactory; viz., camphor and ammonia, which stimulate the stomach without tending to the suppression of any of its secretions; or to subsequent injurious action on the brain, when reaction takes place, which is frequently found to follow the use of alcohol and chloroform. The accounts of the favourable results of the exhibition of alcoholic solution of camphor, and of decoction of red pepper or green chillies, are authenticated by unquestionable medical authorities; and they are worthy a trial when the case is losing ground under the course that I have recommended.

Medicines.
act differ-
ently.

Camphor
and am-
monia.

Red
pepper.

There is another channel for the introduction of medicine besides the stomach, which should

Enemata.

be used as an auxiliary, or reserve, when other means are not gaining ground, viz., the *rectum*. This I have taken advantage of with most marked benefit since 1834, and it has been extensively used in India since that time with satisfactory results. The exhibition of hot saline enemata, consisting of 1 pint of warm water (120° F.), $\frac{1}{2}$ ounce of salt, and $\frac{1}{2}$ drachm of soda, relieves the cramps and uneasy pains in the abdomen; and very often arrests the purging and is followed by reaction without any bad symptoms. Sometimes after the first enema diarrhoea is arrested, the cramps subside, sleep is induced, and reaction gradually comes on. But in many instances in the intense and subsequent degree of collapse this remedy is powerless to save life, though it relieves the suffering from cramps. The objection to their use arises from difficulty of their exhibition owing to want of time and attendants in great epidemics, both in hospitals and in private houses; but where these are available their use should not be neglected.

Supply the
deficient
secretions.

It appears to be a natural indication of treatment to supply artificially those secretions which are deficient or suppressed by the presence of the poison in the system; the reappearance of which is simultaneous with the subsidence of the disease, viz., the bile and gastric juice. I was led to this

consideration by observing that in cases which recovered without the use of strong remedies the burning pain in the epigastrium subsided, and bile appeared in the stools at a period when all secretion of bile had been for some time suspended.

From observation it is well known that after death there is generally found a distended gall bladder, whilst there is no bile in the intestines. It appears to me that this bile is retained in the gall bladder by spasm of the ducts; and that this spasm in those cases that recovered having relaxed as death approached, allowed the accumulated bile to ooze out into the intestines near the seat of the burning pain. It then acted directly on the active germ of the disease, either as an antidote to the poison or neutralising agent; and subsequently appeared in the evacuations. Dr. Orton mentions bile having been used with advantage as a remedy in Madras in 1820; but it has not been employed since. The action of bile on the lower vitalities which abound and are developed in cholera evacuations, as observed by Dr. Lewis in Calcutta in 1870, was immediately to arrest their action on vitality; and the bile from a cholera subject appeared more powerful in destroying them than healthy bile. The action of an acid solution of pepsine was even more powerful in killing the animalculæ, which it also dissolved.

Bile.

Experiments.

Bile and
pepsine

These remedies were tried for a few months before I left Calcutta by Dr. Baillie, in the Native Hospital, with most decided benefit in all cases where the pulse was perceptible. Half a drachm of bile and fifteen grains of pepsine were given every half-hour. The peculiarity of the progress of the cases was that the first dose of bile was followed by vomiting, sometimes of large quantities of undigested food; but afterwards it was retained, and a change of colour soon appeared in the stools; which was followed by gradual reaction. Dr. Baillie left Calcutta; and I am sorry that I have not, since I came to England, been favoured with the result of any subsequent trials; though I strongly recommended his successor to continue these experiments. There will be opportunities of testing the efficacy of this method of treatment in Europe, which will not be neglected.

External
remedies.

Warmth.

Remedies are employed externally to restore the warmth of the body and relieve the cramps and vomiting. Warm baths have been strongly recommended, but the fatigue of using them and the danger of raising the head render them ineligible. Hot air baths, applied in the bed, are more efficacious and less dangerous, but they are not spoken of with much confidence. Warm fomentations give relief. Wrapping the body in

a wet sheet has been tried, but not successfully, in inducing reaction. Cold effusion has been said Cold. to be useful; but I have not seen it employed, and the reports of its effects are unfavourable. Shampooing, or friction with turpentine lini- Friction. ments, or with dry ginger, is very frequently employed with great relief to the cramps, and should not be omitted.

Bleeding was strongly recommended, and ex- Bleeding. tensively employed in 1817 and subsequent years, and it was said that, if the blood could be made to flow, recovery was certain. Patients certainly did not recover when the blood would not flow; but many died when it did. I have seen bleeding in the early stage of diarrhœa followed by fatal collapse. During an epidemic in Madras, out of twelve febrile cases which had been bled, in Dr. Mouat's Hospital, and were subsequently attacked with cholera, eleven died. The practice of bleeding is now generally condemned in India as useless, if not dangerous.

