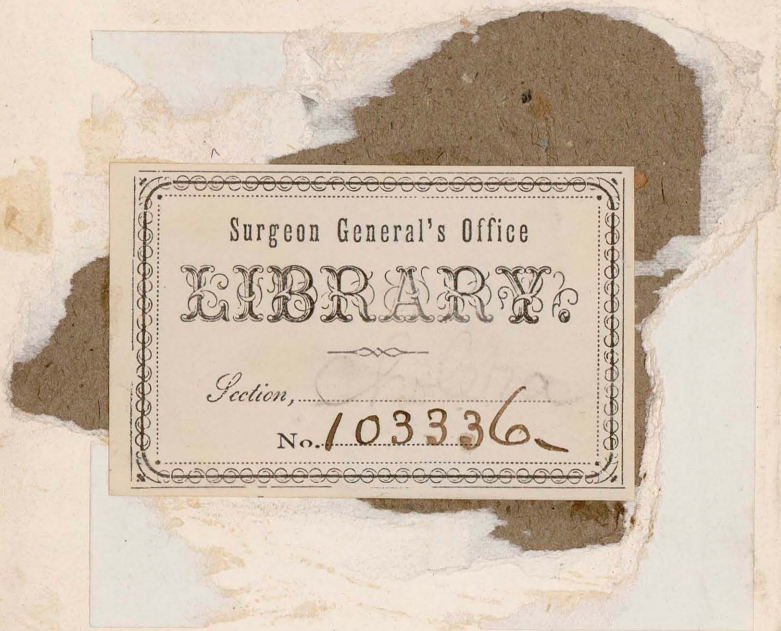
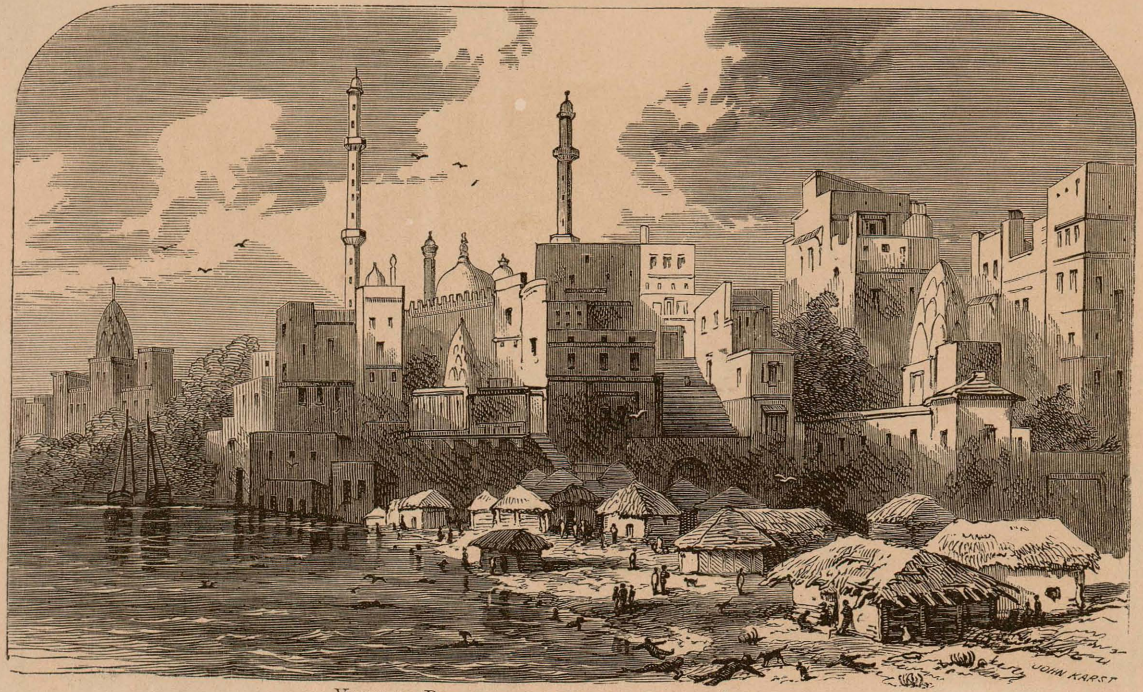
ASIATIC
CHOLERA
ITS
HISTORY
NATURE
AND
REMEDIES





VIEW OF BENARES,—BIRTHPLACE OF THE CHOLERA.

ASIATIC CHOLERA:

ITS ORIGIN, HISTORY, AND PROGRESS, FOR OVER TWO HUNDRED YEARS, AND THE DEVASTATIONS IT HAS CAUSED IN THE EAST AND WEST; ITS RAVAGES IN EUROPE AND AMERICA IN 1831-2, IN 1848-9, IN 1854-5, AND IN 1865-6:

WITH A FULL DESCRIPTION OF

THE CAUSES, NATURE, AND CHARACTER OF THE DISEASE;

ITS MEANS OF PROPAGATION,

WHETHER BY

THE ATMOSPHERE OR BY CONTAGION;

ITS PREMONITORY AND DISTINCTIVE SYMPTOMS;

THE BEST KNOWN MEANS OF PREVENTING ITS ATTACK,

BOTH IN COMMUNITIES AND INDIVIDUALS; AND THE MOST EFFECTUAL REMEDIES FOR IT ACCORDING TO THE CELEBRATED PHYSICIANS WHO HAVE TREATED IT; TOGETHER WITH SIMPLE AND PLAIN DIRECTIONS FOR THE CARE OF THOSE WHO FROM ANY CAUSE CAN NOT OBTAIN MEDICAL AID.

BY

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ASIATIC CHOLERA.

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TREATMENT OF CHOLERA—CONTINUED.

PREFACE.

THE presence of the cholera in some of our seaports, and the very general impression that it will yet gain a foothold and commit serious, though, it is to be hoped, less extensive ravages than in former years, fully justifies the publication of a treatise on the subject, which shall be adapted for popular use.

In the preparation of this little work, we have not sought to terrify the public by portraying the ravages of the destroyer in sensational style, or depicting, with a vividness surpassing the reality, the anguish and distress of the unfortunate sufferer. The facts are sufficiently appalling, and the grounds for apprehension grave enough to excite a good degree of anxiety in most minds, should the disease become epidemic. Still, there is ground for

hope, from the better understanding which we now have of the disease—from the success of some modes of treatment, especially in its early stages, and from the mildness of the disease as compared with former visitations of it.

We have sought to give a history of its progress in the past, so far as it is definitely known; to bring forward the evidence for and against its contagiousness, either directly or indirectly; to discuss the vexed subject of the necessity of quarantine, and to recommend other preventive measures. We have then described, in plain and simple language, so clearly that we are sure no person of ordinary intelligence could mistake them, the symptoms of the disease; have stated what were the theories of its action, the appearances after death, and the principles on which treatment is to be based. Having done this, we have next proceeded to state, in plain language, and without the use of technical medical phraseology, what measures had been proposed by eminent physicians, and

what, according to the statistic tables, have been the success of each. We have given, in the two chapters devoted to this subject, we believe, a greater variety of plans of treatment, and the views of more eminent men, than have ever before been collected on this question. In Chapter VII., the author has given his own views of the treatment, derived from experience and observation, and the result of a conviction, that even in a disease so formidable as cholera, a reckless administration of powerful drugs is quite as likely to kill the patient as the disease.

Those who choose to assume the responsibility of advising the pouring into the stomach of immense and oft-repeated doses of the most potent medicines in the physician's repertory, at a time when the functions of the system are all suspended, and the powers of nature are engaged in a life-and-death struggle with the destroyer, and accumulating them there to prostrate the already weakened vitality by their sudden and violent action, when it is

seeking to regain its powers, are perfectly welcome to do so. The writer does not choose to be reckoned in their party. It is his belief that, with very moderate medication, and constant watchfulness to aid the efforts of nature to rid herself of the morbid poison which is working mischief in the system, the use of judicious nutriment and careful nursing, the greater part of the cases of cholera can be brought safely through. Not that he would counsel neglect, or indifference. No disease requires more careful attention or more skillful nursing. Without either, probably eighty out of every hundred would die. With both, and such medication as will assist nature, eighty out of every hundred, and perhaps more, may be saved.

We have endeavored to explain every part of the treatment so simply and clearly, that any person of ordinary intelligence can carry a patient through the disease successfully, where they are so situated as to be unable to procure the services of a physician. This has been done,

not from any desire to abridge the practice of the members of a profession which has always, in the presence of these epidemics, endeavored to do its whole duty, but from our own observation that in many portions of the West and South, where families and often large estates are at a distance from a physician, it is impossible to procure his services without fatal delay. We say here, as in the book itself: "Where a physician is readily accessible, call him in without delay; where he is not, act as advised in this work." There will be those, we doubt not, among our readers, to whom the course of treatment we have recommended will seem not sufficiently vigorous: to meet the views of such we have given the formulas and modes of treatment of those who are the advocates of heroic measures. If they prefer those, let them follow them; but if they find the disease aggravated thereby, let them not cast the blame upon the book, but rather upon their own craving for a "vigorous practice."

Of course, a book like this can lay small claims to originality. It is, and must be for the most part, a compilation. We have endeavored in general to indicate the sources from whence the borrowed passages were derived, but would in this place farther acknowledge our obligations to Dr. Burrall's valuable professional treatise on "Asiatic Cholera;" an anonymous work on "Epidemic Cholera," published by Mr. Carleton; Dr. R. Nelson's treatise on Asiatic Cholera; Dr. Collins's "Cholera: Its Treatment &c.;" Dr. Brigham's valuable work; Dr. Alonzo Clark's Lectures; Dr. MacLean's Lectures; and the several volumes of Braithwaite's Retrospect, as well as many other sources of information.

L. P. B.

Brooklyn, N. Y. *May*, 1866.

TO

WILLARD PARKER, M. D.,

PROFESSOR OF SURGERY IN THE U. S. COLLEGE OF PHYSICIANS AND SURGEONS, AND ONE OF THE COMMISSIONERS OF THE METROPOLITAN BOARD OF HEALTH:

EMINENT ALIKE FOR HIS PROFESSIONAL SKILL

AND HIS EARNEST ENDEAVORS TO PROMOTE SANITARY REFORM:

THESE PAGES,

INTENDED TO PROMOTE CLEANLINESS AND PURITY,

TO AID IN AVERTING DISEASE,

AND TO INDICATE THE BEST MODES OF ARRESTING AND TREATING IT, IF IT SHOULD COME,

ARE RESPECTFULLY DEDICATED

BY THE AUTHOR (HIS FORMER PUPIL),

AS A FEEBLE EXPRESSION OF ADMIRATION FOR HIS ABUNDANT

AND LONG-CONTINUED EFFORTS

FOR THE ADVANCEMENT OF THE PUBLIC HEALTH.

ASIATIC CHOLERA.

CHAPTER I.

ORIGIN AND HISTORY.

The birthplace and cradle of the Cholera—Bontius's description of it in 1629—Its travels over Hindostan, Farther India, the Islands of the Orient, China, Thibet, &c.—The epidemics of it in the eighteenth century—Its devastations in Upper India—Its outbreak at Japan in 1817—It takes up its march northward and westward—Northern India, Turkestan, Persia, and Western Siberia visited—Its incursion into Arabia—The pilgrims at Mecca—Russia desolated by it—Its progress in Western Europe—Terrible destruction of human life in Germany, France, and England in 1831–2—Its appearance and ravages in America—The epidemic of 1849—Its return in 1854—The epidemic of 1865–6—Its progress from Arabia, through Egypt and Turkey, around the basins of the Mediterranean and Black Seas, to France and England—It crosses the Atlantic in emigrant ships—Visits Guadaloupe in November, 1865—The *Atalanta*—The *England* and the *Virginia*—Cases in New York—The Cholera Congress at Constantinople.

CHOLERA, like the plague and the black death, had its birthplace in the East. In the tropical regions of the Indies, in the marshy jungles, and on the flat and moist plains which

constitute the basins of its great rivers, where, in addition to the hot and steaming miasms which rise and hang in pestilential vapors over the populous towns, there is the filth and stench of an overcrowded population, whose mud-walled huts are receptacles for all manner of vegetable and animal decay and impurity, the cholera first appeared, and has become a permanent inhabitant. Hindostan, Birmah, Siam, Pegu, Cochin China, the peninsula of Malacca, and the islands of Sumatra, Borneo, and Java, have all been ravaged by it for more than two hundred and fifty years, and while it is somewhat uncertain in which of these countries it first made its appearance, we know that in either it found a fitting cradle, and ample food for its banquet of death. In 1629, Bontius, a physician of the Dutch East India Company, then resident at Batavia, in the island of Java, described it to the medical profession of Europe, in a treatise, in which he spoke of its having prevailed for many years throughout the Indies. His description of it (the first on record) is minute and graphic, and represents the disease almost precisely as a medical writer

of the present day, in India, has portrayed it.

He calls it an epidemic cholera morbus, and says: "It is a disease of the most acute kind, and, therefore, requires immediate application of remedies. The animal spirits are speedily exhausted, and the heart, the fountain of life, is overwhelmed with putrid effluvia. Those who are seized with this disease generally die, and that so quickly, as in the space of twenty-four hours at most. This disease is attended with a weak pulse, difficult respiration, and coldness of the extreme parts; to which are joined great internal heat, insatiable thirst, perpetual watching, and restless and incessant tossing of the body. If, together with these symptoms, a cold and fetid sweat should break forth, it is certain that death is at hand." He gives the details of a case he had visited a day or two before, "who was suddenly seized with the violent diarrhea and purging, about six o'clock in the evening, and expired in terrible agony and convulsions before twelve o'clock at night."

At about the same period it was traversing

the region watered by the Ganges, and found abundant victims among the pariah, or outcast class of Hindoos. Hindoo writers of the seventeenth and eighteenth centuries often speak of it, and the Hindoo practitioners named it "Vishuchi," a term signifying, in their language, vomiting and purging. Benares, Dacca, Calcutta, and other of the great cities of India were visited by it, and it lingered with peculiar fondness around the suburbs of those cities, and among the densely populated villages of the marshes, where the unclean pariahs congregated in largest numbers. The poor wretches died in almost incalculable numbers, but the fecund Orient soon replaced the dead with living men, and though the descriptions of the disease by the Dutch physician were treasured up by his professional brethren, and the malady regarded as a new form of pestilence, intended for the reduction of the redundant population of the East, yet none of them imagined that Europe would ever be invaded by it. Nor is this surprising. India was then so remote from Europe, the means of communication were so meager, and the time

occupied in passing westward so long, that it could hardly be regarded as possible that it should ever pass across the vast continent. It seemed, indeed, reluctant to leave its chosen haunts; in the latter part of the seventeenth, and through nearly the whole of the eighteenth century, there were reports from eminent physicians in India, of the fearful ravages of cholera there. Yet though first one and then another portion of tropical Asia was visited by the destroyer, it never left the region where it had so long triumphed. In 1762, Upper Hindostan, embracing the higher waters of the Ganges, was visited by the pestilence, and thirty thousand natives fell victims to it. In 1764, it reappeared and swept off about thirty thousand more. From 1774 to 1781, it scoured the Coromandel coast, and in one year destroyed sixty thousand people between Cherigam and Pondicherry. In April, 1783, it appeared at Hurdwar, on the Ganges, where the natives were gathered in vast numbers to celebrate a festival of one of their divinities, and swept off twenty thousand persons in the course of eight days.

On the 19th of August, 1817, Dr. Robert Tytler, who practiced medicine at Jessore, sixty-six miles north-east of Calcutta, was called to visit a Hindoo who had been attacked the night before with violent pains in his bowels, accompanied by purging and vomiting. Dr. Tytler found the man dying, and was about to report the case to the town authorities, as one of poisoning, when he learned that, in the same part of the bazaar, ten other natives had died with the same symptoms, and in another bazaar seven others, and that the disease had attacked many persons in the street. This was Asiatic cholera, and in two months it had swept off more than ten thousand of the inhabitants of Jessore.

It did not appear as an epidemic at Calcutta until September, 1817, and, for the ten years preceding, not a single case had been treated at the general hospital for Europeans in that busy mart. But that year it raged throughout the "City of Palaces," and thirty-six thousand persons were attacked in the first three months of its visitation. It extended in almost every direction around Jessore, to the

distance of two hundred and fifty miles, and it has been computed that at least six hundred thousand persons died of cholera in thirty-two cities in 1817. At some of the towns and military stations the invasion was so sudden that the roads were covered with the dead and dying, who had not time to regain their tents or houses. Men mounted on horses were seen to fall from the saddle, unable to rise again. "The first week in November, it broke out in the grand army under the command of the Marquis of Hastings, composed of ten thousand English and eighty thousand sepoys, and encamped on the right bank of the Betoah. On the fifth and sixth days, the mortality became so great that despair seized the bravest. To the usual uproar and gayety of a camp succeeded a mournful silence, only broken by the groans of the dying and the lamentations of the survivors. The principal roads and fields around the camp were strewed with the dead bodies of those who had thought to escape by flight. No expressions can truly describe the spectacle of desolation which this army, but lately so brilliant, now presented. In twelve

days, nine thousand men had died, and a still greater number had fled. Those who remained, overwhelmed by so frightful a disaster, disregarded the voice of their chief, and sought only to save their lives, or stun their fears by debauchery."

Happily, the Marquis of Hastings marched his army across the Betoah, and pitched his camp on dry and elevated ground, where the disease soon subsided.

In 1819, the pestilence advanced from Madras toward the south; all along the coast, numerous towns, which had escaped the preceding year, were now desolated by a frightful mortality. Hardly fewer than one hundred and fifty thousand people died in the presidency of Bombay in 1819, from cholera alone. Entire villages were depopulated, and so great was the panic that the crews of many vessels, laden with cotton, deserted and fled in the night. At Bombay nearly twenty thousand persons were attacked. Bankok, the capital of Siam, lost more than forty thousand of its inhabitants. As the people attributed the calamity to the influence of an evil spirit, which, under the form of a fish, had sought

refuge in the gulf of Siam, the sovereign authority ordered the celebration of solemn religious rites on the coast, in order to exorcise the finny demon; but the gathering at one place of so dense a throng of human beings redoubled the fury of the pestilence, and the mortality was frightful. The same year the island of Sumatra was devastated, and so terribly did the disease ravage the capital, that the king fled to the mouth of the river, where he formed a camp. But the angel of death followed them thither; and before the year was out had flapped his black wings over forty degrees of latitude and fifty of longitude.

In 1820 the cholera inspired the inhabitants of Manilla with so wild a terror that they broke out in an insurrection, in which many Europeans and a great number of natives perished.

In 1821 it appeared at Jaggurnah on a missionary expedition. So furiously did it rage among the heathen during the annual monstrosities in honor of Juggernath, that there were not left maniacs enough to drag the car of the idol around the temple, and that year

not a single devotee enjoyed the luxury of being crushed under its wheels.

The same year the scourge invaded Bassora, on the Persian Gulf, and slew seventeen thousand out of a population of sixty thousand. Thence it passed to Bagdad, and destroyed one-third of the population. At Shiraz, the mortality was awful. In the Dutch East Indies, Batavia lost seventeen thousand inhabitants, and the entire island of Java one hundred and two thousand. The scourge traversed forty-three degrees of latitude and seventy of longitude, sweeping and garnishing the unclean places.

In 1822 the progress of the pestilence was in the direction of Europe. The Prince Royal of Persia, having attacked the Turkish army, saw his own army, a few days after the victory, swept away by the epidemic.

In 1823 the destroyer swept the Birman empire, and not even the name of the heir to the crown, worn as an amulet around the neck, was powerful enough to arrest its progress, or diminish the number of its victims. In China, also, the disease raged everywhere, "in consequence of the innumerable canals," and a

population as the sands on the sea-shore. The Russian authorities urged the mandarins to adopt preventive or preservative measures; but the mandarins (self-possessed philosophers!) replied that the deaths would allow more room in the world for those who survived; and besides, that the cholera chose its victims from among the filthy and the intemperate, and that no person of courage, who lived with moderation and cleanliness, would die of it. The emperor, they declared, had said to his subjects, "Do not believe that the disease is stronger than yourselves. It only kills the scared people."

The same year the cholera marched northward, as far as Orenbourg, on the confines of Asia and Europe, where numerous caravans arrive yearly, from China and Hindostan; it also made its appearance on the eastern shores of the Mediterranean, and created a lively alarm in Europe.

In 1825, the cholera returned to Bombay, and compelled the authorities to build hospitals, and burn great quantities of wood, tar, and gunpowder.

In 1827 the epidemic again attacked Calcutta, and this time horses, cattle, elephants,

swine, and dogs shared the fate of human pariahs. The Hindoos attributed the prolongation and universality of the scourge to the anger of the God of the Cemeteries, provoked by the absence of human sacrifices. "At Palcal, a Hindoo woman resolved to burn herself on the body of her husband, who had died of cholera, but the rajah refused to patronize, or even permit, the performance. The widow, however, was urgent in her suit, and declared that the pestilence would cease in five days if she were allowed to sacrifice herself." The rajah yielded, and the woman burned—but it made no difference to the cholera.

In 1830, the epidemic prevailed all along the shores of the Caspian Sea, and on the 27th of July appeared at Tiflis, the capital of Georgia, nearly depopulating it by death and flight. Impatient of the limits within which it had hitherto been confined, it had, the year before, crossed the Ural Mountains, which separate Europe from Asia. On the 19th of July it reached Astracan, at the mouth of the Volga, and thence spread up that river, reaching Nijne Novgorod about the last of August. On the 15th of

September it appeared at Moscow, where it created a senseless panic, and fifty thousand persons fled the city in a few days. The consternation was general throughout the Russian empire, and the Czar offered a reward of twenty-five thousand rubles for the best dissertation on the nature, causes, prevention, and cure of cholera. A Council of Health was convened at Moscow, composed of physicians from Paris, Berlin, Gottingen, and other cities.

In 1831, it appeared at St. Petersburg—on the 26th of June—having previously visited Archangel, Warsaw, Riga, Polangen, and Dantzic. The Czar retired in dismay from the imperial city, and surrounded himself and his court with a *cordon militaire*, permitting no approach from without. In May it broke out in Mecca, among the innumerable pilgrims to the shrine, and destroyed thousands upon thousands of the foulest of those dirty devotees with whom "it is a point of religion that no pilgrim shall change his clothes during the whole period of his pilgrimage, and that each pilgrim shall sacrifice at least one sheep, and leave the skins and offal to rot under an Arabian sun."