2. In the second or confirmed degree of col- Treatment
in second
degree of
collapse. lapse, voluntary life is impaired, and involuntary life is flickering; there are active symptoms in the intestines; but the secretions of the liver and kidneys are suspended, the functions of the lungs are imperfectly performed, and the heart acts

feebly. The intellect is clear, the eyes congested and sunk, and the countenance is livid with a peculiar pinched expression very characteristic of cholera. The pulse is feeble, the breathing oppressed, the breath and tongue cold, the voice a whisper. There is free vomiting or purging, or both, of a peculiar congee-like fluid with a characteristic *mawkish* odour; there is burning pain in the epigastrium; no urine is passed; the skin is livid, with a copious cold perspiration; the fingers are shrivelled as if long in hot water; and the cramps in the extremities ascend higher. Ordinary medicines have lost more of their power in this degree; yet many recover in every wide-spread epidemic, where the only remedy used to assist nature is cold water.

Blood
vitiating.

This degree differs from the former in being complicated with a more vitiated state of the blood, caused by the retention and accumulation of impurities usually eliminated by the secreting organs, whose functions have for some time been suspended; and in many cases by the presence of coagula in the heart. These are frequently found after death, originating during syncope, or from the feeble action of the heart. They are devoid of colour in cases that have been long protracted.

Remedies are still less powerful than in the preceding degree, but recovery occasionally takes place; and it is still our duty to persevere in our efforts to lead nature to this favourable result. It is of the utmost importance to prolong life; and thus allow nature time to overcome the disease. Remedies.

Sleep is one of nature's most powerful agents in restoring strength and removing disease; and it should be promoted by every available means; and its interruption assiduously guarded against. Sleep. One of the greatest objections to the removal of the sick in an advanced stage of the disease arises from its preventing sleep. This also forms an objection to assembling many patients in one large ward; as they cannot be free from disturbance at a time when repose is so necessary and beneficial.

As cholera often proves fatal in a few hours, death does not ensue in consequence of exhaustion from want of nourishment. The nutriment which is accumulated in the body is sufficient for several days' consumption without being replenished by food. Nourishment arises from that part of the food which is digested; and this process being now in abeyance, the exhibition of solid food is useless if not injurious. The benefit which follows the use of the liquid food, which may be Nourishment.

exhibited during this stage, arises in a great measure from the watery part which is absorbed without being digested. In this manner may be explained the superior efficacy of the watery extract of fresh meat in protracted cases. This is highly recommended, and I have seen it useful in some very desperate cases. It is made by macerating fresh meat in an equal weight of water, to which a few drops of muriatic acid have been added. One or two ounces should be given every two hours. Soups and jellies are also recommended, as well as arrowroot and sago made with milk or with a little brandy. In protracted cases there is time to try these different diets, and advantage in varying the remedy.

Watery extract of fresh meat.

Soups.

Theoretical remedies.

Strong remedies dangerous.

Many remedies have been proposed on theoretical grounds, and of opposite qualities: from bleeding to brandy: from fire to ice: from strychnine and arsenic to castor-oil and cold water: camphor, spices and ammonia vinegar and sulphuric acid: externally and internally—and all have been employed in cool determination or frantic despair. Very little reliance can, in this stage, be placed on the medicinal action of drugs, and the danger of increasing the quantity or strength of the doses, which course may be suggested to the inexperienced by their want of

action, must be carefully guarded against. It is very unnerving to see a person (perhaps a loved friend), who a few hours before was in robust health, struggling for life in agony, wishing to be relieved, and willing to try anything with the forlorn hope of ease. Anxious friends will also urge the trial of stronger remedies; but the experienced physician will control this natural impulse from his knowledge of their subsequent danger.

The medicine which has been most used in India is *calomel*; in doses varying from one or two to twenty grains, repeated at shorter or longer intervals; and the quantity given has in some cases amounted to hundreds of grains before death ensued. I consider that calomel is inert until reaction has commenced; after which, if much has been accumulated in the stomach, it acts injuriously; but in small quantities it is generally useful in promoting the flow of bile and urine. Calomel.

Opium has been most extensively used in all stages of the disease. I have already mentioned its beneficial action in small doses in the earlier stages; but in this stage of collapse its employment in small doses is questionable, and in large doses most dangerous. It has no action on the Opium.

paralysed intestines, and is often accumulated to an extent that would prove fatal to a healthy person ; whilst here the flickering vitality is extinguished in the commencing struggle for life as reaction comes on, even by small quantities. Besides, should reaction succeed, the ordinary action of opium is not required to promote recovery ; and it tends to suppress the secretions of the liver and kidneys.

Chloro-
form.

The use of chlorodyne, chloroform, or æther is very highly praised by many whose experience has been limited. The immediate action is generally very favourable in arresting the vomiting and easing the pain or cramps ; but in those cases where reaction comes on after their free use, the head symptoms are often violent and uncontrollable. The simple stoppage of the active symptoms is valuable in preventing exhaustion and allowing time for the restoration of the secretions of the internal organs. The tendency of chloroform and opium is to arrest these secretions, and thus allow the disease to advance unchecked, and the effete parts of the blood to accumulate in the circulation and induce subsequent dangerous symptoms, of which the worst are those of uremia and asphyxia. A temporary relief may be obtained ; but involving a risk of permanent danger which

may counterbalance the advantage of even a moderate use of these remedies, and which renders their continued use in large doses dangerous, if not fatal.

The same danger applies to the use of alcohol Alcohol. in the various forms of wine, spirits, or ale, which are frequently, and in such large quantities, poured down the throats of collapsed patients, as a last chance in hopeless cases; and certainly there is little hope for the poor victims of professional ignorance who fall into such hands. Not that in all instances the greatest skill can save life; but many have died who might have lived had they not been drenched with brandy, and compelled to swallow it as long as consciousness remained. This practice is now strongly condemned by the most intelligent and experienced medical officers in India; but still sometimes persisted in.

Diffusible stimuli, Diffusible stimuli. as camphor and ammonia, are very frequently employed, and in some cases with advantage. They are less dangerous than alcoholic stimuli. Camphor dissolved in spirits and given in frequent small doses has been very highly praised. Ammonia in some shape is very often tried, and there is no danger in giving either or both a trial; but they should not be persisted in should one or two doses prove inert; as an

Spices. accumulation might be injurious should reaction ensue. The same remarks apply to hot spices and essential oils, which have sometimes been useful; and a tentative trial, in very tedious cases, may be advantageous in giving confidence to the sick, and in satisfying their friends that nothing has been left untried. Popular accounts of the success of various remedies are often more extensively than accurately diffused, during periods of panic, and should not be ignored.

Bleeding. I have already stated my opinion of the injurious effect of bleeding in the treatment of the first degree of collapse, and it is even more marked in this degree.

External remedies. In reference to external remedies the application of ligatures to the extremities was employed in earlier times, and it was reported to be beneficial; it is occasionally mentioned in the present day with approbation, and it is not likely to be

Ligatures. Cauteries. injurious. The actual cautery was also much used by native doctors, and is occasionally alluded to by European surgeons; but not with approbation; any more than scalding with hot water.

Blisters. Counter-irritation by blisters is a valuable remedy, though it is condemned by some; and the open surface is often difficult to heal. I am not certain that the temporary irritation from a strong

Second Stage of Collapse—Treatment. 33

mustard poultice, made with vinegar and red pepper, is not equally efficacious, especially as in some cases the cantharides blister will not act. I have seen the blister useful when the vomiting was very persistent, especially when followed by the application of morphia to the raw surface. When the cantharides failed I have succeeded in raising a blister by moistening the part, and rubbing it with nitrate of silver.

Sinapisms.

Blisters.

Ice to the spine has been strongly recommended by some: it is not likely to do harm, and is not attended with fatigue to the patient; but it is not generally considered beneficial.

Ice.

The endermic exhibition of medicines is strongly recommended by a few. The success of quassia thus administered was loudly vaunted in India, where for a time it enjoyed extensive quack celebrity. The injection of chlorate of potash was also at one time recommended, but the result was not promising. Morphia has been thus used with advantage in relieving pains and allaying vomiting. Quinine has also been transfused with supposed advantage. The last suggestion under this head has been the injection of large quantities, scruple doses, under the skin in the axilla; but I have not heard of any success from this plan.

Endermic exhibition.

Quassia.

Morphia.

Quinine.

The treat-
ment
recom-
mended.

Palliative.

Cold water.

Hot saline
enemata.

Friction.

Quinine.

Erect
posture
dangerous.

The treat-
ment in
the third

The treatment that I have found most beneficial is similar in character to that recommended in the previous degree,—the same palliative cold drinks, to which a little salt may be added occasionally; hot saline enemata, hot applications, as bottles, or bran-bags, or fomentations, and friction with turpentine liniments; strong mustard poultices, or blisters applied to the abdomen. The addition of a small quantity of quinine to the water does not seem to have any immediate effect in checking or increasing the vomiting or purging; but it appears to me useful in warding off the exacerbation of the symptoms, which is usually found to take place at intervals of twelve hours, and thus allowing time for the appearance of bile in evacuations, which is the first sign of hope. This is generally preceded by subsidence of the burning pain in the epigastrium.

In this degree of collapse the syncope which is so apt to follow sitting up, if not immediately fatal, is generally followed by such diminished action of the heart as to render the pulse imperceptible at the wrist, which is characteristic of the following or third degree of collapse.

In the *intense* or most advanced stage of collapse the powers of voluntary life are very

Third Stage of Collapse—Treatment. 35

low, and those of involuntary life are paralysed. degree of collapse.
The intellect is dull; the patient is nearly unconscious, but may be roused; eyes half opened, Symptoms.
sunk and congested; hearing dull; breathing slow and intermitting; voice a whisper; pulse imperceptible at the wrist; congee stools are occasionally passed involuntarily; but often there is no discharge from the stomach or bowels for several hours before death. The burning pain in the epigastrium continues, and the cramps ascend to the abdomen or chest; but they are sometimes entirely absent.