Berlin was visited by the cholera in the last week of August, and from the 1st of September to the middle of December, when it had nearly disappeared, the number of cases was two thousand two hundred and thirty of which more than half died. On the 16th of August, the scourge entered Vienna from Hungary, in defiance of a double *cordon*, though the authorities refused to recognize its presence until the 15th of September, by which time it was raging with violence. It was remarked that, in Vienna, the cholera destroyed more of the nobility, and people of the higher classes, than at any other time or place: and here, likewise, was a most extraordinary fatality among physicians and other attendants upon the sick. In the empire of Austria, nearly two hundred and fifty thousand persons perished.

The cholera also prevailed this year (1831) at Constantinople. The Turkish government declined to establish quarantines, but distributed gratuitously, throughout the empire, small pamphlets giving a history of the disease, and the most approved methods of prevention and treatment. Their good sense was rewarded with a mild visitation.

"On the 26th of October the Board of Health of Sunderland, in England, officially announced the presence of cholera in that town. A few cases had been noticed in August, but it did not prevail epidemically until the last of October." On the 27th of January, it appeared in Edinburgh, and reached London on the 14th of February, where, contrary to all expectations, its ravages were inconsiderable. On the 24th of March, it appeared for the first time in Paris, where it carried off nearly twenty thousand persons in one month; and shortly broke out in Dublin. Then it crossed the Atlantic, landed at Quebec on the 8th of June, was in Montreal by the 14th, and New York by the 25th.* It raged with great virulence in New York until the last of July, and then gradually subsided, but did not wholly cease till late in the autumn, and swept on from city to city and from village to village producing fearful havoc throughout the Western and Southern States, and followed

* We have availed ourselves of the vivid description of the progress of the cholera from 1817 to 1832, published in the *N. Y. Tribune*, and said to be from the pen of a former surgeon in the service of the East India Company, as embodying more of the facts of this progress than are elsewhere recorded.

the shore of the Gulf of Mexico to Yucatan and Campeachy.

The first case in New York occurred at the corner of Gold and Frankfort streets. The patient was a native male citizen. Some cases immediately followed in Cherry street; the subjects were Irish emigrants, who had arrived at Quebec in the autumn of 1831, and had resided in Albany till the month of May, 1832, when they had removed to New York. On the 27th, the disease manifested itself at Bellevue Hospital. The patient was an aged woman who had not been out of the institution for three years, and who had held no communication with the city. Reade, Washington, and Duane streets, the Five Points, and the whole region of the Sixth Ward, were visited by the epidemic with fearful violence. Rotten row, in Laurens, between Grand and Broome streets, was another deadly center of the malady. In all these places, as well as in the others where it raged with the greatest intensity, the local and removable conditions of general insalubrity were abundant.

So much for the first epidemic of Asiatic

cholera in Western Europe and America. In Great Britain and Ireland, over one hundred and sixteen thousand cases and forty thousand deaths occurred. In the cities of Quebec, Montreal, New York, and Philadelphia, embracing, at that time, about four hundred and fifty thousand inhabitants, there were over eighteen thousand cases and eight thousand deaths.

The scattered cases which occurred in the United States, and especially in the Western States, as late as 1836, finally ceased entirely, and for twelve years Western Europe and the United States were freed from its scourge. In India, however, it continued to be endemic, and as often as once in three or four years blazed out in a fierce and destructive epidemic. Other of the Asiatic countries were also visited again, and their population decimated by it. At length it again took up its line of march northward and westward. Early in 1846 it appeared at Kurrachee, near the mouth of the Indus, where it raged with terrific violence, more than eight thousand of its victims dying within a few days. Thence it passed on to Teheran, the capital of Persia, where its severity was such

that three hundred perished daily for several weeks in a population of not more than sixty thousand. "Those who were attacked dropped down suddenly in a state of lethargy, and at the end of two or three hours expired without any convulsions or vomiting, but from a complete stagnation of the blood, to which no remedies could restore its circulation."

Entering Europe almost by the identical route which it traversed on its first visitation, though traveling with much greater rapidity than it did at that time, the cholera ravaged parts of Russia and Turkey during the years 1847 and 1848. In the summer of 1848, it seemed to decline in violence, and hopes were entertained that Western Europe would not be visited by it. These hopes, however, proved fallacious. In the autumn of 1848, it appeared in France and Great Britain, revisiting, during the next eight months, with almost unerring certainty, every place in which it had appeared in the epidemic of 1832–'33, and seeking out the same filthy lanes and undrained sections of the cities where it had then committed its greatest ravages. Its character was even more malig-

nant than in its previous visit. Fifty-three thousand two hundred and ninety-three persons were carried off by it in England and Wales, without reckoning fatal cases of diarrhea, most of which were really cholera in its earlier stages.

On the 9th of November, 1848, the ship New York left Havre for the city of New York, with three hundred and eighty-five passengers. There was no cholera either at Havre or Paris when the vessel sailed, and the passengers remained healthy till they had been out sixteen days. One of them was then taken ill with a disease resembling cholera, another and another case followed, until, when the vessel arrived at Staten Island, on the 4th of December, eight or ten had died, and as many were still suffering from the disease. Cases continued to occur at quarantine among the passengers and the patients of the Marine Hospital. A few days after the ship arrived at quarantine, an individual came from there to the city, and stopped at a German emigrant house on the corner of Cedar and Greenwich streets. He was attacked with the disease, and being

carried back died in a few hours. On the 11th of December another case occurred in the same house. This house was excessively filthy, and contained upward of two hundred lodgers, mostly emigrants. One other case occurred at 161 Washington street, and then the disease ceased its ravages. In all, there were ninety-two cases and forty-eight deaths.

But, as usual, it was only resting from its labors. During the first week in April, 1849, it reappeared at quarantine, and, by the 30th of May, forty-three had died of it. In the city it made its irruption in the most filthy regions, and among the lowest of the population.

Meanwhile it had appeared in New Orleans, and had spread over the greater part of the Eastern and Western States; the emigrant parties and military expeditions on the prairies suffered severely from it; many tribes of Indians experienced its attacks, and the mortality from it in California was fearful. It did not entirely disappear from the United States till 1855, and in 1854 became very violent in some localities. In 1853 and 1854 it prevailed again

in Great Britain, and in 1855 and 1856, the allied armies in the Crimea suffered intensely from the pestilence.

After a period of nearly ten years, it again commenced its westward march; and in the beginning of May, 1865, it broke out with terrible fury among the pilgrims to Mecca, who congregated in that city to the number of more than seven hundred thousand, and under the circumstances of privation, filth, and suffering, best calculated to aggravate its intensity. It is stated that, within the space of less than three weeks, more than a million sheep and camels were slaughtered as sacrifices, and their offal left to putrefy in that tropical climate. This alone is sufficient to account for the fearful mortality which so speedily followed. It was said that fully one hundred and fifty thousand of these poor wretches were attacked by it either at Mecca or on their way to or from that city, and the pilgrimage routes were marked for long distances by their bones.

On the 10th or 11th of May, the first death from cholera occurred at Alexandria, in Egypt, the disease having been brought to that city

by pilgrims returning from Mecca. From that date to the 16th of July, three thousand three hundred deaths had ensued from the pestilence, and there had been about ten thousand cases in a population of less than sixty thousand. Rosetta Santa and Zagarig were attacked about the same time. In June it had reached Cairo.

On the 3d of July it appeared at Constantinople, and almost simultaneously several cases occurred at Ancona. From Alexandria it was imported into Marseilles in a steamer. Its ravages in Cairo were frightful, nearly five hundred perishing from it in a single day. In Constantinople, where it produced a terrible panic, under the influence of which one hundred and fifty thousand of the inhabitants fled from the city, many of them only to perish by the way, its malignity was remarkable. The authorities carefully concealed the number of deaths, which were believed in the height of the epidemic to have exceeded two thousand per day. A terrible fire, which occurred on the 5th of September and lasted till the 8th, destroying fifteen thousand houses, checked it

completely, as the great fire in London did the plague in 1666.

It was stated, on good authority, that not less than thirty-five thousand persons fell victims to the disease in Constantinople and its suburbs.

Immediately on the appearance of the disease at Constantinople and the Mediterranean ports, the Italian Government ordered a seven days' quarantine for all vessels coming from infected districts. This quarantine proved a complete protection at every place but Ancona, and here there was carelessness in enforcing the regulations. Sicily was more exposed than Ancona, but Sicily escaped, because in this island the people, remembering the former visits of the disease, brought their powerful fanaticism to the aid of the authorities. They were soon trebly exposed, for the disease took root at Malta and Marseilles, both of which cities were closely connected by steam with Messina.

The people having learned that commercial interests would lead public journals and even city authorities to conceal and deny the truth, clamored for a quarantine against all Italian

ports; and the government gratified them, although Ancona was the only port where cholera prevailed. The people of Sicily said: "We may make a little less money this year, but we shall save our lives." The Prefect of Messina died on the 6th inst., and his brothers in Genoa and Turin were not able to visit him or attend his funeral, because of the seven days' quarantine. The circumstance illustrates the rigor of the administration of that city.

At Ancona the disease found a filthy city, and no preparations made to combat it. At that time, some visionaries were informing all Italy that the ozone was all right, and that cholera could not find food to feed upon. There were forty cases per day before anybody believed that there was actual danger.

The malady soon began to travel outward to the nearest and filthiest villages of the Marches, and thence over into the Capitonata. About twenty cities and villages suffered more or less from the scourge; but in every case the towns invaded were dirty and no precautions had been taken. One village lost a hundred persons, mainly through the folly of physicians,

who insisted that a case developed in a person just arrived from Ancona was not *true* cholera, and would countenance no effort to isolate the case. In another instance, a physician reported a case of cholera; the authorities sent other physicians who quarreled with the first doctor, and reported that he had mistaken colic for cholera. The physician was publicly reproved for creating apprehension in the minds of the people, and the patient died of his colic. There were presently twenty cases per day in the village. The government promptly removed the city fathers, and placed the doctor whose warnings had been despised at the head of the sanitary commission.

The indifference and negligence of the authorities at Ancona cost Italy full ten thousand lives.

Naples, Genoa, and Leghorn were in communication with Alexandria and Constantinople, but in consequence of the rigid quarantine, no cases of cholera occurred in either. In Milan, Florence, Pistoja, and perhaps a dozen other places, there were single cases of cholera, but they were promptly isolated and did not

spread. This was still more remarkably the case in Bologna, Parma, and Modena, where all travelers from Ancona or other infected districts were fumigated, and every case which showed symptoms of cholera was carefully watched and promptly isolated, and the disease obtained no foothold.

The disease extended in July to Malta, where it raged with great violence, though its duration was short. The deaths at one time reached twenty-eight per day among the civil population. Early in August, it appeared at Barcelona, Valencia, and Gibraltar, but the number of cases was small in each place. About the 14th of August it appeared in Marseilles, being brought there by travelers from Alexandria. For a month after the appearance of the disease in Alexandria, there was no quarantine at Marseilles on vessels from that port. Later, a quarantine of twenty-four hours was established, but this was of little use. The disease raged with considerable severity at Marseilles, the deaths reaching at one time sixty per day, but the proportion of deaths to the persons attacked was smaller than in the

East. It remained in the city a little more than two months.

While thus invading points along the shores of the Mediterranean, the destroyer was also skirting the shores of the Black Sea, and working its way into Southern Russia, where it continued to spread, though not in its most virulent form, through the autumn and winter.

From Marseilles, the disease was carried, in September, to Paris, by a woman who died just after her arrival in the latter city. The French government had, however, been very active in improving the sanitary condition of the capital, and the cholera was mostly confined to the vicinity where it first originated, and was at no time very severe or general. The number of cases in any given day did not much, if at all, exceed three hundred in all the hospitals, and the mortality was in all between five and six thousand. On the 24th of October, there were two well-marked cases of it at Southampton, England. The disease spread to some of the neighboring towns, but the timely appearance of cold weather soon checked its progress.

On the 3d of November, the steamship *Ata-*

lanta came into the lower bay of New York having cholera on board. She was last from Havre (12th October), where she had received about four hundred German passengers, mostly in the steerage, who had passed through Paris where cholera was then prevailing; and on the second day out, a child died from a mild attack of cholera; others were attacked soon after, and during the voyage sixty were taken ill, some of them, however, with small-pox; sixteen died, and the remainder, for the most part, began to recover. After her arrival at quarantine, thirty-six more were taken ill, of whom four died. The survivors who were ill were removed to the floating hospital, *Florence Nightingale*, where they recovered. There were five hundred and twenty-five passengers in the steerage. None of the cabin passengers took the disease. None of the small-pox cases proved fatal. The vessel was detained at quarantine and thoroughly purified, and the disease did not spread, though there were in the city of New York, in November and December, a number of cases presenting to some extent the symptoms of cholera.

On Ward's Island, where the hospitals under the direction of the Commissioners of Emigration were located, there were twenty-five or thirty cases of cholera, or disease presenting its symptoms, between November 7th and February 1st, but the disease did not spread.

The disease was carried in November from Marseilles to Point-à-Pitre in the island of Guadaloupe, and there it raged fearfully, nearly six thousand of the inhabitants of that island and those immediately adjacent having fallen victims to it.

In Europe, the cholera was, for the most part, dormant during the winter, a few cases occurring in Italy, and some scattering cases in Paris and other towns of France. It was, however, creeping northward from the Black Sea, following the course of the Danube, and though not virulent during the cold season, steadily made progress. It entered Germany also from the East, and early in March had made its appearance as far westward as Goldsdorf in the Grand Duchy of Luxemburg, where it raged with great virulence. On the 30th of March, the *England*, a large steamer (three thousand

six hundred and seventy tons burden) of the National Steam Navigation Company's line, left Liverpool with one thousand two hundred and two passengers in the steerage, sixteen in the cabin, and a crew of one hundred and twenty-two men. On the fifth day out, cholera made its appearance among her steerage passengers; and on the 9th of April, she put into Halifax, for medical aid, fifty of her passengers having died of the disease and more than one hundred more being already ill with it. She remained at the quarantine at Halifax nine days, and in that period one hundred and fifty more died of cholera, and sixty others suffering from it, were left at the quarantine hospitals. Of these, ten subsequently died. Twenty-five of the steerage passengers escaped into Canada. On the 18th, the *England*, having been thoroughly fumigated and cleansed, sailed for New York with a clean bill of health, and no more cases occurring on her voyage, she was, after a few days' further detention at quarantine in New York bay, permitted to come up to her dock and land her passengers. The cabin passengers were none of them at-

tacked by the disease, though exposed constantly to it for more than two weeks.

On the 4th of April, the *Virginia*, another steamer of the same line (of two thousand eight hundred and seventy-six tons burden) sailed from Liverpool, with one thousand and forty-three passengers in the steerage, and arrived at New York on the 18th, having had thirty-eight deaths from cholera on her passage. She came up at first to the upper bay, but the fact of her having cholera on board being discovered, she was ordered back to the quarantine ground; and after some delay, owing to the insufficiency of the quarantine accommodations, her sick passengers were removed to hospital-ships, and the vessel thoroughly cleaned and fumigated. The cabin passengers in this case escaped wholly, but there were more than one hundred of the steerage passengers taken ill with the disease after the arrival of the vessel at quarantine, and somewhat more than fifty deaths.

The passengers, on both those ships, who were first attacked were Germans, who had come from sections of Germany where chol-

era prevailed, two or three days before their embarkation at Liverpool.

On the 1st of May, 1866, there occurred a marked case of cholera, at the corner of Ninety-third street and Third avenue, New York, in an Irishwoman living in a tenement house, and who had been engaged for several days in removing the contents of a privy vault to some land she was cultivating. Whether there had been choleraic evacuations into this vault was uncertain. The woman died after twenty hours illness. Her child died of the same disease, two days later; and on the 3d of May, another case occurred in Mulberry street, in a crowded and very filthy tenement house.

Early in October, 1865, M. Drouyn de Lhuys, the French Minister of Foreign Affairs, suggested to the foreign powers of Europe and America an International Cholera Congress, to be held at Constantinople, in the Spring of 1866. The Congress met, and discussed the various questions relating to cholera, in April, 1866.

CHAPTER II.

CAUSES OF CHOLERA, REMOTE AND IMMEDIATE—THE QUESTION OF CONTAGION.

Conditions of its origin noticed—What is the poison?—The insect theory—High character of its advocates—Opinions of American, French, and German physicians, Dr. Dixon, Madame de Castelneau, M. Guyon, Dr. Burrall, M. Pettenkofer, and others—The disease differs, both in degree and in kind, from Cholera Morbus or Cholera Infantum—Conditions necessary for the development and spread of the Cholera poison—Who are most in danger of an early attack, and under what conditions is the danger greatest—The steerage passengers on shipboard in more danger than the cabin passengers—The dwellers in low, undrained, and filthy localities than those in well-drained and well-ventilated situations—Is Cholera contagious?—The long discussion on this question—The predominance of the modified theory of contagion—Arguments of the non-contagionists—Opinions of a distinguished authority on the theory of atmospheric transmission of the disease—Statement of facts and observations demonstrating its probability—Regiments in India affected by it—Dr. Byrne's observations—Appearance of Cholera in South Carolina and Key West in 1832—Its advent in Saxony in 1865—The admission of the epidemic into Syria in 1865—The infection carried to Constantinople—Its first appearance in America in 1832—Quebec, New York, and New Orleans—The case of the *Atalanta* in 1865—The Constantinople infection fully detailed—Marseilles—The disease in eighteen lunatic asylums in England in 1848-'9—The pauper school at Tooting, England—Newport, R. I.—The argument

against contagion, that the attendants on the sick do not contract the disease, unfounded—It travels against the wind, and in the lines of commerce—The poison conveyed by the evacuations from the stomach and bowels, and by the fermentations or putrefaction of these—The prompt disinfection of these greatly diminishes the liability of the disease to spread—The circumstances essential for the development of a Cholera epidemic as defined by Pettenkofer and the Bavarian Commission—Dr. E. Harris on the Staten Island Quarantine epidemics—Filth, habits of dissipation, and errors in diet will induce it even in dry localities—The Cholera transmitted in clothing—St. Pierre—Guadaloupe—Transmitted by letters—M. Jules Worms views of the propagation of the disease—Dr. Charles A. Lee's letters—Dr. Burrall's conclusions.

THE *causes* of cholera are properly divided into two classes: the remote, or those which may have induced it in the beginning, and those which have furnished a suitable nest for its propagation; and the immediate, or those which have had a direct agency in its production in a particular case.

We have already stated the circumstances, so far as known, of its origin in India. It seems to be well established that it has prevailed on the banks of the Ganges and along the course of the basins of that river, and its affluents, for several hundred years. The lands in which it has thus existed, sometimes appearing in a few cases scattered over a considerable

district, and at others in the form of a desolating epidemic, sweeping off its thousands, are low, often marshy, and encumbered with a dense undergrowth and masses of decaying vegetation. The inhabitants, especially the lower classes, the Sudras, and, above all, the Pariahs, or outcast race, are intensely unclean and filthy in their habits, and, at almost all times, dead bodies of men, women, or children, nude and in every stage of putrefaction, may be seen floating along the river, the prey of the crocodiles, who are, however, sometimes overgorged with the superabundance of their provisions. In no other part of the world, so far as can be ascertained, has it appeared as an epidemic, unless it was brought there by some person or persons, or by some goods infected with the disease.

What this poisonous influence, which thus originates the disease in that country, is, is a matter of uncertainty. Some very eminent physicians, mindful of the prominent part which minute and microscopic insects play in causing many of the diseases to which man is liable, have argued that the primary cause of

cholera was a microscopic insect, bred in the filth and decay which so abound in the basin of the Ganges, and which, entering the system, perhaps in its undeveloped or lower condition, speedily perfected its existence in the stomach, and, multiplying by millions, produced the diseased condition, and, infecting the discharges from the bowels, propagated the disease through these discharges. The disease which has been communicated to the human system from eating the flesh of diseased swine, the Trichiniasis or Trichina disease, is adduced by these physicians as an example of the deadly effect which may be produced by these animalcules when taken into the system. An eminent American physician, who is, however, somewhat inclined to theorize, thus lays down his views of the ultimate origin of cholera:—

"Diseases are produced by laws as unerring in their action as those by which the body is formed or health restored. Just as certainly as the merest mite that dances in the sunbeam, the moss that covers the roof or tree, the tiny humming-bird, lordly man, the ponderous elephant, the mighty whale, and the infusoria of

the ocean, all originate from eggs and seeds, just as certainly are infectious diseases produced in the same way.

"Yellow fever is the product of closely confined warmth and moisture; it originates directly from those two conditions. United, they produce a vegetable fungus, of microscopic size, which is inhaled by human beings, and thus produces the disease. It is always brought to this city in the holds of vessels from warm climates only. It is never propagated from a single person to another, but it may be brought to any place, where the necessary conditions of atmosphere exist, by clothing or cargoes in bulk, and thus other centers of propagation for these vegetable fungi may be formed, precisely as we form mushroom beds from mushroom spawn in a damp and dark cellar, or toadstools spring up in the same place, or at the root of a tree in the forest. Frost at once destroys yellow fever; therefore it is of vegetable origin.

"Cholera is not produced by a vegetable fungus or moss; it originates in human filth. Wherever human beings congregate in close

quarters and in vast numbers, in a confined atmosphere in this country, there either typhus fever, malignant dysentery, or cholera infantum of our summers, is produced. Asiatic cholera is produced by an animal germ. It came first to this country in a ship, in June, 1832. It first appeared in Quebec, passed to Montreal by the 14th, and was in New York on the 25th. No doubt whatever, it was conveyed in the bodies of travelers, for it can only be propagated in animal organisms. That it is an animal germ we will now endeavor to show: *First.* It is not, like yellow fever, destroyed by frost. It has proved very fatal in winter. The only animal, we have reason to think, that dies from cholera is the hog. The hog cholera of the West is very fatal; the symptoms are similar to those of man. *Second.* We never had Asiatic cholera here till 1832, although the same conditions essential to its propagation—dense population, confined air, and filth—always existed, and always produced their appropriate results—typhus fever, dysentery, and cholera infantum—but never Asiatic cholera.

"Cholera is defective vitalization of the blood, or want of pure air, producing defective nutrition. This causes relaxation of the contractile powers of all the blood-vessels of the body. The entire tract of intestines opens its myriad blood-vessels, and all the albuminous or flesh-making material passes off from the bowels. It is rapid cholera infantum, only it preys upon adults chiefly. Not a single case of cholera occurred on board the *Atalanta* in its spacious cabins, during all the terrible death-scourging among the poor steerage passengers. What can be more convincing? There were filth and confined air, animal poison in its highest degree, depressing the aëration, or life-renovation of the blood, not producing typhus fever, but cholera. The solids of the human body are relaxed, when the blood loses its life-giving power, and animalcules can act readily, perhaps enter the blood-vessels themselves. These animalcules unquestionably could pass by the wind to the inhabitants of the spacious cabins in the posterior part of the vessel, but *their* blood-vessels and nerves were in good order, and kept the tissues tight enough

to prevent the entrance of the exciting germs."

This theory of the insect origin of the disease is not a new one. It was advanced as long ago as the first general epidemic of the disease, in 1832. It has recently been brought forward by eminent scientific authorities in France, and Madame de Castelneau, one of the most accomplished of French naturalists, made a communication in January, 1866, to the French Academy of Sciences, in which she declared that she had discovered the cause of the cholera in a microscopic insect, which she named "the winged leech," and which she stated was developed especially in marshy and filthy localities. The details which she gave in relation to this animalcule, and its connection with cholera, were so minute, that the Academy, which commenced by laughing at the first paragraph of the report, finished by deciding to investigate the matter. About the same time, M. Guyon, an eminent zoologist, presented a paper to the Institute of France, in which he cited a large number of facts tending to prove a certain analogy between the cattle

plague and the cholera, and the insect origin of both.

Dr. Burrall, in his recent treatise on cholera, after stating this theory, says: "An infusorial contagion, originating in the swampy districts of Hindostan, while plausible, is thought to explain some of the strong peculiarities of the disease. The almost marvelous vitality of microscopic animalcules, as well as of their germs, is supposed to account for the periodic renewals of the disease at comparatively short intervals—latent germs being quickened—either as the result of fortuitous circumstances, or in consequence of peculiar inherent laws. The extinction of epidemics also has its analogue in the entire extermination of myriad swarms of insects; but a thorough examination of the infusorial world during cholera epidemics has given no positive results, so that the question still remains unanswered. The same may be said with regard to the theory that the cholera contagion is of a vegetable nature, a fungoid growth developing in the the cholera dejection." Pettenkofer (an eminent German physician) expresses himself very

decidedly on this point in a German medical journal of Oct. 9, 1865: "Without the least danger of making an error," he says, "we can assert that the substance in question (the ultimate cause of cholera) although quite unknown to us as a separate entity, must be of organic nature, and either a cell or a ferment," *i. e.*, either animal or vegetable.

Quite as positively does another American physician give his view of the infusorial origin of the disease:—

"All old-school men of science will shake their heads over the insect theory of the cholera; but one of these days they may be presented with a photograph of the insect taken from life. Microscopic philosophy enables us to prepare objects for careful study in a way formerly considered impossible. An object which, to the naked eye, would be wholly invisible, can be photographed, and the photograph enlarged so that a mere speck becomes a picture a foot in length, displaying the minutest details of form and construction. In cases of disease, some mere point, with position, but not magnitude, may, when photo-

graphed and enlarged, prove to be the egg—the larvæ, the chrysalis, or some form of animal life."

Waiving, however, the further discussion of this question of the insect origin of the disease, we would say that the Asiatic cholera does differ, not only in degree, but in kind, from the common cholera morbus, which occurs to a greater or less degree every season. To the causes which produce that disease there is added something, whatever it may be, in the nature of a specific poison, which devitalizes the blood, and suspends or greatly modifies the action of the nervous system.

Whatever may be the nature of the poisonous germ, which, under favorable circumstances, develops into Asiatic cholera, there are required certain other conditions to its rapid and fatal attack. In small-pox, in measles, and other contagious and epidemic diseases, it is not all, nor even the greater part of those who are exposed, who contract the disease. This is still more the case with cholera. For the speedy and extensive development of the germs of the poison, moisture, filth, foul air, and the

presence in a greater or less degree of noxious exhalations of gas, seem necessary. Yet, even with all these, there are only a certain proportion, and those of the class most susceptible to the disease, from nervous debility, irritability of the stomach and bowels from the habitual use of stimulants, as intoxicating liquors, opium, or tobacco, neglect of personal cleanliness, or excess of any kind, who will at first, at least, become subjects of it. Thus, when the disease breaks out in a ship, some of whose passengers have come from an infected district, a certain proportion of the passengers will be seized within the first six or eight days, and then there will be few or no more new cases, unless the ship comes into port and the passengers are landed, when, under the new conditions of atmosphere, diet, &c., those who had previously escaped the disease will, to some extent, be liable to it.

On shipboard, its ravages are always far more fatal, in proportion to their numbers, among the steerage passengers, than among those in the cabin; and if the steerage is greatly overcrowded, the vessel filthy, the ventilation,

as is almost always the case, insufficient, and the air impure and charged with the exhalations of unwashed bodies, the mortality may be, and often is, frightful.

On land, the disease, when once brought to a place, finds its favorite haunts in the midst of filth and squalor; in cities, seeking the back slums and the crowded and dirty tenement houses, with their uncleansed and fetid sess-pools and reeking gutters, sending up volumes of sulphureted hydrogen, to poison still more the scanty supply of already vitiated air; in the country, it seeks in preference low and marshy lands, farm-houses with their neglected manure, heaps and pools of stagnant and filthy water, and gathers in its victims from the gluttons and moderate drinkers of the community.

This brings us to consider the question of the contagiousness of cholera. There has been no topic touching the physical welfare of man which has been for the last thirty-five years more thoroughly or acrimoniously discussed than this. The greatest names in medicine have been arrayed on the one side or the other, and each has charged the other with indiffer-

ence to the welfare of the community. Into this bitter controversy we have no desire to enter, further than to say that the observations made during the present epidemic, as well as those during its prevalence in 1854, have given such predominance to the theory of contagion, that it is now received, in a somewhat modified form, by the great majority of the profession.

Contagious, in the ordinary or in the medical sense of that word, namely, as being communicated by contact with the patients affected by it, or by inoculation of the matter discharged, like small-pox, syphilis, or scald-head, cholera certainly is not; but that it is *portable*, or capable of being transmitted, by the carrying of its germs from one place to another in the excretions of persons who have already absorbed the poison, there can be very little doubt. And it is not impossible that the deadly virus, after having lain dormant for months, and perhaps for years, may be quickened into new vitality by some influences, climatic or other, which only develop it in the presence or on the approach of the pestilence. How otherwise shall we explain satisfactorily its return with

such unerring certainty after an interval of some years, not simply to the same neighborhood, but to the same house and the same room, to commence anew its ravages? This has occurred too often in London, in Edinburgh, in Glasgow, in Montreal, and in New York, to be a mere matter of accident.

The methods by which those who reject the theory of the portability or modified contagiousness of the disease, attempt to account for its extension, are, in general terms: progressive atmospheric influence, local atmospheric influences, and terrestrial emanations. It has been found, however, that, as diffusive agents, these are all insufficient to explain the peculiar features and progress of the malady.

The following opinions from a distinguished authority, upon certain atmospheric conditions supposed to favor epidemics of cholera, are the results of extensive experience, and are entitled to very great respect:—

"Great importance has been attached to the meteorological conditions attending an outbreak of cholera. They do not appear to be very important, except in two or three cases.

"1. *Temperature.* High temperature favors the spread of the disease, by increasing the putrefaction of the stools, and by augmenting generally the impurity of the air. When cholera has prevailed at a low temperature (and it has been severe at a temperature below 32° Fahrenheit), the drinking-water has probably been the cause.

"2. *Pressure* has no effect. The old observation of Prout, that the air is heavier in cholera epidemics, has never been confirmed.

"3. *Moisture in the air*, when combined with heat, seems to be an accessory cause of importance, probably by aiding transmission.

"4. *Dryness of the air* seems decidedly to check it.

"5. *Rain* sometimes augments and sometimes checks it. This, perhaps, depends on the amount of rain. A very heavy rain is a great purifier.

"6. *Movement of air.* The disease is certainly worse in stagnant atmospheres, as is the case with all specific poisons.

"7. *Electricity* is not known to have any effect. This was particularly examined by Mr. Lamont,

in Munich, one of the most celebrated physical philosophers of our time, but with entirely negative results.

"*Ozone.* This agent has been very carefully observed by Schultze, Voltolini, Dr. Mettre, Lamont, and others, with special reference to its alleged influence in checking cholera, and they agreed completely in the opinion that it had no effect on its presence or absence."

The following statement of the facts and observations on which the doctrine of the portability, or modified contagiousness of cholera, is based, is carefully compiled from the published report of Dr. William Read, city physician of Boston; the valuable professional treatise of Dr. Burrall on Asiatic cholera; Dr. Charles A. Lee's letters, &c., &c.

"The history of cholera shows that its usual method of progress is from a center, in more or less irregular directions; yet, at the same time, its course has been more strongly imprinted along the chief lines of trade and inter-communication. The grand routes of travel and traffic have always been especially marked in its progress; it has followed large

bodies of men in motion; and, when it has passed from one continent to another, the first cases have been observed in seaport towns, from which it has spread to the interior.

"Cholera has frequently attached itself to bodies of troops on their march in India, and has remained with them during many days in their passage over long tracts of country, the inhabitants of which were not suffering from the epidemic. The duration of the epidemic in marching regiments is stated by Dr. Lorimer, who has collected the largest number of instances, to be, in the majority of cases (in 88 out of 121), less than thirty days. It has often, however, been longer, and, in the more severe outbreaks, the epidemic reached its climax in the regiment about the eighteenth day. Many points relating to these attacks of marching troops in India are matter of dispute, but the fact that the disease remained with them for many days, when it did not prevail in the country round, seems not to be gainsaid; and here, again, the inference is irresistible that the cause of the disease traveled with the troops, and affected different men in succession."

Dr. Byrne, an eminent writer on cholera, notices the singular circumstance that, although at the date of his writing (1854), thirty-four years since the cholera first reached Canton, it had never crossed the *atmosphere* of the Pacific; yet since immigration to America had become very extensive, it had crossed the Atlantic a number of times.

Besides, it can not be regarded as a mere coincidence that the disease should never have been seen on the coast of South Carolina before the arrival of the brig *Amelia* in October, 1832, at Folly Island; and that the only cases on the island were of those employed about the vessel; or that the first cases at Detroit occurred soon after the arrival of the *Henry Clay*, July, 1832, with cholera on board; or that it never should have appeared at Key West until the arrival of the *Ajax*, which had sailed from the infected port of New Orleans, and which arrived at Key West with the disease on board; besides many other well-authenticated instances of a similar character.

The present epidemic is consistent with previous ones in affording evidence that the dis-

ease has been mainly diffused along the lines of travel by means of human intercourse.

Dr. Althaus, in a letter to the *Medical Times and Gazette*, dated October 30th, 1865, writes as follows with regard to the recent introduction of cholera into Saxony: "In Berlin, Vienna, and other large towns, no case of cholera has as yet occurred. But the disease has been imported into the very heart of Saxony by a few travelers who left Odessa some weeks ago, when cholera was at its height there. These gentlemen, a few days after having arrived at Altenburg, a small town near Leipzig, fell ill and died with all the symptoms of cholera. Several of the inhabitants of Altenburg were subsequently affected and died, and the disease then spread to Werden, a neighboring town, which is in railway communication with Altenburg, and where the epidemic has assumed comparatively large dimensions. Up to October 20th there had been one hundred and forty-nine cases of cholera at Werden, of which fifty-two proved fatal; and, according to the latest accounts, the epidemic is by no means decreasing. This insulated outbreak of chole-

ra in a previously healthy country, and which is clearly traced to persons coming from a center of infection, must prove an important link in the evidence already accumulated to prove its contagious nature.

Dr. Tilbury Fox, who was traveling in Syria at the time when the epidemic prevailed there, states that numbers of pilgrims from Southern India died of cholera during the months of February and March, at the Arabian ports of Djeddah and Moculla. Eighty deaths occurred on one vessel which arrived off Moculla in mid-winter, before the companions of those who had died left the ship for Mecca. Egyptian physicians have also established the fact beyond question, that the disease advanced, in the last weeks of May, from Arabia along the North African coast, and Egypt was soon visited by the pestilence conveyed thither by the flying pilgrims. In the report of the chief physician at the Isthmus, it is stated that nearly twenty thousand pilgrims, all more or less infected, passed Suez in order to embark at Alexandria for Europe or elsewhere. Suez, Alexandria, and Marseilles were

healthy until some pilgrims from Mecca, who had embarked at Djeddah, where the cholera prevailed, arrived at those ports.

Prof. Tommasini, who published a work on cholera in 1837, states, on the authority of Dr. Frias, a physician of Leghorn, who had lived several years in Alexandria, that the disease was originally carried from Mecca to Alexandria by pilgrims returning from the same feast of Kurban Bairam. This year the same carriers seem to have borne it from Mecca in all directions, since it followed the main routes of the caravans.

Steamships have also played an important part in carrying the seeds of the present epidemic to different parts of the Mediterranean, Black Sea, and up the Danube. They were overcrowded with those flying from the different places where the pestilence prevailed; and outbreaks of the disease occurred at various landings, soon after the arrival of the steamers. It was also noticed that the disease would pass by ports nearer those localities where the malady was then raging, and attack others more distant, with which the means of communication

were more frequent and direct. Thus it passed by Candia, Rhodes, and the Cyclades, and first appeared at Samothraki and Salonica.

The reason why the disease showed a tendency to prevail in the basin of the Mediterranean is, that it was carried to the different seaports by the steamers, and spread from those ports as centers. On the Black Sea, the regular line of steamships was discontinued, for it became evident that the disease was being propagated by means of them.

The recent introduction of the disease into Constantinople, was by a ship which had been lying in the port of Alexandria. It is stated that Osman Pacha came by way of Alexandria in the beginning of July, bearing a message to Constantinople concerning the Suez Canal. Three persons died of cholera on the passage. The physician and captain concealed the deaths, at the Pacha's order, and declared the ship healthy to avoid quarantine.* The first cases

* Here is an instance in which quarantine regulations have been inefficient in warding off the disease. See a more full statement of its advent into Constantinople a little further on.

treated in the marine hospital belonged to the crew, and the epidemic commenced in that part of the city near the hospital.

The coincidence of the outbreak of the disease on this continent, and on islands in the middle of the ocean, with the arrival of an infected ship from an infected port, is one of the most conclusive facts in favor of the transmission of the disease by human intercourse. There are a number of well-authenticated instances of this character.*

The brig *Carricks* sailed from Dublin, then infected with cholera, in April, 1832, having one hundred and seventy-five emigrants on board. The disease appeared among the passengers a few days after leaving port, and forty-two persons died of it before the 3d of June, when she arrived at Quebec. The remainder were permitted to land on Grosse Isle, a few miles from Quebec, and no rigid measures were taken to prevent intercourse between them and the city. Several cases of cholera appeared in

* Dr. Byrne notices the circumstance that cholera follows the line of a single vessel when crossing the ocean, but branches out in a hundred directions after reaching the land.

Quebec on the 6th, 7th, and 8th of June, and on the 9th, fifteen cases were reported officially. This was the beginning of cholera in America.

The emigrant ship *New York* sailed from Havre on the 9th of November, 1848, and the epidemic made its appearance on the sixteenth day of the voyage. Fourteen fatal cases occurred during the passage, and on the 2d of December, cholera patients were landed at the Quarantine Hospital on Staten Island. Eight cases and five deaths immediately occurred on Staten Island, and there was a severe epidemic in mid-winter upon the quarantine grounds.

At about the same time (December 11th, 1848), the ship *Swanton*, also from Havre, reached New Orleans with two hundred and eighty emigrants on board. Thirteen passengers had died at sea, subsequently to the 26th of November, most of them from bowel complaints supposed to be dysentery. On the day following the arrival of the ship at New Orleans, a woman with well-marked cholera was taken to the hospital. On the following day,

a man who had come over in the ship, and had diarrhea on his arrival, was brought in a state of collapse to the hospital, and died in a few hours. Three other cases of cholera, all fatal, were admitted from different parts of the city the same day. In these latter cases, no communication with the ship was traced. The disease now spread rapidly in the hospital and city, although it did not exist at this time in any other part of the United States except Staten Island. These cases are not recent, but are introduced in connection with the following extract from an article in the *British and Foreign Medico-Chirurgical Review* for October, 1865, which refers to the vessels just mentioned:—

"It was in the last week in November, 1848, that it manifested itself at sea, on board two emigrant vessels, bound, the one for New York and the other for New Orleans, when they had been out, the former sixteen and the latter twenty-seven days from Havre, which was unaffected at the time of their departure. The circumstances attending the nearly simultaneous appearance of the disease in two vessels

traversing the Atlantic, and about a thousand miles apart, are among the most curious on record in the history of epidemic cholera. The disease did not extend beyond the limits of the Staten Island Hospitals at New York, after the arrival of the infected ship there."

These incidents, apparently obscure, admit of an easy solution; for although the disease may not have existed in Havre when the emigrants passed through that city, they came from and through cities where the cholera then prevailed. One of the emigrants died of cholera in Greenwich street a few days after leaving the *New York*, and soon after two other fatal cases occurred in the neighborhood. There were more than one thousand fatal cases reported from the emigrant vessels at quarantine, and a severe epidemic raged at the quarantine grounds during the winter. This is stated on excellent authority.

The circumstances connected with the appearance of the cholera on the *Atalanta*, which arrived off New York on the 2d of last November, are well known. The *Atalanta*, an English mail steamer, sailed from London

on the 10th of October, while that city was perfectly healthy. On the 11th she arrived at Havre, remaining only one day, and received twenty-four additional cabin and five hundred and forty steerage passengers, mostly from Switzerland, the northern part of Germany, and Eastern France—all, with few exceptions, passing through Paris on their way to Havre; some remaining only a few hours, and others for days, in the metropolis, where already at that time cholera was reported to prevail, although to a limited extent and of a mild type. Among them were two families from Germany, who remained a day at the hotel City of New York, in Paris, and five days at the Weissen Lamm and Hullgarder Hof, in Havre. While at these hotels, emigrants who had arrived only a few days before them were taken ill, visited and attended by government officials, and by their orders sent to the hospitals. The *Atalanta* sailed again on the 12th of October. On the 13th, the first death from cholera occurred in the person of a little child in the family from the Weissen Lamm. On the 14th, 16th, 18th, 19th, and

22d days of the same month, five deaths from cholera occurred in the family from the Hullgarder Hof. On the 22d, a friend of the family, also from the Hullgarder Hof, but in the second steerage, sickened and died on the 24th. On the 28th, the first cases occurred in the third steerage, when three of the emigrants from London were taken ill, all of whom however recovered.

The *Hermann*, which sailed from Havre at the same time with the *Atalanta*, arrived at the lower quarantine on the 26th of November. The physician in charge reported seven deaths—four children and three adults. The former he reported to have died of diarrhea and inanition; the three adults of disease of the heart, inflammation of the bowels, and premature parturition after a few days' illness. Singular, however, that the first death occurred in the very family who had lost the mother at Hullgarder Hof at Havre, and whose disease and death, after thirty-six hours' illness, the illiterate peasant, her husband, so graphically described, that no doubt whatever could exist that she died of cholera asphyxia.

That cholera prevailed in Paris, and to some extent in Havre, has been admitted by all, and, what is still more significant, the *Atalanta*, the *Mary Ann*, *Hermann*, and *Harpswell*, had each names on the passenger lists which were not among the passengers, but were reported to have been sent to the hospital by the local authorities at Havre.

The cabin passengers did not suffer from the disease, probably because they had no communications with the water-closets of the steerage, and sanitary regulations were carefully enforced among them by the surgeon of the ship. In regard to the epidemic at Constantinople, Dr. Mulig, physician to the Prussian embassy and to the Imperial Naval Hospital at Kassim-pacha, reports that, on the 28th of June, the war-frigate *Mouchbiri-sourour* arrived directly from Alexandria. Until this time, "no case of cholera or of its forerunners, such as diarrhea, sporadic cholera, or irritation of the stomach and bowels, were observed at Constantinople." No sickness being reported on board, the vessel was permitted to come to anchor, but on the same evening twelve pa-

tients were sent to the marine hospital, eleven of whom were recognized to be suffering from incipient cholera, and one in a state of collapse, which terminated fatally during the night. On further questioning, the surgeon of the steamer stated that on the voyage two of the crew had died of cholera, and although when at Alexandria no cases of cholera had occurred on board, diarrhea had been noticed. From this steamer, as from a center of contagion, the disease spread in all directions. To quote Dr. Mulig's report, "The facts speak for themselves. Up to the 28th of June, nothing in the hygienic condition of the city announced an epidemic of cholera. On this day, the frigate *Mouchbiri-sourour* arrived from Alexandria with cholera-sick on board. They are landed at the arsenal, and not five days pass before the first case occurs in a patient from the military workmen's barracks, situated hardly ten steps from the landing of the arsenal. From this day, cases multiply in the arsenal and on board the vessels anchored there; thus the corvette *Ismir* is the first attacked, being at the same time nearest the

barracks, and it is only a few days more before the transports anchored a little further off are visited by the disease. The guard of Parmak-capon, at the entrance of the arsenal, and only a few paces distant from the barracks, is nightly dealt with in its turn; finally, the rest of the guard and the workshops are infected. In the mean time, the corvette *Ismir* is towed to the exterior port, where she remains for forty-eight hours; the cholera continuing, she is removed to Bouyoukliman, and, several days later, the first case of cholera appears in the exterior port. On the other hand, the citizen-workmen employed at the arsenal propagate the disease in Kassim-pacha. If we turn to Yeni-Keuy, which is a considerable distance from the point of origin, we find here also that the disease is propagated from the arsenal, for the first established case is that of a stonemason from Kassim-pacha, arriving already sick at Yeni-Keuy, where he dies the next day with all the symptoms of cholera. Is it a contagious disease, or do you wish to quibble upon the word? Let us state then the fact—it is this: cholera patients impart

cholera! Do you wish an additional proof? That which has happened to the Marine Hospital itself may furnish it. The first case of cholera having stayed at the hospital longer than a few days, the patients remaining there from other diseases were affected, and succumbed under the attacks of cholera. The fourth ward, where the first case of cholera of local origin was observed entering, on the third day of July, with simple diarrhea, has furnished subsequently several other cases. Among the employees, the first victims attacked were the nurse of the cholera ward, and two washermen who cleaned the linen of the cholera-sick. Cholera does not seem to be contagious by simple contact of the patients, but the cholera patients rather develop contagion, like those affected with small-pox; with this difference, that whereas in small-pox contagion is communicated by the skin, in cholera it is through the excretions, especially the stools, that the infection is propagated. Thus, the linen stained by cholera patients, houses occupied by them, and infected ships, may harbor the contagion for a long time, and become the cause of new infec-

tion. It must also be observed that the stools of persons suffering from mild manifestations of the disease, from cholerine and cholein, like diarrhea, do not contain the contagion any less than the excretions of those suffering from confirmed cholera, and it is therefore easy to conceive why a ship or a building may be affected without a case of cholera having occurred."