Reaction in this degree is rare, and recovery Reaction.
even after it very uncertain, owing to the impure state of the blood, and the increase of the poison Prognosis.
in the system; and probably the formation of coagula in the heart. Still it does sometimes take place, apparently uninfluenced by the multitude of remedies that may have been tried. The restlessness subsides, the half-closed eyes shut, and sleep ensues; the pain in the epigastrium disappears, and the stools become coloured with bile. This probably arises from the escape of Escape of Bile.
bile from the gall-bladder, owing to the expiring relaxation of spasm in the gall-ducts, as I have previously suggested.

It has been proposed to rub the side, and try Remedies.

Rubbing
the side.

to press out the bile, but the result of this is uncertain. The hope of recovery is still faint and the diagnosis most unfavourable. I have seen no remedy on which reliance can be placed to save the life of the patient.

Trans-
fusion of
saline
fluids.

By the transfusion of large quantities of saline fluid into the veins, the pulse may be restored, and the skin rendered warm and florid; but in all cases that have come under my observation, this species of reaction has been only temporary. The voice remained broken; copious watery stools returned; there was no restoration of the secretions of the liver or kidneys; the action of the heart diminished and soon ceased.

Remedies
recom-
mended.

The remedies used in those rare cases that I have seen recover from this third degree of collapse were frequent small quantities of iced water, with a few grains of soda, or carbonate of ammonia, and small doses of quinine, with hot saline enemata, and external applications of heat, with persevering friction of the extremities. In cases that have a periodical tendency, it is very important to gain even one or two hours, to allow nature to tide over the crisis. In order to attain this the strength must be husbanded by rest, and the relief of pain must be promoted by rubbing and artificial heat. The prognosis here is most

Husband
strength.
Relieve
pain.

unfavourable, and it should be our constant endeavour to prevent the disease reaching this stage. In this *extreme* degree the vomiting and purging often entirely cease for several hours before death. Their recurrence is a sign of vitality or attempt at reaction, which apparently indicates the use of purgatives and emetics at this stage; but copious evacuations appear to be exhausting. It is but the flicker of a lamp expiring for want of oil. Some cases reach this *extreme* degree within one or two hours of the first appearance of active symptoms, or after one or two motions; but such cases are uncommon, and the ordinary course extends in the most intense cases from four to six hours. Of the fatal cases in the epidemic at Agra in 1856, 35 per cent. died under twelve hours; 70 per cent. died under 24 hours after attack; 42 per cent. of those attacked died.

It is in these intense cases that doctors are urged, and some very ardent young men require very little external pressure, to try the strongest medicines, or even poison, when milder doses prove powerless. I have seen zealous and intelligent surgeons, overtaken by constant duty in hospital, wasting their time and energies in trying all remedies said to have been useful, either

Prognosis
unfavour-
able.

Progress.

Strong
remedies
objection-
able.

Nurses. by physicians or quacks, and all in vain. Here the expectant treatment that I recommend may be carried out by ordinary hospital attendants, or on an emergency by untrained but obedient and intelligent nurses ; while the physician may be more usefully employed in treating the disease in its earlier stage, or preventing its attack.

The treatment on reaction. The treatment on reaction, or the subsidence of the attack, varies with the stage of the disease at which it takes place. There are no sequelæ left after this subsidence in the stage of *malaise*.
 After malaise. The poison appears to be eliminated, leaving no morbid changes, in the same manner as alcohol is eliminated, without any permanent change in the blood or organs.

After diarrhœa. After the earlier degrees of diarrhœa there are no sequelæ. The symptoms which appear after the cessation of the congee stools in the first degree of collapse are sometimes as mild as those after the previous stage. I have seen the congee stools cease after the exhibition of a hot saline enema, and be followed after an interval of twelve or twenty-four hours by a healthy feculent stool, without the exhibition of any laxative medicines. In such a case the treatment should be the same as in the previous stage ; but more generally the evacuations which follow

Mild.

Symptoms following Reaction. 39

congee stools are green, or dark coloured, and frequent; sometimes they are passed with tenesmus. Two grains of calomel with half a cholera pill should here be given two or three times a day. A mustard poultice should be applied to the abdomen if the tenesmus be troublesome, and the patient should remain at rest. Should the stomach be irritable, iced water, or small effervescing draughts, would be useful; or if very persistent, a sinapism or small blister should be applied to the epigastrium. The diet should be limited to tea, arrowroot and soup; no solid food, and little if any wine. When the evacuations have assumed the natural colour, the treatment as in the previous stages will be followed, and the mild diet continued for two or three days.