M. Grimaud narrates the following facts concerning the epidemic in Marseilles. The *Stella*, Capt. Regnier, entered the port Napoleon, on Sunday, June 11th, at half-past two, from Alexandria, with ninety-seven passengers, of whom sixty-seven were Algerine pilgrims. On the evening of the same day, the *Byzantine* arrived with fifty-five passengers, having left Alexandria June 3d, and touched at Malta. The *Syria* arrived on the 15th, with the English mail and three hundred and twenty passengers; and the *Said* on the 16th, with one hundred and ninety passengers. Of the sixty-seven pilgrims on the *Stella*, two were thrown into the sea eight days after leaving Alexandria; and two days after, on the 11th of

June, the remaining sixty-five disembarked, of whom Ben Kaddour died on landing.

The Arabs left Fort St. Jean to re-embark; a crowd surrounded them, and assisted them with their baggage outside the fort. It also accompanied them along the bridge overlooking that part of the city. There the first case of cholera appeared, but it did not remain there, for on June 22d a severe case was reported by Dr. Forcade in Rue de Rome; and thus the cholera was, for the sixth time, introduced and developed in Marseilles.

Dr. Baly,* in his "Report on the Cause and Mode of Diffusion of Epidemic Cholera," gives some very interesting accounts of the disease, as it was observed in eighteen lunatic asylums in England. This report consists mainly of deductions made from the replies of English physicians to questions on cholera, which were addressed to them by Drs. Baly and Gull in 1848 and 1849, during the prevalence of cholera

* Reports of Epidemic Cholera, drawn up at the Desire of the Cholera Committee of the Royal College of Physicians. By William Baly, M.D., and William W. Gull, M.D. London, 1854.

in England; and its conclusions are of great importance. The weight of opinion is increased by the fact that, while in the commencement of their investigations, these gentlemen were disposed to question the contagiousness of cholera, their views became much modified as their inquiries progressed. The report says:—

"The commencement of the disease usually in one limited part of a public establishment or in one of a group of houses, and its extension to others in succession, is not easily reconcilable with the theory of a general and persistent state or influence. To adapt this theory to the facts, one of two hypotheses must be adopted: either it must be assumed that a peculiar condition of localities is necessary for enabling the general epidemic influence to produce its effects, and that when one part of a public establishment or a group of houses, previously free from this condition, has on a sudden acquired it, other parts are very likely to participate in it, in more or less quick succession; or else it must be supposed that a peculiar state of susceptibility is necessary in the persons who are to be affected by the

hypothetical epidemic influence, and that, when one or more among the inmates of a public establishment or group of houses, who have all hitherto resisted that influence, chance, from whatever cause, to acquire the necessary state of susceptibility, those in different parts of the building or in contiguous houses, are apt successively to fall into the same state.

"A much more probable explanation of the commencement of the epidemic in one part of an asylum or other public establishment, and of its subsequent extension through other parts, is obviously afforded by either of the other theories, which suppose the cause of the disease to be a material poison transferable from spot to spot, and from person to person, by human intercourse or currents of air. Again, if the theory of the production of cholera by a general atmospheric influence were adopted, the continuance of the disease in each ward of a lunatic asylum for a certain time, its cessation in some wards sooner than in others, its final disappearance from almost all before the epidemic in the neighborhood had come to an end, could be explained only on the

supposition of the temporary existence, in each ward in turn, of that supposed condition, either of the locality or of the patients, which was necessary to excite the general atmospheric cause to action. The difficulties in the way of this hypothesis are obvious. * * * *

"If, on the other hand, the theory of contagion be rejected, and the cause of cholera be regarded as a poison not reproduced within the bodies of the sick, but existing and increasing independently of human bodies, the comparatively protracted duration of the epidemic in one ward of a lunatic asylum, while it was spreading to other parts of the establishment, seems to require some such assumption as that the poisonous matter attached itself to the surface of the walls, or furniture of the ward, or the clothes of the patients, and remained there for awhile, its quantity increasing more or less, and that, while one portion of it was imbibed in some way or other by patients in the ward, another portion was conveyed to other parts of the establishment. According to this view, too, the ultimate cessation of the disease in each ward must be ascribed either to

the destruction of the poison by a spontaneous process, such as might be supposed to take place in the most simple vegetable organism, after it had thrown off germs, or to its destruction or removal, either by an altered state of atmosphere, or by the ventilating, cleansing, or other sanitary processes adopted. The hypothesis of the susceptibility of only a limited number of persons, would not here suffice to explain the entire cessation of the disease, inasmuch as it would leave the cause of the disease still existing, and ready to affect any persons newly exposed to its influence.

"If, then, the doctrine of contagion be rejected, it is undoubtedly difficult to find a mode of explaining the cessation of the epidemic in each limited spot which would not be simply conjectural."

The outbreak of the cholera in the school for pauper children at Tooting, in England, gives a striking example of the communicability of the disease from individual to individual. The malady commenced in the school on the last two days of December, 1848, and, in consequence of the great mortality among the

children, it was determined to distribute them in the parishes to which they belonged.

"In four known instances, fatal attacks of the epidemic occurred immediately in the work-houses or other asylums into which the infected children were received, and the outbreak of the disease in a fifth institution was traced to communication with one of the dispersed parties of children.

"Forty-five of the children being removed on the 6th or 7th of January to the Bellevue-House Pauper Asylum at Margate, one of them died there on the 8th of January; and immediately afterward, several inmates of the house, who had not come from Tooting, were attacked, and three died, two on the 11th and one on the 23d.

"At the Royal Free Hospital, one hundred and fifty-five of the children were received from Tooting, on the 5th of January; four of them died between the 6th and 8th of January; five of the attendants were attacked, and two of them died between the 13th and 20th of the month."

One of the attendants at the Royal Free

Hospital, who was attacked with cholera, died at the Holborn Union Workhouse, and the disease at the same time broke out in the latter institution. Similar results were observed in the St. Pancras Workhouse, and in Park-House at Hackney, showing that the disease was traced immediately to the advent of the pauper children.

On the 17th of July, 1832, two females left New York, then infected with cholera, for Newport, where they arrived the next day. They were detained one week in quarantine, and, on the 25th, permitted to land, when both were found to be sick of spasmodic cholera, which proved fatal. On the 30th, Mr. Forbes, who had helped to bury them, had bilious colic, and, after several recurrences of symptoms, was restored to health. Subsequently four members of his family had cholera, and his wife and two children died. The first subject of the disease was a nursing child, who died on the 4th of August. Two hospital nurses, living in Newport, also had the disease and died; both of them had been employed at the house of Mr. Forbes. At the time of the appearance of

the disease, Newport was healthy, and Mr. Forbes's house was in a healthy part of the town.

Such instances as the preceding are numerous in every epidemic.

An argument against the communicability of cholera by human intercourse, is based on the assertion, that the attendants of those sick with the disease do not contract it, or, if so, the instances are rare. The evidence on this point, however, shows that there is undoubted reason to believe that attendants are more liable to contract the malady than those less exposed. In Moscow, where the faculty at first decided against contagion, because the medical attendants did not take the disease, they found that, later in the epidemic, the greater part of them were affected, and the theory of contagion was adopted.

"The instances are very numerous in which the communication of cholera by single patients laboring under the disease, is supported by evidence which it is scarcely reasonable to doubt."

During the recent epidemic at Ancona, a city of forty-six thousand two hundred and

twenty-seven inhabitants, fourteen physicians lost their lives, and the Sisters of Charity were decimated. In this visitation, the total number of deaths was one thousand three hundred and forty-six of the entire population.

The irregular progress of the disease—sometimes against the wind, and, again, leaving towns in its route and passing on to others, to return again to the first, as well as the circumstance that those who might be supposed, from acclimation, to enjoy an immunity from attacks, are often early victims—these are all facts most readily explained by supposing that the pestilence is carried by man, particularly as other explanations are insufficient, while this is entirely adequate. This is also the most plausible method of explaining why the disease should sometimes spread during the winter, in defiance of what might be considered atmospheric obstacles, and why its rate of travel should correspond with the comparative speed of intercommunication and traffic in different countries.

It may, therefore, be considered as a well-established feature of cholera, that it is trans-

mitted by human intercourse; yet the evidence also shows that direct contagion, if it ever occurs, is very uncommon. The labors of Pettenkofer, Snow, Delbrück, Budd, Griesinger, and others, have shown that the evacuations from cholera patients, or those suffering from cholera diarrhea, are a very frequent, and, as they claim, the chief cause of the propagation of the disease. Griesinger says: "It is possible that the disease may be propagated by other methods; yet this is problematical, while it is certain that the discharges from the stomach and bowels contain the infectious material." With reference to the same subject, Dr. Parkes writes: "On looking back to the epidemics I saw in India, I can perceive many points which are capable of explanation, if the putrefying stools are the cause." It is also believed that fresh stools are harmless, and therefore that the dangerous element is developed during their putrefaction.

The germ of the last cholera epidemic in Munich is believed to have been brought there by Italians, who had come from places where cholera existed to the exhibition in the Munich

Crystal Palace. These, by using the water-closets of the Crystal Palace, infected them, and, as they were also used by many others, the infection was carried to all parts of the city.

Dr. William Budd, in a recent pamphlet, gives a number of very striking instances, in which the spread of cholera was arrested by an immediate disinfection of the discharges. Among other incidents, he narrates the following:—

"Immediate disinfection was tried, at my suggestion, in the same year (1854), at Fishponds, in the workhouse situated there for the reception of the Bristol poor.

"In 1849, cholera, brought in by a woman coming from an infected quarter in Bristol, killed, in this same workhouse, more than one hundred and thirty out of less than six hundred inmates.

"In 1854, although the pest was introduced into the workhouse three separate times, only eight died of it, and the total number of attacks was under thirty.

"In the prison of Kaisheim, cholera was in-

troduced by a prisoner who died there. The sanitary conditions of the prison were as bad as possible, but the choleraic discharges were disinfected, and the result was that only one of the five hundred other prisoners took the disease.

"In the prison of Elrach, on the contrary, where no measures of this kind were taken, of three hundred and fifty prisoners, fifteen per cent. perished.

"At Traunstein, in Bavaria, in every case in which the rice-water discharges were disinfected by sulphate of iron, the disease ceased with the person first seized.

"In conclusion, I may mention the case of a planter in the Island of St. Vincent's, who ascribes the almost entire escape of his laborers from cholera, in the great epidemic of 1853, to similar measures. When cholera broke out on his estate, he encamped all his negroes on open ground, and, by the advice of one of my friends, had a pit dug in the earth, and deeply charged with chloride of lime, to serve as a receptacle for all discharges from the sick. The result was that, while the neighboring estates

were all decimated by cholera, and some almost depopulated by it, this gentleman's estate escaped with only a slight outbreak."

Yet, admitting that the evacuations of cholera are a very frequent cause of the disease, it is certain that their noxious effect depends to a great degree upon certain conditions.

Pettenkofer thus defines his views as to the circumstances which are essential for the development of a cholera epidemic:—

1. "An inhabited stratum of earth which, for a certain depth (the depth of the moisture in the soil), is sufficiently porous to admit of the diffusion of air and moisture.*

2. "An occasional decided variation in the quantity of this moisture. This is best observed in the varying quantity of water held in alluvial soils, and here the period when the moisture recedes from an unusually high level is the period of danger.

* This condition of Pettenkofer can hardly be considered absolute, inasmuch as it has raged fearfully in the sandy districts of Arabia, at Aden, a dry and barren rock, in the Himalayas, four thousand feet above the sea, and on the summits of the Lebanon and Caucasus Mountains.

3. "The presence of organic materials, especially such as are formed from the contents of sess-pools, &c., with which the soil has become infiltrated.

4. "The specific germ, transmissible by human intercourse, the ultimate cause of cholera, transferred principally in the evacuations of those suffering from cholera diarrhea; perhaps also by persons in good health coming from infected districts.

5. "A predisposition on the part of individuals to receive the disease."

The commission appointed to prepare a report based on observations made throughout the whole kingdom of Bavaria, during the cholera epidemic of 1854, decided "that all cases where the cholera has prevailed epidemically, stand on a porous soil which is permeated by air and moisture, and, according to our present knowledge, the water lies at a depth of from five to fifty feet. This condition of soil seems necessary for the existence of an epidemic. In localities upon a compact rocky foundation, or upon rocks which contain no moisture, scarcely any instances of cholera

have been observed, at the most only individual cases, but not an epidemic."

Dr. E. Harris, in a report on epidemic cholera,* gives the following results of observations made during cholera epidemics at the Staten Island Quarantine, as to the contagious properties of the rice-water evacuations:—

"In studying the history of fourteen epidemics of cholera that have occurred within the walls of our New York Quarantine establishment, the writer has seen abundant evidence of the infectious agency of the sick and their 'rice-water' evacuations. Ten of these epidemics at quarantine unquestionably depended upon cholera patients from ships, and in six instances, at a time when there was no cholera upon our Atlantic coast. These sudden outbursts of cholera, as a general rule, occurred within a period of four days from the disembarkation of the sick; and whenever cholera was not generally epidemic in this country, these epidemics at quarantine ceased

* Report on Epidemic Cholera, by the Council of Hygiene and Public Health of the Citizens' Association of New York. New York November, 1865.

as suddenly as they came, after sweeping off a portion of the convalescents and patients that were in other hospital buildings, having other diseases. The cholera patients were kept as remote from other patients as possible.

"Concerning these repeated outbreaks of cholera at quarantine, it should be stated that, while they proved how fatally infectious the cholera poison may become in the midst of crowded hospitals and public institutions, they utterly failed to prove that from the same exclusive cause—viz., the contagion of the cholera evacuations—a world-wide epidemic could be caused. These outbreaks did prove, however, that the stools and besmeared clothing of the sick with cholera can, under certain circumstances, propagate the disease; while, on the other hand, a series of events at quarantine and in the city demonstrated that, for the production of a wide-spread epidemic, other important causes than the presence of the 'rice-water' stools and vomitings must be present."

Those instances in which the disease has ravaged a certain locality during one epidemic,

and passed by it in a succeeding one, although prevailing in its neighborhood, Pettenkofer explains by the varying level of the water in the soil, and this water or moisture he considers as the chief localizing cause of cholera.

This theory is supported by many very striking facts, and explains, among other circumstances hitherto difficult to understand, why the disease, contrary to its usual affinity for low and marshy soils, has prevailed at very considerable elevations. In Flintern, the principal cholera field of Zurich, where the epidemic raged four hundred feet above sea-level, while sparing the adjacent low ground, an abundance of water was found, on boring, at a depth of only ten feet. A humid soil is also supposed to have afforded a localizing cause for the epidemics which have prevailed during the winter.*

Yet some writers consider that the existence of all epidemics of cholera can not be explained on this theory. Kiehl says that cholera has

* Moscow and Orenburg, 1830; Prague, 1831; Ancona, 1846; Staten Island Quarantine, 1848; St. Petersburgh, 1852 and 1853.

prevailed in Hindostan on a soil where every trace of vegetation was destroyed, and not even a blade of grass could find nourishment. Dr. Drasche, in his monograph on cholera, also gives a number of instances in which the disease prevailed epidemically, without regard to the moisture in the soil, and even on the bare rock. Dr. R. Lorange, physician to the Johannes Hospital, in Beyrout, who has been in that city during the recent epidemic, also finds Pettenkofer's teachings insufficient to account for the prevalence of the disease there. He states that it is a city renowned for healthfulness, and the soil is unusually free from moisture. During the summer, there is a deficiency of water, and the wells which indicate the level of the water in the soil (these contain a greater or less quantity of salts of lime) are at a depth of eighty feet or more. The stratum on which Beyrout lies is a moderately fragile limestone, with an occasional vein of flint, and the earth is so thin that in many places the houses stand upon bare rocks. He adds that the diet of the Orientals is bad. Their cooked dishes are almost always too complicated and greasy, and

fruits and vegetables are preferred by the poorer classes in an unripe or raw state. The interval between the morning and evening meal is too long; and the fasts of the Christians, as well as the Mohammedans, contribute to the production of intestinal catarrhs. In summer, a large part of the population passes the night in the open air. There are no sanitary regulations worthy of the name, and Dr. Lorange is at a loss to know how, if Pettenkofer's teachings with regard to the evacuations from cholera are correct, the epidemic might not continue indefinitely, since there were, at the time of writing, so many *infected* privies, and eight hundred badly buried corpses. To these may be added some interesting facts with regard to the cholera as it appeared in Beyrout, in 1855, for which Dr. W. H. Thomson, of New York, who was there at that period, is authority. On the east side of the city there are large vineyards, which are irrigated by a river which comes from the mountains behind. Intermittents are very common in that locality. The western extremity of the city is more healthful, and

in that vicinity the excrements and refuse of the city are deposited; it is a kind of dumping-ground. The sess-pools of Beyrout run from the houses into receptacles in the streets; these receptacles are emptied by a class of men called zibbàls, who carry away their contents in large panniers upon the backs of donkeys to the dumping-ground. Sometimes the zibbàls also ride upon the load. During the epidemic, nearly all of these men died of the disease, and the cholera prevailed with much greater violence on the west side of the city, usually the more healthful, but near which the refuse of the city was deposited, than on the east side, infected with malaria, and, ordinarily, more unhealthful. Such facts seem to show that a cholera epidemic may prevail upon a dry and rocky stratum, in which the moisture lies more than fifty feet below the surface, when it appears among a people careless of the ordinary laws of health and in the vicinity of an abundance of decaying excretions; also, that such excretions favor the spread of cholera more than a malarious atmosphere. At the same time, the fact that the disease was not

indefinitely protracted does not weaken the theory that the evacuations contain the infectious material, for the striking mortality among the scavengers in Beyrout is an additional argument to the many more in its favor. It only proves that the laws upon which the duration of a cholera epidemic depend are still unknown.

Whether the cholera principle is transferable in clothing and the cargoes of vessels, except as these may have been defiled by choleraic evacuations, is still a debatable question. M. Grimaud relates the following incidents of the recent epidemic which he considers reliable:—

"A peasant died of cholera near St. Jean du Desert, at St. Pierre, not far from Marseilles, in an isolated place, and his wife also died. He had not left the country, but D. Dussiller states that his wife was a laundress, and had received a bundle of linen belonging to an individual recently arrived from Egypt. It was the husband who opened the bundle and unfolded all the pieces." There is very good reason for supposing that this clothing was defiled.

The disease was introduced into Guadaloupe by the clothing contained in a trunk belonging to a person who died on the voyage thither from Marseilles, where the cholera was then raging. The laundress who washed the clothing died of the cholera, and all her family.

The next case which he narrates is still more interesting, since there is not the same probability of contact with cholera evacuations:—

"The postal department of Marseilles numbers one hundred and twenty persons, of whom seventy-five to eighty are clerks; twenty-two are employed at the bureau of departure, and nine at the bureau of arrival. There has not been a single death, or even a case of sickness, at the former bureau, while of the latter nine employees, eight have been sick and one has died. These eight have been taken sick one after the other. This has been proved of the first five: the one who opened the dispatches from the East fell sick, was 'cholerisé;' another was put in his place, the same effect followed, and so on up to the fifth."

The custom has been adopted in the East,

during epidemics of cholera, to send the mail in boxes, on the supposition that they are less likely to carry infection than bags.

From a personal experience of a two-weeks' quarantine in the port of Messina, it may be stated as a custom of the authorities there, to fumigate with sulphur all letters from those in quarantine who have left ports supposed to be infected with cholera. This custom may be supposed to have been adopted as the result of experience. With regard to the transmission of the disease in cargoes, it has been noticed, in connection with the epidemic on the *Atalanta*, that "thousands of boxes of merchandise not only came from Paris, but from Marseilles, Toulon, and Barcelona, while cholera was prevailing as an epidemic there, without producing the disease in a single instance."

The opinion of physicians in Europe has been tending toward a belief in the contagious nature of cholera. During the last epidemic in Paris, the cholera patients were treated in separate wards, and the administration ordered the immediate removal, cleansing, and disinfection of the bedding used by cholera patients,

as well as the washing and fumigation of the personal clothing.

M. Velpeau considers the contagious character of the disease proved to a certainty, and the same is true of other prominent European physicians. M. Jules Worms, chief physician of the Military Hospital of Gros-caillou, is also of this opinion, and presented the following views on the method by which cholera is propagated, at a meeting of the French Academy of Medicine, held on the 10th of October:—

"On the banks of the Ganges, and under conditions which are not well understood, a special agent, poisonous to a large number of individuals, is produced.

"This agent shows itself among individuals who are collected together in rest or motion, but always presents an uninterrupted connection.

"The cholera is a malady transmissible by man.

"This agent manifests its influence on certain human beings (probably also on certain animals) by mild or severe effect.

"The proportion of individuals liable to the

poison can only be approximately estimated, and is under all circumstances very small. The human system may become a fruitful field for the multiplication of this agent as soon as its poisonous effects are manifested.