The symptoms which follow reaction from confirmed collapse vary with the period during which it has lasted. When this has been short there is no fever. The evacuations are generally first green, and then dark, and the looseness continues for one or two days; the colour gradually becomes lighter and more natural, and the vomiting disappears; and the urine is freely secreted. This latter sign must be carefully looked for, as the danger is not passed until this appears. To assist this, larger quantities of

Dark stools.

Calomel.

Vomiting.

Iced water.

Blisters.

Diet.

After collapse.

Mild.

Urine scanty.

- Calomel. calomel should be given and a blister applied to the loins. Turpentine in small doses appears useful in obstinate cases, and chlorate or nitrate of potash is thought useful.
- Turpentine.
- Sequelæ. In ordinary cases the febrile reaction is slight and soon subsides ; but in case of long standing, brought on by intemperance or exposure, or where much brandy or opium has been given, the symptoms are more troublesome and dangerous.
- Fever.
- Vomiting. There is often distressing vomiting which is not only painful and exhausting, but it prevents nourishment being received or medicine retained.
- Nourishing enemata. In such cases it is advisable to support the patient by nourishing enemata of arrowroot made with soup or milk, given in small quantities and retained as long as possible. When there is great irritability of the rectum it is useful to give anodyne enemata occasionally. Under these circumstances the less that enters the stomach the better, and it is only the simplest and mildest remedies that are not injurious. A little iced water or effervescing draught is soothing and relieves the uneasiness of the stomach, even though vomited afterwards.
- Effervescing draughts.
- Opiates. Opiates and hydrocyanic acid are strongly recommended by some ; but their internal use is questionable. If applied externally to a blistered
- Hydrocyanic acid.

surface, or by sub-cutaneous injection, they give relief more safely; as the influence on the general course of the disease must be borne in mind, in the action of the remedies employed for individual symptoms. The head, liver, and kidneys are generally affected in a way for which opiates would not be prescribed; and it is very probable that the irritability of stomach is dependent on the state of these organs. We ought to be satisfied with a gradual and progressive subsidence of the symptoms; as time is required for the purification of the blood through the natural secretions of the body. It is injurious to urge or stimulate too strongly any of the enfeebled organs, especially if the remedies used would interfere with the functions of the other organs.

Gradual
subsidence.

The symptoms which follow reaction after the *intense* form, or when collapse has lasted several hours, are more serious. In addition to the frequent dark evacuations, which are often very persistent, there are low typhoid, febrile symptoms, similar to those which follow suffocation from drowning, or from breathing carbonic acid gas; with the dangerous symptoms of uremia; and sometimes violent delirium, when chloroform or much brandy has been used. There is great pain

After
intense
collapse.
Fever.

Uremia.

and irritability of the stomach ; frequent painful purging of dark watery mucus and sometimes bloody stools ; small feeble pulse ; dry brown tongue, with sordes on the teeth and lips.

Sequelæ. The various forms of disease which are now developed are found in all countries, often arising from causes unconnected with cholera ; and always requiring the zealous attention of the physician to conduct to a favourable termination.

Treatment. The peculiarities required in the treatment of the symptoms as they appear following reaction, depend on the previous course of the disease, and whether their cause be the presence of the cholera poison in the system. Now this may either have run its course and passed away—as completely as when the asphyxiated body, in a case of drowning, is removed from the water—or part of the poison may still be retained in an active form. This is highly probable in those cases where there has been little active evacuation, or where this has been checked for some time previous to the commencement of the imperfect reaction. This must modify the remedies indicated for the individual complications. The organs especially acted on by the cholera poison, as the stomach and intestines, have probably

Cholera
poison
retained.

suffered during the previous stage, and must call for attention.

In the present disorganised state of the system, the removal of the poison must be more difficult than when the organs are in their normal condition, and able to destroy or eliminate the poison. The leading indication, therefore, is to restore their functions by removing the accumulated impurities from the blood, and restoring the lesion in the individual organs of which the lungs, liver, and kidneys are the most important. A diminution in the quantity of the blood would render the purification of the remainder more easy to the debilitated organs; and also relieve congestion and increased action, or inflammation; but this would also diminish the vital power, which it is desirable to husband and increase; it is therefore to be avoided. The temporary withdrawal of a portion of the blood by dry cupping, or determination to distant extremities, by putting the feet in hot water or applying sinapisms, would be less objectionable, and though less powerful would act through this channel with advantage, and should not be overlooked.

Remove
the poison.

Restore
functions.

Bleeding.

Dry
cupping.

Sinapisms.

Pure air is of vital importance to recovery, so that a crowded or ill-ventilated hospital or room must be a source of great danger.

Pure air.

- Calomel. In regard to medicines, I consider small doses of calomel to be useful in promoting the action of the liver and kidneys, and assisting in the absorption of effusions that may have taken place during the previous stages of the disease.
- Ipecacuanha. Ipecacuanha is very useful in promoting the action of the liver and skin, if the state of the stomach allows it to be retained. Diluents or demulcents are most useful in increasing the flow of urine. Chlorate of potash, digitalis, nitric ether, and nitre, are much used for this purpose, and should be cautiously employed, as this is one of the most important secretions to be restored, and its suppression during collapse is the cause of the dangerous symptoms of uremia which is a frequent cause of death. Small doses of quinine appear to assist the action of all the other medicines, and should not be omitted. Free action of the bowels is advantageous; but pain should be soothed and excessive action restrained by anodynes and anodyne enemata, composed of arrow-root and laudanum.
- Quinine
- Chlorate of potash.
- The Brain. The brain is one of the most important organs, whose functions are deranged after reaction. This is evidently the result of changes that have taken place during the stage of collapse; as previous to that time it was not de-

ranged ; and the morbid appearances found in the most rapidly fatal cases, show no appreciable sign of disease, beyond congestion or stagnation of the blood. On examination of protracted cases, there is little change visible beyond slight effusion of serum, and occasionally more bloody points than usual in the substance of the brain. The characteristic change lies in the chemical composition of the serum, which is strongly impregnated with urea. Dr. Henderson, in some cases, found it more abundant than it is found in healthy urine. This fully accounts for the symptoms of uremia, which so often follow reaction in protracted cases ; and which proves so dangerous and difficult to remove ; and which is so surely fatal when the secretion of urine cannot be re-established.

Low, muttering delirium, followed by coma and terminating in death, is the ordinary course of this form of the disease. Occasionally, there is wildness and violent delirium ; especially in cases where spirits, or chloroform, have been freely used during the attack. I have seen this more frequently since chloroform has been so extensively employed. In former days the patient was considered safe when reaction set in ; now at least one third of the cases prove fatal after re-

action. The recoveries from the more simple form of brain affection are not common, but I have never seen a case recover from the severe form that I have described.

Local remedies.
Ice.

The best local remedy is ice to the head,—leeches and blisters with mercurial ointment are often employed, and sometimes with partial relief; as well as calomel, chlorate of potash and digitalis, with warm baths; the free action of the bowels is a valuable auxiliary, if they be not themselves disorganised.

Calomel.

Kidneys.

But the hope of cure rests on the restoration of the functions of the kidneys; these functions were diminished or suspended at an early stage of the disease, before collapse was fully established, and not, as the head symptoms, the sequelæ of that stage. The uremia does not depend on the want of the watery portions of the blood, which have been diminished by the congee stools; as this may be supplied by artificial injection without removing the disease. On post-mortem examination, in cases which have rapidly proved fatal, the kidneys show no signs of organic change; and I am aware of no characteristic changes found in more protracted cases. The functions of the kidneys are suspended at the same time as those of the liver, and probably by the same general

Morbid appearance.

cause, and not from local change of structure. Still the changes in the nervous power and the composition of the blood, which are now present, must materially influence the action of the kidneys, and also the ordinary action of remedies on that organ.

It is essential to recovery that the urea be eliminated from the blood. There may be other sources of danger, but this alone would prevent health being restored. To accomplish it is one of the most difficult tasks that try the skill of the physician; but the body is now alive and sensible to ordinary treatment: and there is time to try its effect, having a decided object in view, and no urgent call for violent remedies; but a steady demand for a cautious trial of such medicines as experience has shown to be useful in combating analogous symptoms.

Eliminate
the urea.

Remedies.

From the name of this disease, *cholera*, it might be inferred that the liver was the organ chiefly implicated in its course, and that its progress could be traced after death in that organ. In the most intense cases, the vessels are only found gorged with dark blood; but no trace of organic change of structure is appreciable. The gall bladder is distended with bile, which is generally dark and ropy; but sometimes light

The Liver.

Morbid ap-
pearance.

Gall
bladder.

Bile. and watery. There is no pain in the side, and after reaction there are no signs of inflammation of the liver. Bile is seen in the evacuations before urine appears; that which first escapes is generally dark and irritant; it then becomes lighter, then healthy. When the collapse has been of short duration the return to the healthy colour is rapid, but in other cases, where the collapse has lasted long, the discharge of vitiated bile continues longer, and tends to create or keep up irritation in the bowels. The bile which first appears is probably that which post-mortem examination shows to be accumulated in the earlier stages of collapse; and the persistence of dark bile is likely to be dependent on the process of the purification of the blood, in which effete matter has been accumulated. The liver appears to do a double duty when the kidneys act imperfectly; and to give relief to the head symptoms. In this it should be encouraged, till the secretion of the kidneys be restored. For this purpose small doses of calomel and ipecacuanha are well suited, combined with anodynes where there is irritation of the bowels, but opium is contra-indicated.

Calomel.
Ipecacu-
anha.

The intes-
tines.