"The multiplication of this poisonous agent takes place chiefly in the alimentary canal.

"The vomitings and evacuations of cholera patients contain the active agent of the transmission of the disease.

"This communicability does not correspond to the time when these matters are voided, but is developed a few days subsequently, and seems to be exhausted at the end of from fifteen days to three weeks.

"The corpses of cholera patients emit the poisonous agent in a greater degree than the bodies of the sick.

"Persons attacked merely with choleraic diarrhea (cholerine) void with their evacuations the agent which is capable of producing confirmed cholera in their vicinity.

"The greater or less density of the soil on which the evacuations are thrown, diminishes or favors the propagation of the disease."

Dr. Charles A. Lee, Professor of Hygiene in the Buffalo Medical University, a physician of the highest reputation for extensive medical and sanitary attainments in the country, addressed in January, 1866, the following letters on this subject to Dr. Lewis A. Sayre, Resident Health Physician of New York:—

"BUFFALO UNIVERSITY, MEDICAL DEPARTMENT,
January 17, 1866.

"LEWIS A. SAYRE, M. D.:—

"DEAR SIR: Some time since you did me the honor of requesting my opinion in regard to the contagiousness of cholera. Circumstances beyond my control have prevented attention to your request, and even now I can only briefly indicate the conclusions at which I have arrived, after close and varied personal observation of its progress, both in our own and in foreign countries.

"In the first place, then, I have seen no reason to believe that the disease is ever communicated directly from one person to another, even under circumstances of the greatest intimacy. In other words, *it is not contagious*, according to the common understanding of that word.

"On the other hand, facts abundantly prove *that the disease is portable*, and always follows the great routes of travel and commercial intercourse. I hold also that we have satisfactory evidence that the disease is communicated through the evacuations of those infected with it, and in this way only. I could adduce many instances where there can be no question that the cholera has been conveyed to hitherto healthy localities by means of one infected person, in whom the disease has manifested itself only by an apparently trifling diarrhea. Persons so affected may doubtless travel from one place to another without serious development of the disease, and leave behind in privies and water-closets germs which may give rise to a deadly epidemic. It is this fact, so generally overlooked, or not recognized, that has thrown so much mystery over the causes and modes of extension of this most fatal and mysterious malady.

"This fact also explains those apparent anomalies in the progress of the disease, why it often takes no defined course in its wanderings, but spreads indifferently in different directions.

and to different quarters, now with the wind and now against it—now following the main routes of travel, nevertheless often deviating from them, *but traveling no faster, in any case, than ships, railroad-cars, and men travel.* Those great leaps which it sometimes seems to take, and which have been supposed to be owing to the poison of cholera being carried by winds, are thus satisfactorily explained.

"Although cholera is undoubtedly communicated by the fresh dejections of those infected, I think there can be little doubt that, if the poison may not be actually present in the stools just discharged, it may be generated in them at a later period, under certain conditions favorable to its development. These conditions are now pretty well understood. The contact of such discharges with putrid animal and vegetable matters is very certain to develop the poison of cholera; and an impure atmosphere, from the presence of similar matters, favors its rapid dissemination. The accumulation of filth and organic remains, imperfect sewerage, overcrowding of tenement-houses, and the saturation of the earth with the products of decay,

are the chief causes of the greater intensity and diffusion of the disease in large cities than in other localities.

"To these, however, may be added the great imprudence with which cholera discharges are emptied into common privies, gutters, and sewers, which serve as *foci* from which the malady spreads in every direction. Hence we find that, in localities visited by the disease, the houses and streets in which those infected reside are the places of the greatest danger. But while these are being depopulated, the epidemic spreads rapidly, attacking first those low, filthy, over-crowded places, where the predisposing and favoring causes most abound; afterward ravaging portions of the city and localities which were at first wholly exempt, and which were probably deemed safe from any danger of an attack.

"I think the experience on board the *Atalanta* tends strongly to confirm the correctness of these views. The disease originated in the steerage, where it may have been brought by one individual laboring under *cholerine*. As the water-closets used by the steerage passen-

gers were not used by the first-cabin passengers or the crew, not one of these latter were attacked by the disease, while large numbers of the steerage passengers, who exclusively used them, were seized with the malady. Does not this theory also afford a good explanation of the fact that the disorder is generally more active on lines of travel by water than by land? Although these views seem to me to be abundantly sustained by well-known and acknowledged facts, I am ready to admit that there are some phenomena which cholera exhibits in its wanderings, which it is difficult to explain on any existing theory. But this ought not to prevent us from profiting from what is actually known.

"The practical lessons which flow from these considerations are the following:—

"1. Quarantine regulations can not be too strict, nor too rigidly enforced.

"2. The most thorough sanitary measures must be enforced and carried out in all places exposed to the invasion of the disease, especially in large cities, where every effort should be used to have all houses, streets, alleys, privies,

drains, sess-pools, &c., thoroughly cleaned and disinfected.

"3. All intercourse with places infected with the disease must be absolutely prohibited, or, at any rate, guarded with the greatest care and precaution.

"4. Should the disease unfortunately be introduced into a place, *cholera stools should never be emptied into necessaries and water-closets in common use.*

"5. The police should be instructed to pour into every privy and water-closet suitable disinfectants, or furnish the same for this purpose.

"But in regard to this matter of prevention, the admirable directions you have already issued to the public leave nothing additional to be said or recommended. They embody, in fact, all the results of past experience, as well as the deductions of science and reason.

"With much respect,

"CHARLES A. LEE, M. D.,

"*Professor of Hygiene, &c., in the University of Buffalo.*"

"BUFFALO, January 18, 1866.

"L. A. SAYRE, M. D.:—

"MY DEAR SIR: In my letter of yesterday, I omitted some points which I wish to add by way of postscript.

"And first, in regard to *quarantine*. You are aware that the quarantine of places in Europe and the United States, during the earlier epidemics of cholera, were nearly, if not altogether, useless; and you are also aware that the regulations were extremely lax, and rarely, if ever, properly enforced. But such has been the evidence of the *portability* of the cholera by means of human intercourse, gathered from the history of the former as well as the present epidemic, that the strictest quarantine has been enforced in many places, and all such places, I believe, have entirely escaped the disease. You have also called attention to this fact, as observed in India, &c., in one of your recent communications to the New York Board of Health.

"As the period of incubation of the disease is from thirty-six hours to two or three days (the highest period ever assigned to it not ex-

ceeding ten days), if a vessel arrives from a foreign port where cholera prevails, if there has been no case of attack on the passage, it will be strong presumptive evidence that the seeds of the disease, or its specific virus, are not on board that vessel. Of course, it is possible, though not very probable, that the *cholerine*, or that form of diarrhea which precedes generally an acute attack (but which is true cholera), may be present in some of the steerage or even cabin passengers; while there may have been no violent manifestations of cholera on the passage. But, as the conditions met with on board our emigrant vessels are eminently calculated to develop the disease in its severest forms, if no such cases have occurred, I think the health officer would be justified in allowing such vessel and passengers to come to the city, after undergoing the usual vessel-cleansing and purification, and perhaps a detention of a few days, if there are any cases of diarrhea on board, or any other suspicious circumstances present.

"Of course, very close and careful investigation will be necessary in all such cases, and, if

proper precautions are used, cholera will never be introduced into New York city through any of its foreign shipping. Should it unfortunately be introduced into other ports and other cities of the United States, then I know of no other means of keeping it out of our city, but the establishment of perfect non-intercourse; and there is no probability of our citizens ever consenting to such an embargo. In fact, the *only real security of our people against this disease is in carrying out the most thorough sanitary reforms, in personal, domestic, and civic cleanliness and purification; and it is a work which requires instant attention.* Not a day nor an hour should be lost. Laws against the overcrowding of tenement-houses should at once be passed by our Legislature, with the power of enforcing them; also granting the right of domiciliary visitation and inspection in all cases deemed necessary. But on this point I have nothing to add to what you have already written, and what has again and again been reiterated by others.

"Truly yours, &c.,

"CHAS. A. LEE."

The Resident Physician remarked, after reading these letters to the Commissioners of Health, that these letters of Dr. Lee satisfactorily explained certain facts observed by Dr. Rich at the Cholera Lazaretto in the Balearic Islands, and at Malta, in 1831. Dr. Rich states that he there observed that the persons who had charge of the privies and dejections of the patients were most likely to be attacked by the disease, and suspected that this was the principal source of its propagation. Having observed in Sicily that the choicest wines were preserved from evaporation by being placed in jars and covered with an inch of olive-oil in place of a cork, he conceived the idea of constructing receptacles for all the dejections, to be covered with oil in the same way, and thus prevent the escape of noxious gases. He made for the purpose large vessels, partially filled with water, and poured on to it one inch of common fish-oil. Into these vessels all the excretions and soiled clothing were placed, and a jet of chlorine gas forced into them to saturation before they were permitted to be handled by the assistants. After the adoption

of this plan, not a case occurred among the assistants who had charge of this department of the hospital, whereas, previous to its adoption, they had died at the rate of from two to five a day.

In proportion as further study reveals more of the essential nature of cholera, unexplained phenomena will become clearer, and apparent discrepancies reconciled. Something has been already accomplished in this direction, and the following important propositions, which are sustained by sufficient evidence to justify a belief in them, are the results of comparatively recent investigations.

First. Cholera is a disease which is diffused by human intercourse.

Second. The cholera discharges are the chief (if not exclusive) agents in disseminating the infectious material.

Third. Certain circumstances, among which moisture in the soil has a prominent, but not exclusive, part, favor the spread of the disease.

CHAPTER III.

THE PREVENTION OF CHOLERA.

Classification of measures for the prevention of Cholera—Dr. Marsden's "Laws of the Progress of Cholera"—Quarantine—Necessity of its rigid enforcement—Partial inefficiency of quarantines hitherto—Suggestions for their greater efficiency—Measures recommended through the United States Minister at Constantinople—The necessary period of detention—What goods should be detained on vessels in quarantine—Will the ship ordinarily communicate the disease subsequently?—Period of incubation of the disease—Observations on this point—Localizing causes of Cholera, to be removed or disinfected—Reappearances of the disease in the same house in successive epidemics—Low, marshy, and wet soils objectionable—Impure water, especially when the impurities come from sewers, &c.—The Broad street well—Necessity of general sanitary measures—Ventilation—Disinfectants—Dr. Harris's list—Diet—Other measures of personal prevention—Water for drinking—Flannel bands—Other preventives—Tents for the sick instead of hospitals, when practicable—The directions of the New York Board of Health—Those of the Young Men's Christian Association of Philadelphia—Dr. Dunham's suggestions—Dr. Collins's—General sanitary measures of the highest importance.

MEASURES for the *prevention* of cholera may be divided into two classes: those to be applied by the government, municipality, or community, and those to be adopted by individuals. To the first class belong quarantine, whether by sea or land, and measures of sanitary inspec-

tion and improvement generally, as well as the enforcement of thorough municipal cleanliness, and the establishment of sanatariums, refuges, or temporary homes, for that portion of the poor most exposed to the epidemic, and the organization of a system of house-to-house visitation, with a view to anticipate and forestall the disease in its incipient stage.

We have discussed the question of the contagiousness of the disease so fully, and shown so conclusively that it is transmitted by human intercourse, that we need only lay down the laws of the progress of cholera as defined by Dr. Marsden, an eminent Canadian physician, before proceeding to consider the subject of quarantine.

First. That it is a communicable and controllable disease.

Second. That its causes are not in the atmosphere.

Third. That it accompanies human travel and human traffic.

Fourth. That it progresses at the rate of vessels across the ocean, and never precedes them.

Fifth. That it is transmissible by clothing and effects as well as by passengers.

Sixth. That it never appears in a new locality, without communication, directly or indirectly, with persons or places.

Seventh. Lastly, that it may be arrested, like the plague, by an absolute quarantine of a short duration.

Quarantines, to be effectual, must be rigidly enforced. In this country we are more favorably situated in this respect than most countries. Cholera can only come to us by sea-going vessels, and after a voyage of not less than eight or ten days. If, now, we arrest the progress of any vessel on which symptoms of cholera have been observed, at a sufficient distance from our seaports, and detain it until the period of incubation of the disease is passed, then, after thoroughly fumigating and disinfecting both the ship and its cargo, or such portions of it as would be likely to retain the infection, we should be able to keep the disease at a distance. Yet the fact remains, that hitherto no quarantine has ever been able to do this completely in this country. In Italy, last autumn,

it was so nearly accomplished as to prevent in Genoa, Leghorn, Naples, Bologna, and the cities of Sicily, any considerable number of cases. But while it is not known that quarantine regulations have ever protected any community during the entire course of any epidemic, yet, on the other hand, there is abundant evidence that a strict quarantine has interposed, for a time at least, an effectual bar to the advance of the disease, thus postponing its visitations, though it could not prevent them. To all who properly value human life above convenience in journeying and the uninterrupted flow of trade, this fact is a sufficient argument in favor of a strict quarantine.

The United States Government have carefully watched the course of the present epidemic, and have ordered all vessels coming into any port of the United States from infected ports or ports in communication with infected districts, to be subjected to quarantine regulations, and when any case of cholera has appeared on board during the voyage, the vessel is to be put under rigid quarantine regulations.

The following suggestions, made by eminent

European medical authorities, and transmitted to the United States Government by the American Minister at Constantinople, embody the general principles on which quarantines will probably be conducted.

1. Quarantines ought to be located at a distance from towns and populous centers, and, where possible, on islands.

2. Passengers should never be permitted to pass their quarantine on board of vessels.

3. Spacious and thoroughly isolated lazarettos should be established at suitable points.

4. Every lazaretto ought to have a hospital entirely separated from the principal edifice.

5. Sanitary physicians attached to the lazarettos, and whose number should correspond to the importance of the station and the circumstances, ought to be in constant attendance on the inmates; and they should have reliable assistants always on duty at the bedside of the patients, to report their actual condition.

6. If a case of cholera has occurred on board a vessel, the crew ought to be landed and put in the lazaretto, and those suffering from diarrhea sent to the hospital. The vessel should

undergo a thorough purification, as is practiced with regard to vessels contaminated with yellow fever. After twenty-five days the crew may return to the vessel; but she should remain under the strictest medical surveillance for a further period of fifteen days.

7. The linen and clothing used by cholera patients during illness (and, of course, that also belonging to those persons who have suffered from choleriform diarrhea) must be destroyed, and the hospital be disinfected.

8. All communication with lazarettos and vessels in quarantine must be severely interdicted, and every violation of the quarantine regulations punished with severe vigor.

There is, necessarily, no small measure of arbitrary power conferred on quarantine commissioners during the prevalence of a contagious or quasi-contagious disease in foreign ports, and the tendency is strong on the one hand to overdo the matter, and by unjust restrictions on vessels which, though from ports suspected of infection, show a clean bill of health after a voyage of twelve or fourteen days, a period sufficiently long probably to have developed the

disease if it had existed; or, on the other hand, to relax the necessary vigor, and permit the infection to creep in. Any considerable detention of vessels on which, during the voyage across the Atlantic, no cholera or choleraic disease has appeared, would be unjust and impolitic, inasmuch as it would lead to evasion and the breaking down of the moral force of quarantine, which alone can render it effective. Yet there are strong motives to deception on the part of the medical and other officers on board the ship, and if any thing besides cholera can be made of a case, we may be sure it will be. The length of the voyage, however, generally insures such an outbreak of the disease, if it appears at all on board, that deception is impossible.

Another point of importance in relation to this subject is the circumstances under which detained passengers pass their term of quarantine. Here *strict non-intercourse* with the public, and the *total separation of the sick from the well*, are the chief points of importance. In enforcing *non-intercourse*, men ought not to be made uncomfortable, and subjected to inconveniences. A quarantine establishment ought

to be as pleasant for well men as a first-class hotel. Much less ought well men to be exposed to the danger of taking the disease against which we are hedging, by being *confined in close contact with the sick.*

To fail to meet the requirements of reason and civilization in these important particulars, is to arm all reasonable men against the system of quarantines in general. It is stated that Behia, French Minister of the Interior, refused to establish a quarantine, last June, in Marseilles, because he had suffered all the horrors of a Turkish quarantine some years before. The quarantine system of the Middle Ages was unreasonable, nay, it was inhuman; and quarantines in the East are still so. Even in Europe they fall far short of the true standard, and are the most uncivilized of their institutions.

We have no right to subject men and women to discomforts which they are unable to bear, or to expose them to the presence of a dreaded disease, because *it is not necessary to do this.* It is only a question of spending a little more money, in order to obviate both these objections to quarantines.

We may detain travelers in quarantine who have crossed the sea in company with cholera, and plead that the public safety is the supreme law. But the public safety does not require us to *keep* them in the company of cholera, or to subject them to any privation beyond that of intercourse with their friends.

There should, and probably will be uniform regulations in regard to quarantine in all the United States ports; but there should be also, if the restriction is to prove of much avail, uniformity between the regulations of the United States and those of the British Colonies, Mexico, and the States of Central America. Merchandise of a general character, coming from places where cholera prevails, but brought on clean, uninfected vessels, ought not to be detained long, if at all. Rags and second-hand clothing, in exceptional cases, should be detained; but, in general, fumigation on the best principles known to science will obviate all the dangers arising, or likely to arise, from this source. Clean, new goods, coming from places where cholera prevails, but brought by clean. uninfected vessels, ought not to be quarantined.

Even for goods on board infected vessels, a somewhat brief detention, and a very thorough fumigation ought to suffice. Nor ought the most villainous smells to be selected for fumigations. There is room for the development of an art of disinfection that shall give us the minimum of inconvenience with the maximum of disinfection. All needless inconveniences should be avoided, both as to goods and persons.

The probabilities, based on evidence in the past, are that, ordinarily, neither the ship nor cargo hold or nurture the infectious principle. Perhaps an exception should be made in the case of a cargo or ship defiled by cholera discharges, though these can doubtless be removed by careful cleansing, and a free use of disinfectants.

The period of incubation which has been assigned to the disease by trustworthy observers, is a guide as to the length of time for which those held in quarantine should be detained. There are some very interesting observations which have been made on this point.

The Genoese Medical Commission, who were

sent to Hungary and Vienna for the purpose of studying the phenomena of cholera, concluded that "those who have absorbed the germs of the disease are generally attacked before the third, and always before the fourth day."

The British Medical Commission, who made similar observations in St. Petersburg, in 1831, after detailing a series of cases upon this point, state as their opinion: "That in the above cases, in all of which the time intervening between an only exposure to infection and the subsequent development of the disease was most accurately marked, the period of incubation ranged between one and five days."

Observations made in Berlin upon the same point showed that, of one hundred and seventy-one cases, which happened in houses where one case had been reported, one hundred and fifty-nine occurred within five, and the remainder within eight days after the first. Prof. Niemeyer, after stating that some have placed the period of incubation at from eight to fourteen days, adds that, in a number of cases noticed by himself and Dr. Greifswald, the duration of

this period was not less than thirty-six hours, and not more than three days. Dr. William Budd is of opinion that it seldom exceeds three days. Other observers (Madin, Huette, Rilliet, Hielmann, Weissbrod) place it at from twelve hours to eight days. The disease appeared in Quebec three days after the arrival of the brig *Carricks*, and in Folly Island a day or two after the arrival of the *Amelia;* on Staten Island "immediately" after the arrival of the *New York*, and in New Orleans on the next day after the *Swanton* reached that city.

These results indicate that the period of incubation occupies, in most cases, only a few days, and generally less than a week; but there are instances in which a much longer time has apparently elapsed between exposure and the appearance of the disease.

During an epidemic in the prison of Ebrach, in Bavaria, a released prisoner, who had been isolated in an adjacent building for fourteen days before being allowed his liberty, was seized with cholera on reaching his home at Kulmbach, on the river Main. The homeward route from Ebrach did not lead through any

infected district. It is also stated that the first case of declared cholera at the Island of Mauritius, in 1819, did not occur before the fifteenth day from the arrival of the *Topaz* frigate.* Pettenkofer places the maximum of the incubation period at twenty-one days.

* Mr. W. J. Stillman, U. S. Consul at Canea, on the Mediterranean, in a communication addressed to Hon. William H. Seward, Secretary of State, under date of Feb. 12, 1866, states the following case, which shows the danger of too short a quarantine, and makes a very good suggestion relative to a mode of abridging the term of it with safety:—

"Being anxious that my late experiences in connection with the cholera should in some way result in advantage to our country, I beg permission to state an incident in the epidemic which took place in our Lazaretto of Susa.

"In one case, an arrival of passengers from Alexandria, having passed a quarantine of eleven days, were about being permitted to *pratique*, when, on the last day of the eleven, five cases of cholera in a bad type were manifested, although the medical officer had not been able to discover any symptom of the malady previously—and the Lazaretto is one of the best and healthiest in the Levant. This would seem to indicate that not less than fourteen days are sufficient to secure the isolation of the disease.

"But as the quarantine regulations, as now carried out, are very onerous and distressing in many cases, I beg permission to suggest a measure to the Government for the alleviation of the inconvenience which would, while in no degree diminishing security, greatly diminish the inconvenience now experienced. It is to allow vessels, so choosing, to take on board at the port of departure a health-officer, sworn by and responsible to our authorities, and chosen by or with the approval of our consul at the port of departure. If cholera had manifested

Such instances seem to throw uncertainty upon the question as to the length of the period of incubation; but the facts connected with the appearance of the disease on the *New York* and *Swanton* may account for the long interval which has in some cases apparently elapsed between exposure to cholera and its development. As has been previously stated, the disease did not show itself on the *New York* until sixteen, nor on the *Swanton* until twenty-seven days after sailing. Now there is evidence to make it highly probable that clothing defiled with decomposing cholera discharges is capable of communicating the disease, and in the following instance *the origin of an epidemic* is traced to infection from the clothing of a cholera patient.

In 1854 cholera was not known in the county of Bedford, when it broke out in the village of Ridgmount, and eleven cases occurred from first to last, all of which were fatal. On care-

itself during the voyage, the time occupied in the voyage should be counted as part of the quarantine—a measure which can not be adopted where the officers and all on board the vess elare interested in concealing diseases which may have occurred."

ful inquiry as to its origin, it was clearly ascertained that the first case occurred in a man whose son had died of cholera in London, a week or two before, and whose clothes were sent down to the country. The poor man unwrapped the bundle of clothes himself, was seized with the disease, and died; his case was the nucleus of the rest.