The intestines form the most frequent seat of disease after reaction; occasionally there is no

looseness or vomiting, and the stools at once assume the natural appearance, though the digestive powers are feeble, and there is little appetite; but in general the stools are green or dark coloured for some days, and passed with uneasiness or straining. In some instances there is severe looseness and tenesmus, the evacuations consisting of mucus, and occasionally thin watery blood; from this state few recover; and these only after long-continued and persistent diarrhœa and great emaciation. As it is in the intestines that the disease first shows its active symptoms, we naturally look in post-mortem examinations for the change of structure which it has left in them; but here again we are disappointed; characteristic traces are not evident to the eye, even aided by the most powerful microscope. In the most rapid cases there is sometimes no appreciable alteration; but generally there is a rosy tint over the small intestines, and a thickened doughy feeling; the inner surface is covered with whitish mucus, and filled with whitish fluid, which becomes more watery the lower it is found.

Watery
blood.

Morbid ap-
pearances.

If the case has lasted some hours the microscope shows a deficiency of the epithelium, and scales of it with the tubular covering of the mucous glands are often found in the congee

Epithe-
lium.

Micro-
scopic ob-
servations.

evacuations, of which some consider that they form the white flocculent ingredient. This, however, is not confirmed by the most recent and accurate observations of Drs. Lewis and Cunningham in Calcutta. There appears no more reason that the epithelium should be washed off from the intestines by the abnormal watery discharge, than that the cuticle should be washed off by the profuse perspiration. As after convalescence a

Desquama-
tion.

scurfy desquamation frequently takes place, so a similar shedding of epithelium might be anticipated; and it probably takes place, rendering the surface more sensitive than usual.

Diarrhœa.

Irritation or inflammation of the mucous membrane frequently is induced by the long continued contact with irritating contents, consisting of vitiated secretions, undigested food, or probably the specific poison of cholera. This is shown in all cases of long standing, particularly in the swollen state of the glands of Brunner and Peyer, which often appear with a dark spot in the centre, very like small-pox. These, in more advanced states, become inflamed and slough off, leaving a granular surface, which in bad cases spreads, forming large ulcers, from which blood or bloody mucus appears in the stools. This morbid state of the mucous coat of the intestine appears to be

Mucous
glands.

the effect, not the cause, of the disease; as it is absent in the worst and most rapid cases. It may be induced by irritating applications, as undigested food, or vitiated secretions; and the same appearances are found after protracted fevers and other diseases. Short or slight irritation passes off as the cause is removed; but it increases if the cause be persistent, or of great power. Then organic changes ensue in the structures, which augment in extent in prolonged attacks; whilst their renovation or cure is protracted by the debilitated state of the general health, the improvement of which their presence impedes by interfering with the digestive powers.

Irritation.

Organic changes.

The first point for consideration is the cause of the persistence of the diarrhœa. Should this appear to arise from the bile, which the liver is eliminating from the impure blood, the indication would be to guard the intestines during its transit, not to arrest it in its passage; nor would it be proper to check the action of the liver, which might easily be done by a dose of chlorodyne or opium; but only for a few hours, during which the cause of the symptoms would be increasing, and the effects only concealed. Such practice may be pleasing to the patient; but not profitable to the professional reputation of the physician.

The cause.

Bile.

- The
treatment. The removal of the irritating cause is essential ; but its passage should be soothed by being diluted, whilst anodyne applications are made to
- Enemata. the irritated surface of the intestines, by enemata of arrowroot, or starch and laudanum, whilst strict attention is paid to diet. Small doses of
- Calomel. calomel with ipecacuanha, or Dover's powder, and a steady persistence in quinine, will generally be found useful. The occasional application of small
- Blisters. blisters to the abdomen will assist the cure. In those cases that are connected with defective secretion of urea, turpentine, either by the mouth or applied externally, is very useful. Cases of this nature are very obstinate, often continuing
- Change of
air. for months, and generally requiring change of air to the sea-side, or a long sea voyage to complete the cure. Where ulceration of the intestines has taken place, the recovery is slow ; enemata of acetate of lead or nitrate of silver are here advisable. The existence of ulcer is shown during convalescence by detached patches of mucus, sometimes streaked with blood, attached to consistent stools.
- Vomiting. Vomiting is sometimes very obstinate and troublesome. M. Broussais, in 1832, considered cholera as gastro-enterite, and many writers have formed the same opinion, since the appearance of

cholera, up to the present day. Gastro-enterite is clearly shown in the post-mortem examinations of many cases, especially those in which spirits or strong stimulants have been exhibited; or which have been excited by drinking; but it is not seen in the most intense and rapidly fatal cases. Vomiting after reaction is dangerous in so far as it prevents the strength being supported by the digestion of food, and the straining is exhausting. Iced water or small effervescing draughts give relief. Chlorodyne and hydrocyanic acid are strongly recommended, and in small quantities may be tried. Hydrate of chloral is less objectionable, as in small doses (eight or ten grains) it does not interfere with the digestion. In some cases the slightest quantity of food is immediately rejected; in these the strength should be supported by enemata of arrowroot or starch, made with soup or milk. These injections are retained for three or four hours, and in some instances they are apparently digested and absorbed.