Hence, it is highly probable that emigrants or travelers from infected districts may have among their baggage defiled clothing, which, when brought out, would give rise to cholera. A supposition of contagion by such fomites, would account for some, if not all, of those cases in which the period of incubation is unusually protracted.

Consequently, although, on excellent authority, the maximum period of incubation is placed at twenty-three days, so long an interval is rare, and may depend upon contagion by fomites. On the other hand, the length of this period of incubation is usually less than a week; so that when the vexations and often useless delays consequent upon a long detention are considered, it is a question whether

the uncertain immunity which it affords compensates for such impediments to commerce. A bundle of infected clothing may be passed through quarantine barriers, and produce an epidemic. Therefore, if thorough disinfection of personal clothing and baggage is practiced, and all exposed localities are carefully cleansed, so that, if the disease enter, it may find no soil to nourish it, it does not seem necessary to require a detention longer than twelve days, including the passage, for healthy vessels from infected ports, or which contain passengers from infected districts; or for infected vessels of more than fifteen days after the last case of cholera or acute diarrhea.

If the baggage of emigrants could be subjected to disinfection or ventilation before the voyage, and great attention paid to the care of such emigrants on the passage, during the prevalence of cholera in Europe, the chances of importation of the disease to this country would be still further diminished.

There is reason to believe that, other circumstances being equal, cholera is more likely to spread on land than on water. This might

be inferred from the consideration, that the diarrhea dejections of those on shipboard are cast into the water, while at the same time the vessel undergoes a kind of constant disinfection by means of the tarry exhalations which are given out on every side.

The limitation of the disease on the *Atalanta* favors this idea, and there are other facts which afford similar evidence.

In the Report to the Minister of War of the British Sanitary Commission, sent to the seat of war in the East—1855, 1856—it is stated that, during the prevalence of cholera in the ports of Varna and Balaklava, it was observed among the crews of the vessels stationed there, that those ships which put out to sea with an infected crew, lost the disease in from ten to sixteen days. The *Britannia* left Varna for the high-sea, for the purpose of purification. The ship was heavily manned, and after the first week was deprived of so many soldiers and sailors as to be short-handed. In this emergency the commander requested the captain of another vessel, free from cholera, and which had not been in contact with any in-

fected port, to take his sick men, and at the same time send some of his own healthy crew to the *Britannia*. As a result, none of the crew which had left the clean vessel, or of those which remained on board of it, were seized with the disease.

The *North America* arrived off New York in 1854 with cholera on board, which had existed two weeks before her arrival, and of which ten individuals had died. Seven cases were sent to the hospital on her arrival, and the following day all her passengers were landed. In three days, one hundred and twenty-eight cases and thirty-two deaths occurred among two hundred and fifty passengers; while the crew remained perfectly healthy, and no new cases could be traced to the vessel.

It is also worthy of note that, notwithstanding the extensive commerce which has long existed between India and England, the disease has always traveled to England by what might be termed an overland route.

From the preceding, it follows that, since there is no reasonable doubt of an immediate connection between the presence of a ship in-

fected with cholera at any port, and the origin and spread of disease in and beyond that port, it is very important that infected ships should be kept as far away from shore as is practicable, and intercommunication prohibited. It may also be inferred that a quarantine will be more effectual if maintained upon the water than on the land; if on the land, an island or a rocky foundation should, if possible, be selected for the accommodation of the sick, and if this be impracticable, then as dry a soil as can be found to answer the purpose. Where tents can be used, they are preferable to hospital buildings.

The well should be taken from the infected vessel, and detained in a separate vessel or structure built upon the water; at the same time, thorough ventilation and disinfection should be practiced on both vessels.

But, apart from quarantine, there are numerous measures of prevention to be undertaken by the public authorities, to prevent the destroyer from finding an abiding-place in any community, from which, like the fabled Lernæan hydra, it might sally forth at will and

seize upon its victims. The means of accomplishing this come under the general denomination of *sanitary police*. The Council of Hygiene of the New York Citizens' Association, in their very able report on epidemic cholera, in November, 1865, thus specify the localizing causes of cholera, in large cities, towns, and villages :—

1. Decaying organic matters, bone, hide, fat, and offal houses, neglected stables, putrescent mud and filth.

2. Bad drainage, local dampness, malaria.

3. Obstructed sewers, filthy streets, gutters, stables, garbage, and sess-pools.

4. Water and beverages in any manner contaminated by putrescent organic matter, particularly by any soakage from privies.

5. Neglected privies and putrefying excrements.

6. Overcrowding, and neglect of ventilation.

To these may be added, though not in New York, yet in some cities and towns of the country, crowded burial-grounds, especially where the graves are shallow.

We have already mentioned instances in which the epidemic commenced a second or third time in the same house, and, in some instances, in the same room in which it had previously made its entry into a city or town. European writers give other instances of the same kind. Among them are Tœplitz, Leith, in the same room in 1832 and 1848, and Rheims in 1849 and 1854. Whether the sanitary condition of these dwellings was so much worse than that of the others, as to attract the disease irresistibly twice in succession, or whether the poison had lain dormant during the interval, and was only called into activity again by some effort at cleansing the place, is not as yet decided.

A low level of the soil is usually associated with a deficient drainage, and is under ordinary circumstances damp; while the deadly influence of poisoned air, such as is found in filthy, over-crowded dwellings, has forced itself upon the notice of the inhabitants of tenant houses, and its effects have been characterized by themselves in striking language "as tenant-house rot." During a cholera epidemic, such

an atmosphere would be far more deadly from the presence of the poisonous dejections.

Bad food, less common here than in other countries, scanty clothing, darkness, and dissipation, dispose to any disease, by diminishing nervous resistance. During the prevalence of cholera, there is a general predisposition to looseness of the bowels, likely, if unchecked, to run to a grave termination, and this is aggravated by improper food, or water impregnated with organic or excrementitious matter.

One of the most remarkable cases of the influence of this last agent in producing cholera is to be found in the history of the Broad street epidemic, so called, in 1854. In this case, there was a well in Broad street, London, into which the contents of a sewer had been percolating for months. Of this water, hundreds of persons had been drinking, and although cholera was present in other parts of London, there were no cases in this locality. At last, a case of cholera occurred, and by means of the sewer the excretions of the patient were mingled with the water of the well. Within three days, more than six hundred persons who used

the water from this particular source were attacked. Acting on his belief regarding the cause of cholera and its communicability, Dr. Snow, health-officer in that district of London, removed the handle of the pump in this well, thus cutting off the use of the water, and the disease immediately disappeared.

Almost every attack proved fatal. In Broad street alone, one hundred and eighteen persons out of a population of nine hundred and twenty-four died of the disease, and other streets in the vicinity, the inhabitants of which used water from the same well, died in almost as large proportions. The duration of the epidemic was only ten days, and there were no new attacks after the water drawn from the pump was exhausted.

One fact is remarkable. A lady, residing at Hampstead (West End), being very partial to the Broad street water, was in the habit of drinking it daily, having it fetched in a bottle by a cart that went every day from Broad street to Hampstead. She was seized with cholera on September 1st, and died the next day. A lady staying with her at the time

also drank of it and died. A servant drank the water, and had a slight attack of diarrhea. No other case of cholera occurred at West End.

We have been more particular in our account of this case, the facts in which were abundantly verified, because there are many instances, both in city and country, in which wells are situated so near to sess-pools, privy-vaults, or barnyards, that impurities percolate through the intervening soil, especially if it is porous, and disease is undoubtedly often communicated in this way.

Cholera has shown the same affinity for low, moist, and unhealthy locations in this country as in other lands. Those localities where chills and fever, diarrhea and dysentry, typhoid and typhus fever prevail, are also the favorite haunts of cholera. Persons living on the borders of marshes or in the vicinity of pools of foul and stagnant water, into which the washings and waste matters of factories, distilleries, or breweries are discharged, should remove from such localities at once, and thus escape the dangers of this poisoned atmosphere.

The Board of Health, in New York, on the 27th of April, 1866, published the following statement, relative to personal measures for the prevention of cholera, which is, for the most part, as applicable to the country as to the city:—

"The Board of Health publish this simple statement, and beg the public to give to it their earnest attention.

"Cholera is generally a *preventable* disease, and in the early stages can be arrested, if the habits be good.

Study, therefore, *temperance in eating and drinking. Do not believe that alcoholic stimulants are useful* in guarding you against an attack. Let the food be nutritious, and keep the digestive organs in a healthful condition. Use no stale or uncooked vegetables. Let your meat be fresh and your vegetables be well cooked, and all fruits be fresh and ripe.

"*Cleanliness of the body* is of the first consideration. Keep the skin in a healthy state by bathing the whole body, with a free use of soap. Cold bathing is best used in the morn-

ing—never before just going to bed. Dry frictions or the warm bath may be more safely used just before going to bed.

"*Cleanliness in your houses* is of equal importance. Let your apartments be dry—never damp. Suffer no decayed vegetables or stagnant water to remain in your cellars or yards. Any disagreeable smell from privies, sess-pools, or sinks, is a proof of their unhealthfulness. Remove them by necessary repairs, lime chloride of lime, or whitewashing. Ventilate well your houses and apartments. Expose your bedding to the air and sun. Avoid excessive fatigue. Keep regular hours in eating and sleeping. Wear flannel next to the skin. A good plan is, if the bowels are at all disordered, to wear a broad band of flannel (a flannel belly-band) around the body, reaching from the hips to the ribs. Maintain the natural temperature of the body by sufficient clothing, especially keep the feet warm. Never, when heated, sit on the grass or stone seats, or sleep under an open window. If exposed to wet, change your boots and clothes as soon as possible.

"Take no purgative medicines, except by direction of a physician.

"By order of the Board of Health.

"EMMONS CLARK, *Secretary.*"

The first epidemic made its appearance in New York in the vicinity of Roosevelt and Cherry streets, and at the same time it appeared in Reade, Washington, and Duane streets. The Five Points and the whole region of the Sixth Ward, were visited by the epidemic with fearful virulence. In 1849, it commenced in Baxter street, and quickly extended to the First, Fourth, Fifth, and Thirteenth Wards—the lowest, filthiest, and most crowded portions of the city. In Philadelphia, it appeared in the districts of Moyamensing and Southwark, where the work of cleansing was incomplete. In Boston, the epidemic began in Hamilton street, and spread through such places as Ann, Cove, Hanover, and Sea streets. At Louisville, Ky., the centers of the epidemic were associated with filth, malaria, and crowding; the same was true of Buffalo, New Orleans, and other cities.

The inference from the preceding is, that all towns, and especially seaports, should be placed in the best possible sanitary condition, since by this method the influences of those causes which favor the spread of the disease may be very much diminished. At the same time, as there is good reason to believe that the disease is chiefly propagated by choleraic discharges, these should, in the event of an epidemic, be at once disinfected, and the advance of the pestilence contested step by step.

Low, moist places, should be thoroughly drained; yet this should be done before the appearance of an epidemic; for it is often observed that, in very dry seasons, malarial fevers prevail, in consequence of the drying up of marshes or ponds; and there is every reason to believe that malaria and cholera devastate the same ground. Hirsch says it is a well-known fact, that malarial fever has preceded outbreaks of cholera, not only in single places or particular regions, but in an almost universal distribution. Dr. R. Lorange, physician to the Johannes Hospital, also states that during the recent epidemic in Beyrout, before

the disease had reached its height, there appeared what he terms a gastric, rheumatic, remittent fever, of an epidemic character. The fact that malarious districts are favorable to the spread of cholera does not necessarily imply an identity between the agencies which develop malaria and those which produce cholera; since it may only indicate that circumstances which favor one may also favor the other.

A very strict watch should be kept over those localities in which previous epidemics of the disease have commenced; and, if necessary, they should be thoroughly cleansed.

During the prevalence of cholera, the greatest household and personal cleanliness should be observed; yet all street, pavement, and house-cleansing should be done, as far as is possible, without water, by what is called dry cleansing. Fires should be kept in damp places. Persons inhabiting damp localities, should, if possible, leave them temporarily for dry ones; and it is, in general, desirable that those whose presence is not needed during an epidemic should, if circumstances permit, go to some dry or healthful neighborhood; as in this

manner a larger supply of fresh air is left for those remaining, while the number exposed to the disease is also lessened. This is particularly important in the case of pregnant women.

The effect of poisoned air from unavoidable over-crowding may be diminished by keeping windows open, the entire building being thoroughly ventilated; since it is believed that fresh air is the best disinfectant. At the same time, since the best air in certain localities is bad, disinfecting substances should be used in connection with free ventilation. Drains should all be provided with good traps, and drains and sewers often flushed and disinfected. Garbage should be speedily removed or disinfected by chloride of lime, or some similar agent, if there is delay in its removal. It is also of the greatest importance that privies should be thoroughly disinfected as often as twice daily during the prevalence of an epidemic. This is particularly required for public privies, such as those of hotels, saloons, schools, factories, and railroad stations; and it would be a proper precaution for strangers coming from in-

fected districts, to make a free use of disinfectants, particularly if suffering from diarrhea.

The sick, and the appurtenances of the sick-room, should be isolated from all but the necessary attendants, and the room well ventilated. At the same time, it is advisable to place dishes containing chloride of lime in the vicinity of the patient; since it has been inferred from experiments made in hospitals that this agent hinders the propagation of the disease, by neutralizing those conditions which favor its advance. Yet a disinfectant in a closed room does not take the place of fresh air.

The evacuations and vomitings should be received into vessels containing either permanganate of potash, carbolate of lime, a solution of chloride of zinc, sulphate of iron, or some other active disinfectant, and be at once removed. If the discharges have been ejected upon the bed, they should be sprinkled with some disinfectant, as Labarraque's solution. It is also recommended to place a bag (folded cloths), containing a sufficient quantity of Condy's or Macdougall's disinfecting powder, un-

der the breech of the cholera patient, to disinfect involuntary discharges. The privy into which the discharges are cast should be used exclusively for that purpose, all utensils of the sick-room kept scrupulously clean, and attendants should wash their hands before taking food.

In country towns, it would be preferable to place the discharges in a pit containing chloride of lime, and cover them with earth. The bed and body-linen of the sick which can not be disinfected should be burned. Boiling water is a powerful disinfectant of clothing defiled with cholera discharges; yet, since individuals exposed to the vapor of hot water containing such clothing, as washerwomen, have in many instances contracted cholera, perhaps from that source, it would be advisable to add some disinfectant to the water into which the clothing of the sick is immersed.

After the cessation of the disease, the sick-room should be thoroughly cleansed and fumigated;* in fine, a kind of domestic quarantine should be established, since, from instances

* Liebig recommends burning sulphur for this purpose.

afforded by the present and past epidemics, there is reason to believe in the efficiency of such a method.

The following suggestions, by Dr. E. Harris, directing "how to use disinfectants," are introduced for easy reference:—*

"1. *Quicklime.*—To arrest putrefaction, to act as a rapid drier, and to decompose certain moist and hurtful effluvia, strew the dry lime upon the earth; or distribute upon plates, &c.

"2. *Chloride of Lime.*—Employ this for the same purpose as quicklime, also as one of the cheapest sources of chlorine. One pound of this substance will usually disinfect about 1,000 gallons of fluid sewerage. To mix immediately with offensive materials, it may, for convenience, be combined with water, in proportion of one pound to the gallon.

"3. *Chloride of Zinc, Proto-Chloride of Iron, Sulphate of Iron, or Nitrate of Lead.*—Make a saturated solution of the salt, and use such solution diluted in eight or ten times the quantity of water.

* Report on Epidemic Cholera, Council of Hygiene, Citizens' Association.

"4. *Chlorine Gas.*—When required more copiously than it would ordinarily be given off by the chloride of lime, or Labarraque's solution, the following ready methods may be resorted to for producing it. For the ordinary methods, see books of chemistry.

"*Quick Method.*—Pour dilute hydrochloric, sulphuric, nitric, or acetic acid, upon chloride of lime, zinc, or soda. This may be done gradually by means of a glass or lead siphon, or by the capillary siphon or lamp-wick, dropping the acid upon the chloride, if desirable to evolve the chlorine steadily for many hours.

"*Chlorine Water* may be readily prepared by mixing two tablespoonfuls of common salt in two teaspoonfuls of red lead in a quart of water, and add half a wineglass of sulphuric acid. It will give off gas as needed.

"It must be borne in mind that chlorine is irritating to the lungs. It is believed not to disinfect and destroy the cholera poison itself, but it arrests putrefaction and destroys many noxious gases.

"5. *Nitrous Acid Gas.*—This is prepared by putting a mixture of nitrate of potassa (saltpe-

ter) and sulphuric acid in an iron or porcelain dish. It must not be breathed.

"6. *Coal-Tar.*—To be used in sinks, sewers, privies, and bed-pans, by directly applying it, and allowing it to be washed away. It serves an excellent purpose when painted frequently upon the interior walls or sides of stables, prison cells, privy vaults, &c. Carbolic acid is derived from coal-tar, and is more convenient for use in the sick-room. Dilute it.

"7. *Bromine* is a powerful disinfectant; to be employed by physicians.

"8. *Permanganate of Potassa.*—To be used as an immediate and most effective disinfectant. Dilute the saturated solution of this salt in from ten to five hundred parts of water, according to the requirements for the occasion. It is the neatest and most effectual of all the disinfecting fluids, and can be used in less quantities than most others. A few drops of the solution will instantly disinfect a quart of drinking-water.

"9. *Heat.*—Boiling water or steam to be employed in cleansing, as the most certain means of disinfecting contaminated clothing, &c.

"10. *Charcoal.*—As a disinfectant or deodorant for extensive use in masses of putrescent material, and for local purification, fresh charcoal is of acknowledged value. The British Sanitary Commission in the Crimea ordered whole ship-loads of peat-charcoal, which they used in the progress of their work of purification in the hospitals, barracks, and camps in the East. A report of that Commission states that 'perhaps the best deodorizing compound was one used by the inspectors in all their works. It consisted of *one part of peat charcoal, one part of quicklime, and four parts of sand or gravel.*' But it may properly be stated in this report that charcoal does not seem to disinfect or destroy the cholera poison. The ships which were employed in transporting charcoal from Constantinople to the Crimea were ravaged by cholera."

To the above may be added the advice of the Privy Council of the British Government on the same subject:—

"In the ordinary emptying of privies or sesspools, use may be made of perchloride of iron, or chloride of zinc, or of sulphate of iron. But

where disease is present, it is best to use chloride of lime, or Condy's fluid. Where it is desirable to disinfect, before throwing away the evacuations from the bowels of persons suffering from certain diseases, the disinfectant should be put into the night-stool or bed-pan, when about to to be used by the patient.

"Heaps of manure or other filth, if it be impossible or inexpedient to remove them, should be covered to the depth of two or three inches, with a layer of fresh-burnt vegetable charcoal in powder. Freshly-burnt lime may be used in the same way, but is less effectual than charcoal. If neither charcoal nor lime be at hand, the filth should be covered with a layer some inches thick of clean dry earth.

"Earth, near dwellings, if it has become offensive or foul by the soakage of decaying animal or vegetable matter, should be treated on the same plan.

"Drains and ditches are best treated with chloride of lime, or with Condy's fluid (permanganate of potassa), or with chloride of iron.

"Linen and wearing-apparel requiring to be disinfected should, without delay, be set to soak

in water, containing, per gallon, about one ounce either of chloride of lime or of Condy's red fluid. The latter, as not being corrosive, is preferable. Or the articles in question may be plunged at once into boiling water, and afterward, when at wash, be actually boiled in the washing-water.

"Woolens, bedding, or clothing, which can not be washed, may be disinfected by exposure for two or more hours in chambers constructed for the purpose, to a temperature of two hundred and ten to two hundred and fifty degrees Fahrenheit.

"For the disinfection of interiors of houses, the ceilings and walls should be washed with quicklime water, and the walls frequently whitewashed. The wood-work should be well cleansed with soap and water, and subsequently washed with a solution of chloride (permanganates) of lime, about two ounces to the gallon."

The question of diet is one which has been the theme of much discussion. The Cholera Commission of Munich, in 1854, addressed the following inquiry to the physicians of Bavaria:

"What food and drink seem to have furthered the outbreaks of the disease?" The result of the replies was a list of all the various articles of diet consumed throughout the kingdom. Yet there are certain kinds of food which are to many persons difficult of digestion at ordinary times, and it is the part of prudence for all to avoid these during an epidemic of cholera. As examples, are cabbages, cucumbers, turnips, green corn, cherries, apples*, plums, whortleberries and milk, green vegetables, and all kinds of unripe fruit. To this list may be added crabs, oysters, clams, lobsters, and fresh pork. On the other hand, a diet which is, in general terms, nutritious and easily digestible, is to be recommended; and bread, rice, beef, mutton, and poultry, with a moderate use of thoroughly

* It may be doubtful whether any injury would accrue from the use of fresh, ripe fruits, just plucked, in the country, or from the use of perfectly fresh green vegetables well cooked, especially where there are no tendencies to the disease on the part of the individual. Unripe fruits or stale vegetables should never be eaten at any time. In cities and towns where it is impossible to get either fruit or vegetables in their best condition, abstinence is the only safe rule. Fresh fish, if cooked very soon after taken from the water, and not taken from impure waters, are not prejudicial to health, but, if stale, are perhaps the worst possible articles of diet.

cooked ripe potatoes, are examples of articles which are nutritious and easily assimilated. Certain sub-acid fruits, as ripe currants, are considered by some as actually beneficial. An excessive use of starchy food is not desirable. It is perhaps worthy of mention that beef-tea often produces a relaxation of the bowels, in which case mutton broth may be substituted.

Yet the details of diet must be varied to meet particular cases, and that which one may eat with impunity would be most injurious to another. The object to be attained is to repair the waste of the body by an unirritating and easily digestible diet.

Water used for drinking should be boiled or filtered, and as pure as can be obtained.

In addition to the preventive measures previously mentioned, the custom of wearing a flannel band sufficiently large to cover the abdomen, is most excellent. This is very important in the case of children, since the flannel shirts which they wear are an insufficient protection, and with the varying movements of the child the shirt often becomes rolled up upon its chest. The feet should be kept dry, and

night-air avoided. Mental anxiety should be laid aside as far as possible, and cheerfulness and calmness cultivated; since the influence of fear in predisposing to attacks of cholera is generally acknowledged. It has also been observed that the insane are more liable to choleraic infection than those of a healthy nervous organization, and the wise man has said, what the experience of every physician confirms, that "a merry heart doeth good like a medicine."

An objection to cholera hospitals (houses of refuge) is, that the disease seems to spread from their vicinity. Yet the poor and friendless must be cared for somewhere. If in their own healthy homes, the chances of their recovery are diminished; while, in consequence of their careless habits, the disease is likely to become epidemic in that locality, or be carried to other neighborhoods. If in general hospitals, experience has shown that cholera extends in the wards, and the fear of receiving the malady would operate unfavorably upon those sick with other complaints. Therefore, by centralizing and isolating the disease, and placing

cholera patients in large, cleanly, and well-ventilated wards, a benefit would be conferred upon the sick, and the danger to the health of the community diminished. The removal should be effected as gently as possible, and for this purpose biers or stretchers are preferable.

When the circumstances permit the use of tents they are the best hospitals. Dr. Parkes says: "Men sick from cholera are also best treated in well-ventilated tents; cholera wards and hospitals do not answer so well. Even in cold countries, up to the end of October or the middle of November, tents can be used, if properly warmed.

Instances of the treatment of cholera in tents are of the most interesting character. The two hospital buildings in Varna received, from the 10th of July to the 18th of September, 1854, two thousand three hundred and fourteen cholera patients, of which one thousand three hundred and eighty-nine died—a mortality of sixty per cent. In the three tent-hospitals in Varna and Franka, there were also received, from the 5th of August to the 19th of September, 1854, two thousand six hundred and thirty-

five cholera patients, of which six hundred and ninety-eight died, or a mortality of twenty-six per cent. Besides, notwithstanding vigorous hygienic measures, the hospital buildings remained full of infection, while this was not the case in the tents. In the hospitals of Gallipoli, Adrianople, and Varna, seventeen physicians lost their lives, while not one of those physicians in charge of the tents took the disease. In 1854, when the cholera appeared in the hospitals of Pera and Rami-Tchifflick, in Constantinople, M. Levy immediately removed all cholera patients from the hospital buildings into tents; this was twice rendered necessary, and each time the epidemic came to a speedy termination. About the end of October, the bad weather made it impossible to continue the care of the cholera patients in tents, and, as a result of the change, fourteen cases of dry cholera appeared; while, before the return of the patients to the wards of Rami-Tchifflick, there had not been a single instance of this form.

The Young Men's Christian Association of Philadelphia issued, in April, a circular of which the following is an extract, and caused

it to be distributed to every house throughout the city. Its advice is very good, except in the particular of recommending bathing of the whole body daily. This, in many instances, would produce debility, and invite rather than repel cholera. Twice or thrice a week, if thoroughly performed, is sufficient. Bathing should be practiced, if in the open air (in a river or stream), in the morning before noon, rather than in the after part of the day, and the stay in the water should be brief. But to the circular:—

"There is every reason to expect that cholera will be here by the middle of May or the 1st of June. Its victims will be principally:—

"1st. Those who use intoxicating drinks.

"2d. Those who are not cleanly in their persons and houses.

"3d. Those who are irregular in their habits, keeping unseasonable hours, eating irregularly, &c.

"4th. Those living in filthy, dirty localities.

"To prepare for cholera—1st. Be scrupulously clean in person, bathing the whole body daily, and keeping the entire clothing clean.

"2d. Clean thoroughly and whitewash your rooms, outhouses, and premises generally.

"3d. See that no swill, garbage, or other ref use matter, is thrown out either on your lot, street, or alley. Clean up thoroughly your whole premises, in-doors and out, and set an example of cleanliness to your neighbors.

"4th. If your landlord refuses or neglects to do his duty in putting his houses and lots in proper order, report him to the health-officer or our visitor in your district.

"5th. Abstain from all intoxicating drinks—ale and beer, as well as whisky.

"6th. Use simple, wholesome food, thoroughly cooked, avoiding stale vegetables or tainted meats. Do not give way to fear or panic. This will increase your danger."

Dr. Carroll Dunham, a New York physician, makes the following suggestions in regard to personal measures of prevention:—

"It is universally conceded that the free use of alcoholic drinks predisposes to cholera. It should be remembered, however, that habitual drunkards are also habitually filthy, and irregular in their habits, and are often destitute.

Those who, having previously abstained from liquor, resort to its free use for the purpose of warding off cholera, thereby only increase their liability to the disease. On the other hand, those who are *habituated* to the moderate use of wine run a risk if they suddenly discontinue this habit.

"Excesses and extremes of all kinds predispose to cholera. *Excessive filth* does so. So does *excessive bathing*, with a view to extreme cleanliness; for it reduces the heat of the body and debilitates the system. The inordinate use of either animal or vegetable food is a predisposing cause. But so, *most emphatically*, is *fasting* or *abstinence*, especially as regards *animal* food. The excessive mortality from cholera in Paris, in the epidemic of 1854, occurred during the fastings of Lent. Nothing like it occurred at any other period. In a part of Louisiana where nearly all the people are Papists, the mortality, during a cholera epidemic, was quadrupled during and after a three days' fast.

"Any thing in food or regimen that irritates the bowels predisposes to cholera. So does

fatigue or violent exercise. Reduction of the temperature of the body by exposure to night-air, or by excessive bathing, has the same effect."

The following recommendations by an eminent physician, Dr. G. T. Collins, late of St. Louis, have strong indications of common-sense about them, and we commend them most heartily to our readers :—

"Give immediate attention to any disturbances of the bowels. It is the first indication of the coming malady. Check it while you can. Keep out of the night-air, and avoid the dews of the morning.

"Keep the body clean. Wash the entire body every week; two or three times will do no harm. A dirty skin will invite the attack. Change your under-clothing frequently.

"Wear flannel next the skin. It will protect against sudden changes of temperature.

"Do not sleep on the lower floor, or in a small room with several persons. Cold water should be drank cautiously in warm weather. Ice-cream I have known to produce sudden and fatal attacks. Avoid as much as possible over-exertion and fatigue.

"Do not give way to alarm. Fear and all the depressing passions are great provocatives to the disease.

"Therefore, endeavor to keep a cheerful mind, and, if attacked, never think for a moment but what you will recover. There is wonderful tonic power in faith.

"Do not fear danger from contact with the sick. The cholera is not contagious.

"Indulge in rational amusement. Do not sit too long, however, in a crowded room.

"There is no question but that, as a general rule, persons of cheerful dispositions, regular, temperate, and cleanly in their habits, are much less liable to an attack of cholera than those who are negligent and careless in these respects.

"Those persons and those communities who pay most attention to the observance of the plain laws of hygiene—the laws of God and nature—are passed by, while those who trust to bravado and a total neglect of the common rules of living are the first victims.

"Be temperate in eating and drinking. Eat your meals at stated hours.

"Abstain from stimulating drinks—ale and

lager-beer, as well as alcoholic liquors and wines.

"Fish of all kinds are dangerous.*

"Avoid fruit. Even when ripe, it is liable to produce fermentation in the stomach.† Unripe fruit is death.

"Garden vegetables should be partaken of sparingly, if at all.

"Cabbage, *sauer-kraut*, cucumbers, water-melons, &c., should be banished from the table.

"During the prevalence of cholera, it may be considered a sure thing that whatever tends to disturb the equilibrium of the system may lead to an attack.

"The diet should be nourishing, warming, dry, and easily digested.

"All excesses should be avoided.

"Lean, fresh meat, good potatoes, cold bread, rice, eggs, milk, butter, tea, and coffee, will afford a meal unattended with danger. The closer you confine yourself to these articles of food the better.

* Not unless stale. Shell-fish should be avoided.

† This applies rather to the city than country.

"Pastry, puddings, cheese, pickles, and such like et ceteras, should be scrupulously avoided.

"Eat moderately. Do not indulge in varieties of meats at the same meal, and swallow no more than the stomach can easily digest.

"IN AND ABOUT YOUR HOUSES.

"Take up your carpets and have them well cleaned; let no dirt accumulate beneath them.

"See to it that your mattresses, bedding, and hangings are thoroughly aired and cleansed.

"Have every room in your house regularly and thoroughly ventilated.

"Sleep in a chamber, or upper room, if possible.

"Whitewash your walls, cellars, out-houses, fences. Lime is a purifier.

"Keep the sewers, drains, and sinks free from accumulations of filth and refuse-matter of every description.

"The garbage and offal should be promptly removed.

"Allow no decomposing vegetable or animal matter to remain on your premises.

"Take one pound of chloride of lime, put it

into a bucket of water, and, after stirring it, every day sprinkle a small quantity wherever foul air can possibly exist. Cellars, kitchens, drains, back yards, and privy-vaults should receive a portion.

"Half a pound of sulphate of iron (copperas), and half a pound of sulphate of copper (blue-stone), dissolved in a bucket of water, is the best deodorizing and purifying agent that can be used for privies. Throw a portion into the vault, and allow the vessel to remain in the privy, stirring it occasionally. Both this mixture and chloride of lime will injure the clothing if it comes in contact with it.

"Do not drink river-water, or use it for cooking-purposes, unless previously filtered or otherwise purified. Hydrant-water holds in suspension a large amount of animal and vegetable matter. This restriction I know to be of the utmost importance in large cities, during the prevalence of cholera.

"The purest water that can be obtained is from condensed steam, and in manufactories run by steam and on board of steamboats this is easily obtained. A barrel in a convenient

position will hold the water as it is condensed from a steam-pipe arranged for this purpose. This water, for cooking-purposes on board of steamboats, and, when properly cooled, for drinking, is the healthiest that can be used.

"Cleanliness in the sick-room is of the most vital importance, not only to the patient, but to the attendants and friends who assist him.

"The evacuations from the stomach and bowels should be immediately removed to the privy-vault. A vessel containing a solution of the chloride of lime, chloride of soda, or sulphate of iron, should be kept constantly in the room.

"Be extremely careful that no portion of the matter evacuated from the system remains on the bed-clothing, carpet, floor, or furniture. Throw a little of the disinfecting solution into the vessel used by the sick person. In short, be scrupulously clean.

"Strict attention to the rules laid down will afford great protection, and materially lessen the chances of an attack of cholera.

"Whenever the epidemic makes its appear-

ance, every individual should give special attention to the state of his health.

"Attend to the condition of the stomach and bowels. Eat and drink in moderation. Be careful not only in regard to what kind of food you eat, but also as to how much you eat—quantity as well as quality."

After all, the spread of cholera in any city or town will depend very greatly upon its sanitary condition. Once introduced from abroad, it may, even in the most cleanly city and the best ventilated dwellings, find some victims among the feeble, the intemperate, and the licentious; it may indeed strike down now and then a subject among those whose habits are irreproachable, but whose health is not firm; but it will soon pass away if the filth, foul air, bad ventilation, and drunkenness, and lewdness, which furnish it with its most numerous victims, are not present to give it aliment. But when it visits a city reeking with animal and vegetable decay, and every foul odor, like Constantinople or Cairo, it will riot in destruction, and though its most numerous victims will be the poor, the vicious, and de-

praved, it will not spare the dwellers in lofty dwellings, nor those of pure and peaceful life. Paris, by timely and careful sanitary precautions, escaped with a comparatively light visitation, and other cities may well follow her example.

CHAPTER IV.

SYMPTOMS OF CHOLERA — PATHOLOGY AND INDICATIONS.

The plague in London, in 1665—Sudden deaths from cholera—Cases in India, Arabia, Egypt, Constantinople, in England, and Canada—Premonitory diarrhea generally present; testimony of M. Marin, Dr. Hutchison, Dr. Vache, Dr. McLoughlin, and others—Character of the diarrhea—Are there any earlier forerunners of the disease?—Contracted and immovable pupil—Peculiar condition of the tongue—Lassitude and depression—General statement of symptoms in a case which runs its course without medication: cramps, coldness of the body internally and externally before death, and its heat after death—Appearance of the body after death—Condition of the internal organs—Dr. A. Clark's statement of the phenomena of cholera—Further statements about the cramps and spasms of cholera—The pulse—Condition of the skin—The blueness—The urine—Pains of cholera, neuralgic pains in the head—Clearness of the mind and complete consciousness—Character of the fluids vomited—Contents of the cavities of the heart, arteries, and veins—Greater frequency of attacks in the morning hours, and of death in the evening hours—Average duration of the disease—PATHOLOGY—What is cholera?—Different theories—The blood theory—The colliquative theory of Dr. Nelson—Dr. George Johnson's theory—Drs. Gull and Clark's view—Explanation of the phenomena under this theory—The theory of the Eclectic School of Physicians—INDICATIONS—The principles on which treatment must be based, as drawn from its symptoms and the theories of its action.

De Foe relates that, when the great plague raged in London, in 1665, many were silently infected without perceiving it, till they fell into swooning and faintings and death, without pain. Very similar to this is Eugene Sue's account of the perishing of the two children in the cholera hospital of Paris. The blood, immediately after it is poisoned by the deadly contagion, parts rapidly with its oxygen, leaving a lifeless carbonic mass.

The pestilence attacks insidiously, and fixes a sudden hold upon the vitals. The patient, often seeming just before to be in robust health, assumes a shriveled, death-like aspect; the surface of the body becomes cold, giving to another a sensation like contact with the skin of a frog; and the face, hands, and feet quickly put on the purple of imperial death. Dr. Milroy relates that, when the cholera prevailed at Kurrachee, in 1845, "within a little more than five minutes, hale and hearty men were seized, cramped, collapsed, and died." At Teheran, the capital of Persia, multitudes who were attacked dropped down suddenly in a state of lethargy, and expired. In Muscat,

Arabia, ten minutes often did not elapse from the first apparent seizure till the fatal termination.

The soldiers in the army of the Marquis of Hastings, in India, in 1817, if cavalry, fell off the horses they had mounted in health, and died almost instantly; if infantry, they "fell dead in their tracks."

At Bellamy, in India, a tailor was attacked while at work, and died in his working attitude, sitting cross-legged on his mat; and a merchant, concluding a bargain, vomited twice and instantly expired. At Mecca, individuals in perfect health were suddenly stricken to the earth, vomited, turned cold, and died.

In Arabia, in Egypt, and in Constantinople, the epidemic, in its late appearance in the summer of 1865, often did its work with similar celerity. The pilgrims, one hour busily engaged in slaughtering their sacrifices, the next were stretched dead upon the sand. In Constantinople, the Turk, hastening after a physician for a wife or child smitten with the disease, fell and died in the streets.

As the disease advanced westward it was, in

general, less fearfully malignant in its character, and in France and England there were comparatively few of these sudden deaths, without any premonitory symptoms. Still, in the epidemic of 1832, the disease was occasionally very virulent and death speedy, both in Western Europe and in America. Dr. R. Nelson, Health Commissioner in Montreal, in 1832 and 1834, relates a number of these cases of sudden death. A young lady of excellent family called on her friend, a Miss Beaujeu, whose father had died of cholera a few days before. She was taken with cholera at ten o'clock, P. M., while sitting in full dress, and, refusing to lie down, died in her chair, about daylight, which, at that season (June 27), in Montreal is considerably before four A. M. A man, apparently in health, called at the office of the doctor, at twelve o'clock at night, for an order for a coffin for his wife. The doctor gave him one, and before one A. M. another man came in on a similar errand, and said that he had seen a man lying on the pavement opposite the English Episcopal church, about a mile distant. Dr. Nelson sent instantly to his relief, but

found him dead, and in his vest-pocket the order given for a coffin less than an hour before. Very many of the cases in Montreal and Quebec, during the epidemic, were not more than six hours from their first attack to the death of the patient. In the subsequent epidemic of 1834, as well as in those of 1849 and 1854, the disease was less malignant in its character, and the premonitory symptoms were more decided and marked. In the epidemic of 1865, in Europe, the onset of the disease was almost invariably preceded by the usual symptoms.

The very general precursor of cholera in Western Europe and America is a painless diarrhea. M. Marin states that the premonitory diarrhea was present in nine-tenths of the recent cases in Marseilles, and the replies received by the cholera committee of the English Royal College of Physicians, 1848 and 1849, "served to establish the frequency of a stage of diarrhea, lasting from a few hours to several days." In two hundred cases, reported by Briquet and Mignot, there was premonitory diarrhea in one hundred and forty-three; and

of these, the period within which the antecedent symptoms passed into those of a severe character was, in twenty-four cases, one day; in twenty-one, two, in fourteen, three days; in three, one hour, and in the rest from two to sixteen hours. Mr. Grainger, and others, have noticed that, during certain epidemics, individuals have suffered from frequent spasmodic pains in the bowels, and cramps in the calves of the legs, especially in those districts where the disease was severe, and these symptoms were not always accompanied by diarrhea.

Dr. J. C. Hutchison, of Brooklyn, N. Y., who had a very large experience in the epidemics of cholera in 1849 and 1854, published in the New York *Journal of Medicine* a detailed record of six cases, in which there was no preliminary diarrhea. Dr. Vaché, in reporting fifty-six cases which occurred in the Centre Street Hospital, in New York, in 1832, states that forty had the premonitory diarrhea, and six had not.

"In France, M. M. Levy found that, of one hundred and forty-two patients (at the hospital of Val-de-Grace), there were only six

without prodromic symptoms. In ninety-five cases, the diarrhea had lasted for two, three, four, and even a greater number of days. A general inquiry, instituted by the 'Comité Consultatif d'Hygiène,' during the epidemic of 1853, gives the following as part of its report: 'From the 1st of November, 1853, to the 22d of January, 1854, of nine hundred and seventy-four choleraic patients admitted to the hospitals of the capital, seven hundred and forty had been attacked with premonitory diarrhea; the others appeared exempt, or were unable to give exact evidence.'"

On the other hand, Dr. McLoughlin, of London, and Dr. Trask, of the Westchester Workhouse Hospital, insist that diarrhea is an invariable forerunner of the disease, and that when it is reported as not occurring, it is because the patients have concealed the fact. That this is sometimes the case is very probable.

Yet, while diarrhea precedes the characteristic symptoms in a majority of cases, it is not always present; in some instances, a few discharges are followed by collapse, and in others,

very rare, a mortal coldness is present from the outset. The manner in which the disease develops is in many cases an index of its course.

Dr. Gull states "that the diarrhea premonitory of the severer symptoms of cholera was often feculent and bilious, and presented no characteristics whereby it could be certainly distinguished from other forms."

Dr. La Segue, in charge of the *Hôpital Necker* in Paris, writes, in the *Archives Générales de Médecine* of November, 1865, with regard to the diarrhea of the recent epidemic, that it is liquid, watery, abundant, and more or less colored. The stools succeed each other every hour or two, and sometimes oftener. After the second or third, they become whitish, like very thin paste, are voided without pain, and cause no sensations of burning or bearing down. In the interval, there is an occasional rumbling of the intestines. The evacuations are not followed by that sensation of sinking so frequently associated with smaller discharges. When, after five or six stools, the nature of the matters passed is unchanged, and the excretions are

not more serous or paler, it is a favorable symptom. The vomitings are sometimes green, long after the discharges have become exclusively watery.

Recent writers also state that diarrhea and other forerunners of the disease did not make their appearance before the outbreak of the epidemic in Paris, but that soon after its commencement diarrhea became very prevalent. This would seem to indicate that no epidemic influence preceded the arrival of the pestilence, but that after its introduction an infection pervaded the air.

Some observers have stated that diarrhea is not the earliest symptom of cholera. Dr. Barraut considers that a contracted and immovable pupil precedes all other manifestations of the disease; and Dr. McNaughton, writing of cholera as it prevailed in Albany in 1832, says: "The very first morbid change which I have been able to detect was in the tongue. This varies with a shade of white, so slight as scarcely to be perceptible, to that in which it is covered with white, slimy coat, as thick as a sheet of paper. This coat may exist to a

considerable degree without any loss of appetite or complaint on the part of the patient; but when it is well marked, a slight check of perspiration or irregularity of diet will bring on diarrhea."

M. Gibert states that the tongue, in bilious or inflammatory diarrhea, is red, dry, and pointed; in choleraic diarrhea, broad, moist, white, and covered with a mucous paste.

Dr. Freeman thinks that a sensation of depression, lassitude, and weariness, indicating that the poison has begun to effect the nervous system, often precedes the diarrhea.

Let us now detail the course and symptoms of an average case, as they will occur if not interrupted by medication, if, as is the usual fact in the beginning of the epidemic, they go on to a fatal termination. We propose to do this in such a way as to enable the non-professional reader to recognize the disease without difficulty. Within a longer or shorter period after the poison has been absorbed by the system, usually only a very few hours, though in exceptional cases it may be days, there is a vague feeling of uneasiness in the stomach and

bowels, accompanied by a sense of heat and disorder, with some looseness, a simple feculent diarrhea, with little or no griping, at first with but infrequent discharges, three or four in a day, but increasing by the second day to ten or twelve. Accompanying this diarrhea, there is soon occasional nausea, with a constantly increasing lassitude and languor. After purging, the patient is giddy or dizzy, and very weak. There is an empty, hollow feeling at the stomach, and soon some vomiting, at first of no great amount, but a thin, watery fluid, mixed with a little bile, and perhaps some undigested food. By this time there is a slight tendency to shivering, though no distinct chill. The stomach and bowels are distended, and the more frequent stools are no longer feculent, but thin, whitish, having the appearance of whey or rice-water, with starchy-looking fæces floating in them, and, though there may be once or twice traces of bile, it soon disappears. There is a restlessness about the patient, and he complains of ringing in his ears, a tingling sensation in his hands and feet as if they were asleep, and slight cramps in his

feet. The pulse, at this stage, is somewhat quicker and weaker than in health, the tongue is moist and slightly furred, but the patient complains of thirst. The features have an unnatural sharpness, and the countenance an anxious and apprehensive expression.