Gastro-enterite.

Treatment.

Chloral.

Nourishing enemata.

I have seen many bad cases of cholera followed by boils all over the body, and ulcerations of blistered surfaces, or of mosquito bites, which are very troublesome, and retard convalescence. They require soothing local applications, and they disappear as convalescence advances.

Boils.

Convales-
cence.

Convalescence in slight cases is rapid. It is difficult to comprehend the short interval of extreme danger between sound health and convalescence. In no other disease do such violent symptoms so suddenly subside, and leave no trace behind. In the most satisfactory cases there

Malaise.

remains only *malaise*, which is overlooked in the congratulations on the escape from this great danger; but even this slight sign should not be

Relapse.

neglected or relapse may ensue. Excess of diet, or over fatigue, or the imprudent use of purgatives, are the ordinary causes of relapse. These should be avoided, and the medical treatment recommended for *malaise* pursued.

Diet.

Great attention should always be paid to the diet. It should be nourishing in quality and moderate in quantity, with a little wine or ale.

Cholera
belt.

A flannel roller, or what is called a cholera belt, is of great use during convalescence. In fact it is prudent for all to wear it during the prevalence of an epidemic. They sustain the equable temperature of the ganglionic nerves, which the natives of India consider the portion of the system affected in *coup-de-soleil*, or as they call it 'stroke of the hot wind,' instead of the brain as usually supposed in Europe. In cholera there is now no question of the priority of the action of the

cholera poison on the sympathetic or ganglionic system, which is very sensitive to great alterations of heat and cold.

In tedious convalescence, change of air is desirable, and sea-air useful. The natural mineral waters are very advantageous, and to seek their use implies change of scenery and of society, which is beneficial; but this remedy is too expensive to be generally available.

At the time of an epidemic of cholera, the locality in which the patients are treated is a matter of great importance. As the primary source of the disease is the human body—though it may be multiplied and disseminated through various media—there is danger in its proximity, and safety in its isolation. By the careful application of known means this danger may be diminished; but the neglect of these precautions, very possibly accidental, may permit the poison to escape, and cause much mortality. Perfect isolation is impossible, as this would cause the death of the patient; but he may be treated apart from the crowd, in special hospitals, and by special attendants. The admission of cholera cases among the patients in a general hospital exposes them to a great danger, from which it is the duty of the physician to protect them. Even special

Change of
air.

Mineral
waters.

Hospitals.

Danger.

Isolation.

General
Hospitals.

- Special wards. wards in a hospital, which is the ordinary practical expedient, brings the danger into very close proximity, which is objectionable.
- Contagion. My views regarding cholera have been formed chiefly from personal experience in India, and on some points the climate must modify the disease in Europe; but that the point of contagion remains unchanged is shown by the official reports in the Bulletin de l'Academie à Medicin of the epidemic in Paris, of the present year. Out of 291 cases treated in the civil hospitals in Paris from September 16 to November 10, 1873, 101, equal to 35 per cent., originated in the hospitals, in patients under treatment for other diseases. Large numbers should not be collected and treated in one room, as the poison becomes concentrated, and acts injuriously on the sick; besides rendering the attack of the attendants more probable. The sight of their neighbours dying in agony alongside their beds is very depressing and injurious, at a time when it is of vital importance to keep up the spirits of the patients. At one time I used a separate ward for the cases that were beyond hope; but, although the proceeding was doubtless beneficial to the others, it took all hope from dying patients themselves, and the practice was soon discon-
- India. Paris in 1873. Separate ward.

tinued. The hospitals best suited for the treatment of cholera cases are small buildings, on open ground ; well drained and in the vicinity of trees if possible.

In India tents have been used with the greatest advantage ; they should be sufficiently large to contain four beds. In this country wooden huts of the same dimensions would be more comfortable and water-tight ; but tents are more easily removed when the ground becomes tainted ; and this is an advantage. These especial hospitals should be located as near the centre of an epidemic attack as possible ; as the delay and fatigue of long transport are dangerous to the sick. The proper treatment of all the sick in their own houses, in great epidemics, is not practicable from the want of sufficient attendants and the difficulty of medical superintendence ; and besides this, the crowded and unsanitary state of the majority of the houses where it would be likely to rage is most unfavourable to the hope of recovery. In large houses efficient arrangements may be made when the danger is fully recognised, and the ample ventilation and isolation here secured is beneficial to the sick, so that individuals in these circumstances may be conveniently and comfortably treated at home.

Tents.

Special
Hospital.Own
houses.

Special
Hospitals.

Previous
arrange-
ment.

The arrangements for special cholera hospitals are beset with difficulties in crowded cities, and all points should be considered by the local health authorities; and the best course decided on *before* an epidemic actually appears, as when that takes place excitement ensues, which causes confusion and sometimes panic; this is averted and confidence inspired by judicious precautionary measures taken in anticipation of a known danger.