If now the case is suffered to go on without medical interference, or a further time elapses before any thing is done for the patient, the purging becomes more frequent, abundant, and sudden, the discharges being violent, "shot out," as the attendants will say, and always of the rice or barley water character, with flaky or starchy particles floating in them, and with each purging there is a sinking of the pulse, severe cramps in the feet and legs, and increased helplessness and prostration. Vomiting accompanies the purging, and the matter ejected from the stomach is similar in character to that which comes from the bowels, with occasionally some traces of bile; but the vomiting is not so copious as the purging, and after a time ceases. As the patient grows weaker, the purging ceases also; but before this, spasms of a lockjaw character have developed

from the cramps which at first affected the feet and legs; the fingers and toes thrill and tingle as if they were asleep; this is followed by a quivering—rather strange than painful—feeling in the hands and feet; then a sudden twitching and stiffening, and twisting of the toes and fingers, which greatly alarms the patient, and often brings tears. Then the calves of the legs, and the muscles of the arms and thighs and loins are drawn up in excruciating knots; the skin and muscles of the abdomen are raised in irregular folds, the belly itself drawn violently backward toward the spine, the diaphragm or midriff upward and inward, and toward the chest. There is hardness and constant pain in the region of the bowels, and the flesh is sore to the touch. Agonizing, however, as these spasms are, there is no convulsion, no blunting of the intelligence, no unconsciousness. In the interval of these spasms, the expression of the countenance is bloodless and corpse-like; there are livid circles around the mouth, and the dull, sunken eyes; the features are sharp and contracted; the expression helpless, wild, and terror-

stricken; the lips blue; the face and neck have a leaden, brown, or purple hue, according to the complexion of the patient or the severity of the attack; the hands are withered, and the fingers wrinkled and sodden, resembling those of the washerwoman when just taken from her tub; the large superficial veins are very dark, almost black; the respiration is broken, labored, and irregular, inspiration appearing to be effected by an immense effort of the chest, while the nostrils, instead of expanding, collapse, and stop the ingress of the air, and the expiration is hurried and convulsive. The breath is intensely cold—much colder than the atmosphere; the tongue, perhaps, white and loaded, but always moist, flabby, and chilled, having a feeling like the nose of a dog or a bit of dead flesh. The feet, legs, thighs, and arms, and soon the abdomen and chest, also have the discoloration so marked in the dead body, and the toes, like the fingers, are shrunken and withered. The patient tosses incessantly from side to side, laboring and struggling for breath; his voice is a hoarse, plaintive whisper, or occasionally a low, poig-

nant wail or a weak whine; he calls constantly in piteous tones for "water, water, water," to allay the all-consuming thirst, and in broken sentences, a word at a time, complains of the weight and anguish at his heart, and the fire in his stomach, bowels, and throat. His skin is deadly cold, and wholly or nearly insensible to the action of either mustard or blister, yet at times he complains of feeling too warm, and endeavors to throw off the bed-clothes. The secretions have all, or nearly all, ceased; there is no urine, no bile, no saliva, and no tears. There is no genuine perspiration, but a cold, clammy sweat, possessing in a marked degree the death-odor, exudes from the relaxed pores of every portion of the body; the lips and cheeks puff out and flap in expiration, with a white froth between them as in apoplexy. The spasms have cramped the very vitals; the pulse, which has been growing feebler and feebler for hours, ceases at the wrist; the broken heavings of the chest grow fewer and fainter; there is a quivering among the tendons of the wrist; a long, weary, convulsive sob, but no rattle, and all is over. Of course,

all of these symptoms may not be present in every case; in rare and exceptional instances, the preliminary diarrhea has been absent, and an obstinate constipation has continued up to the time when the explosive purgation and cramps set in; but very seldom in genuine cholera are the rice-water stools, the terrible cramps, the tetanic spasms, the oppressed breathing, the chilled breath, the dog-nose feel of the tongue, the withered, sodden condition of the hands and fingers, and the wild, haggard, pinched, and anxious expression of the countenance absent. The entire course of the disease, which we have thus endeavored to portray, may be run in twelve hours, or it may occupy three or even four days. Spontaneous recovery, without medication, when the attack is severe, is exceedingly rare.

The cramps usually commence at the lower extremities, chiefly in the muscles of the calves, and extend upward; involving first the fingers and arms, then the chest, neck, and abdomen, occasionally the loins. Cramp of the muscles of the jaw is very rare. This spasm does not implicate alone the system of volun-

tary muscles, but extends to the involuntary. Among those organs endowed with smooth muscular fiber which have been noticed during life, the iris has frequently been found in a state of moderate spasm, the pupil being somewhat contracted, and responding very slowly to light.

The pulse is usually about eighty-five, decreasing as the disease advances.

The heat of the body after death is a very remarkable phenomenon, contrasting as it does in so marked a degree with its extreme coldness during the latter stages of the disease. We have adverted to the coldness of the breath and the tongue, which are usually eighteen or twenty degrees below the temperature of the room, but it is a fact well established that the interior of the body is equally cold, the temperature at the base of the tongue, in the bowels, &c., being usually full thirty degrees below the standard of health. After death, in many cases the heat of parts of the body rises to nearly the normal standard (from ninety-nine degrees to one hundred and one degrees), and remains there for some hours.

When death occurs at the height of the disease, the appearance of the body is very characteristic. The hands are clenched, the limbs drawn up, and the abdominal muscles contracted. Stiffness of the corpse comes on early, and lasts from twenty to forty hours. The countenance is greatly changed; the eyes are sunken, and surrounded with wide blue rings; the lids half closed; the uncovered portion of the globe of the eye is like parchment; the nose is pinched; the lips bluish or dark brown; the whole surface, in fact, has a bluish tint—a phenomenon most marked on the last joints of the fingers and toes and the toe and finger-nails. The skin is wrinkled.

On opening the body, the most striking appearances are the dryness of the cellular tissue immediately under the skin, and the deep red hue of the muscles. "The blood contained in the cavities of the heart was, in the majority of cases, coagulated into a dark, homogeneous mass, with fibrinous clots extending into the large vessels.

The loose folds of the small intestines have a reddish appearance on the exterior surface,

while the large intestine retains its usual color. In both the large and small intestines are found, sometimes in large quantity, the peculiar rice-water discharges, as well as occasionally medicines which have been administered but not absorbed. It is not quite true, as some writers assert, that absorption ceases wholly and absolutely during an attack of cholera. It is, however, greatly diminished, and only substances which have the greatest tendency to rouse the absorbents, like iodine and its compounds, pass through and make their appearance in the blood. The mucous membrane (the lining membrane of the stomach and bowels), and the entire intestinal walls, are puffy and swollen with frequent red patches, and the whole interior surface of the bowels is covered with shreds of the mucous membrane, and presents the appearance of a portion of the skin which has been blistered by boiling water.

Dr. Alonzo Clark, Professor of the Theory and Practice of Medicine in the College of Physicians and Surgeons in the city of New York, and one of the most eminent physicians

in the United States, thus describes the symptoms of cholera:—

The first fact to be noticed is *diarrhea.* In enumerating the symptoms of the disease, all observers agree that diarrhea is present in the great majority of cases, commencing generally before the occurrence of any of the other symptoms, and continuing for a certain number of hours, days, or weeks, varying in different epidemics and persons, according to probable influences of climate, habits, mode of living, and individual idiosyncrasies. This diarrhea is not to be confounded with ordinary diarrhea.

During the prevalence of an epidemic of cholera, a large number of persons are usually affected by it. In many, after continuing for a length of time, it terminates in the full development of the disease, while in others, it finally passes away without the accession of other symptoms. It may or may not be looked upon as a part of the disease. For all practical purposes, however, it may be so considered. It is usually painless, attended with gurgling of the intestines, at other times accompanied by colic. The character of the

discharge is usually, at first, what is commonly called bilious—that is, yellowish, supposed to contain bile. But as it approaches the period when the other symptoms begin to appear, a change occurs, presently to be noticed. The number of discharges that precede an explosion of cholera varies considerably. Frequently, there are not more than two or three in twenty-four hours; while at other times there are as many as twenty, continuing for days or even weeks. Nothing, however, contained in the discharges of this initiatory diarrhea has been found to be characteristic of the disease (unless, as many believe, on very strong evidence, the discharges from the bowels during its progress contain the germs of the disease, which by putrefaction or delay may develop and propagate it in other cases).

As the other symptoms approach, a change is observable from the more natural appearance of the discharges. From yellow, they become pearl-colored, serous, like rice-water, and very soon or simultaneously with this, the diarrhea itself becomes more violent, and *cramps* and *vomiting* set in. So prominent are

these three phenomena, that the nearest definition, perhaps, which may be given of the disease is, that it is characterized by purging, vomiting, and cramps. Purging is almost constant, vomiting and cramps general.

We have then arrived at cholera fully developed, and if the diarrhea is included, which is generally present for a longer or shorter space of time before the incursion of the other symptoms, the disease may be divided into four stages :—

First stage—characterized by simple diarrhea.

Second stage—characterized by violent diarrhea, vomiting, and cramps.

Third stage—characterized by collapse.

Fourth stage—that of reaction, and the occurrence of typhoid symptoms.

In regard to the duration of diarrhea, the following facts are presented, which were collected at the beginning of an epidemic. The diarrhea lasted before the occurrence of other symptoms—

In one case, two and a half hours, ten evacuations; in another, two days; in another,

there was no diarrhea until the cramps occurred, and then only four evacuations before collapse; in another, none until cramps set in, when it became very severe; in other cases, it lasted respectively ten, two, two, thirty, thirty-six hours, two and a half days, and three weeks. Dr. Buel, physician to one of the cholera-hospitals in New York during the prevalence of an epidemic, calculated the average duration of the diarrhea, in four hundred and sixty-nine cases, as three days and six hours.

At about the time when cramps and vomiting set in, two other phenomena make their appearance, namely: suspension of the *urinary secretion*, and a marked change in the *voice*. In the above cases, suppression of urine was noticed at the time when the purging became violent, in eight cases; there was little suppression of urine in three, and none in one case. The voice in these same cases changed from the first appearance of severe diarrhea.

In regard to the *vomiting*, the material usually at first ejected consists merely of the contents of the stomach, of food which has been retained in the organ for some time. But

frequently soon after, the ejections assume much of the nature of the evacuations from the bowels, like rice-water, thin, greenish or dark green, varying according to circumstances. In about one-half of the cases above referred to, the vomited matter was tasteless, while in the other half it had a bitter taste. In two of these cases there was no vomiting. The time of the beginning of vomiting in these cases was as follows: in one it commenced with the diarrhea and cramps; in two cases, from one to two hours after the diarrhea; and in ten cases, with the cramps.

The *cramps* are associated with this, the more violent stage of the disease. They begin in the inferior extremities in the greater number of cases, soon passing to the whole body; in a few instances, they are confined to the lower extremities entirely; they are known to have commenced sometimes in the fingers and toes, and thence to have gradually involved the rest of the muscles. They continue generally during the diarrhea, but frequently cease in collapse. In a good many cases they are terribly painful, yet in some they are slight.

But, as a general rule, they may be considered as the chief source of suffering of cholera patients.

Collapse generally follows the diarrhea, and consists in these associated facts: *first* ,a very marked feebleness of pulse, or pulselessness of the wrist, while the heart is found to beat yet with considerable force; *secondly*, coldness and lividness of the surface, and prostration.

The *coldness* of the skin is usually noticed as beginning on the nose; here, and in the tongue, it is first recognized; then in the feet, legs, hands, and face, in succession, and the arms, thighs, breast, chin, as the disease advances. A noticeable fact in regard to this decrease in the temperature of the body is that the surface of the abdomen often remains warm.

A deathly paleness of the surface occurs nearly in the same order; first in the lips, then in the face, under the nails of the fingers and toes, the surface of the breast, then over the whole body. Generally, with the coldness of the skin there is found a considerable degree of moisture or dampness over the whole sur-

face, though in a few cases it remains dry and cold. The breath also is very frequently observed to be cold.

The *pulse*, though it sometimes reaches a figure as high as one hundred and thirty per minute, usually is not found much accelerated, being about eighty-five; but as the disease advances, it is apt to grow less frequent. The respiration is frequent, and occasionally there is a great deal of difficulty of breathing. This may have given rise to the term cholera "*asphyxia*" (or suffocating cholera). The respiration is almost always nearly double in frequency; while from sixteen to eighteen respirations per minute constitute the normal standard, their frequency has been noticed, in a number of cases observed in succession, respectively as thirty-four, thirty-four, twenty-eight, twenty-four per minute; they are almost entirely performed by means of the ribs of the chest.

Associated with all this is an unnatural and violent *thirst*, the patient drinking, if allowed to do so, almost without limit.

At the pit of the stomach, the patient has a

sense of great distress, occasionally a burning sensation, at other times merely a sensation of weight. In connection with this, it may be mentioned that, while the whole of the body may be cold, the patient often has a sensation of burning in his arms and hands, and will, on this account, throw them about from the bed-clothes, constituting another striking feature of the disease.

As collapse advances, the patient assumes a corpse-like look, his hands and feet, especially on the palmar surface, become shriveled; a sense of deep prostration, often beyond description, seizes him and becomes extreme. When the skin of the neck is pinched up into folds with the fingers, in noticing the rapidity with which it returns to the natural state, it is found to return to its natural position quite slowly, and this want or loss of elasticity of the skin has been spoken of as one of the characteristic features of true cholera; it is certainly a striking, though unimportant fact.

Although the patient is weak, and may give little evidence of mental activity, on account of the great prostration, the intellect is gener-

ally preserved throughout. In certain cases, however, marked, as has been indicated previously in discussing the post-mortem appearances, by much congestion and sometimes effusion in the brain, we find decided tendency to doze, and even stupor. Some of the patients complain of ringing in the ears, but this is an unfrequent symptom. In the deeper stages of collapse, the pulselessness is often absolute, the heart-beats are becoming more feeble, the cadaverous look grows more intense, there is little or no mobility, the eyes are sunken, the loss of voice becomes absolute, vomiting, cramps, and purging cease, and death closes the scene.

Although the cramps usually begin in the extremities, and thence creep gradually to the trunk, yet in some cases they are simultaneously in all; and sometimes the order of succession is reversed, the abdomen being first affected, and then the hands and feet. Generally, neither the vomiting nor the purging are symptoms of long continuance; either they are checked by art, or the enfeebled body is no longer able to perform those violent motions—so that

they, together with the cramps, usually disappear some time before death. After the first emptyings of the bowels, the stools have been observed to be yellowish, turbid, or frothy like yeast, and though generally inodorous, they sometimes emit a rank, fleshy smell. The dejections are seldom attended with much griping, and sometimes they are effected without effort or uneasiness, though generally the calls are sudden and irresistible, and the discharges expelled with alarming force. Tenderness of the belly, on pressure, is not among the most common symptoms, nor, we repeat, are the vomiting and purging by any means the most important or dangerous; in a great number of fatal cases they have not been profuse, and have ceased, even without remedies, early in the attack. Though one of the most marked characteristics of the disease, there is a very small proportion of cases in which they do not appear.

The cramps sometimes precede the vomiting and purging, but, in the low and most dangerous form of cholera, spasm is often absent, or is present in a very slight degree. Tetanic

spasms of the legs, thighs, and loins have been observed, but there is no general tetanus (lock-jaw), or even trismus. Hiccough in cholera is not indicative of danger; on the contrary, when it occurs in the interval of struggle between death and reaction, it is a favorable sign, and generally announces the return of circulation. The spasm at the pit of the stomach is often very acute, and the belly is almost always drawn toward the spine by a remarkable permanent contraction of the abdominal muscles.

The pulse occasionally, though rarely, keeps up tolerably for several hours after the disease has plainly declared itself. Generally, it becomes small and accelerated at an early stage, and, on the accession of spasm or vomiting, suddenly disappears from the extremities. On the cessation of the vomiting or spasm, and sometimes apparently from the exhibition of remedies, the pulse will return to the extremities for a short time, and then again be lost. In the less severe cases, it is not wholly extinguished, though much reduced in volume, and a thread of pulse, however small, is almost

always felt at the wrist, where recovery from the blue or cold stage is to be expected. The sinking of the pulse in cholera is a symptom not less characteristic than the cadaverous countenance, or the hoarse, plaintive whisper (*vox cholerica*), or the discolored skin, or the *chilled breath;* when it can be felt, it is generally regular and extremely feeble, "sometimes soft, not very quick, usually ranging from eighty to one hundred."

In the state of the skin, as in the other symptoms of cholera, striking variations are found. The surface is sometimes observed to be dry, though cold; and, in a few rare cases, natural—"nay, of preternatural warmth." A rise of temperature has been repeatedly observed to take place just before death; but the development of heat under such circumstances appears to be confined to the trunk and head, and in almost all cases may be regarded as a fatal symptom. It is not indicative of any restoration of the diffused energy of the arterial system, or of any improvement in the function of respiration. The heat, in such instances, has continued well marked for some hours after

death. The skin, in complete collapse, is generally insensible, even to the action of chemical agents, and hence the usual vesicatories fail to blister. The application of mineral acids or of boiling water, in this condition of the skin, produces little or no effect, and now and then a patient is found who is insensible to the operation; nor can leeches draw blood from an early period of the attack.

The *blueness*, so characteristic of cholera in the East, has by no means been found an invariable, or even a very common phenomenon in England or the United States. Dr. White, one of the physicians to the Gateshead Dispensary and Cholera Hospital, states that in scarcely one case in ten, in his practice, did the discoloration assume that form; but there is often a deep, brownish hue of the face and hands. This blueness or brownness can often be temporarily dissipated by energetic friction. Absence of the peculiar "cold sweat" is a rare, and, we believe, a decidedly unfavorable sign.

The urine, from having been limpid and free, will become more and more scanty, and its

passage will sometimes be attended with such difficulty as almost to amount to strangury; but as the collapse advances, this condition gives place to that in which the kidneys have ceased to perform their office, and there is no more secretion. Some patients complain of an urgent and painful desire to empty the bladder; but the bladder is empty already, and after death is found to be dwindled to the smallest size; the desire may arise from the contraction of the posterior disk of the bladder hard against the internal opening, as disclosed in post-mortem examinations.

The pains of cholera are agonizing to the sufferer, and at times so pitiful as to move the attendants to tears. The patient tosses incessantly from side to side, and complains of intolerable weight and anguish at his heart. As he struggles for breath, his imploring looks and gestures make you almost feel the horror that is burning and gnawing and wrenching and strangling at his stomach and chest. At times, especially when the cramps are most severe, he rolls about and screams—and then there is that weary, weary cry for "water,

water, water," and the heart-rending, haunting wail, when the cold, bony grip of death is on him.

Violent headache is far from being a common symptom in cholera—a neuralgic pain over one eye is less rare. The cramp is invariably increased on moving. In some cases, the patient declares himself free from pain and uneasiness, just when the dead, cold skin, and the sharpened, anxious features, and the absence of pulse at the wrist, most surely portend speedy dissolution.

During all this mortal struggle and commotion in the *body*, the mind remains clear and the perceptions unimpaired, almost to the final moment of existence. "The patient, though sunk and overwhelmed, listless, averse to speak, and impatient of disturbance, still retains the power of thinking and of expressing his thoughts, so long as his organs are obedient to his will." The mortal lies all down-beaten and distraught, but the immortal is still master of itself. Dr. Lawrie, Professor of Surgery in the Andersonian University, who closely observed the epidemic as it appeared at Sunder-

land, Newcastle, and Gateshead, in 1832, commenting upon the declaration of the majority of medical men, that the mind is *always* unimpaired, says it appeared to him, in many cases, affected to a degree little short of what we find in concussion of the brain. He remarked this particularly in several children; when undisturbed, they lay in a dull, sleepy, semi-comatose state, breathing with perfect calmness; when roused, they thought only of relieving their distressing sensations, and called vociferously for cold water. But he does not say that he found them irrational or incoherent, or that their condition was other than that which should attend upon congestion of the vessels of the brain.

The character of the fluids vomited is very variable. Sometimes it is green, dark green, or yellowish; at other times, it has the same rice-water appearance as the discharges from the bowels. One of the most striking characteristics of all the discharges of cholera, whether by vomiting or purgings, is that they are strongly acid. The rice-water discharges, which, though a general, are not an absolutely

universal characteristic symptom of the disease, owe their peculiar appearance to the shreds or particles of epithelium, or the surface mucous membrane of the bowels. The membrane, in a healthy condition of the system, has the power of reproducing this epithelium.

All the cavities of the heart are filled with a thick, blackish treacle; and blood so dark that, when extended on a white surface, it resembles in color a piece of the darkest cherry, is often found in the arch of the aorta and in the other great arterial trunks. The principal venous vessels are found engorged—the most forcible injection could not have more completely filled them—and the contained blood is black and sirupy. The vessels and membranes of the brain are frequently turgid with blood, particularly toward the base. A fluid is sometimes found effused into the convolutions in considerable quantity, with more or less serum in the lateral ventricles. The blood-vessels of the vertebral column and spinal cord may be noticeably congested, and in some cases there are marks of inflammatory congestion in the larger nerves. But the cases in which the

brain presents a natural appearance, and those in which the sinuses and the veins leading to them are stuffed with almost black blood, are of equally common occurrence.

Dr. Hutchison has made some very interesting observations in regard to the time of day or night of the attack of cholera, and also as to the time of death. Of seventy-nine cases, fifty-five were attacked between one and twelve, A.M., and twenty-four, between one and twelve, P.M., that is two-thirds were attacked in the morning hours. Of the fifty-five attacked in the morning hours, ten were seized between midnight and four o'clock, A. M., and forty-five between five and twelve o'clock, noon. The time of death in seventy-three cases was, forty-six between twelve noon and twelve midnight, and twenty-seven between midnight and noon. The duration of the cases averaged 54.83 hours—the shortest period of recovery being sixteen hours; forty-eight hours was the average duration of fatal cases.

What, then, is cholera? In other words, what action or injury does the subtle poison, somehow introduced into the human body,

inflict upon the vital organs, which causes such symptoms as we have described? This is a question on which there has been, and still is great diversity of opinion among the most eminent members of the medical profession. Some maintain that the poison exercises its baleful influence directly on the blood, through the medium of the lungs, and, thus distributed through the system, produces the physical changes which constitute the primary symptoms of cholera. This view has its opponents, who allege in disproof that inoculation with the choleraic discharges has never produced the disease, and that the blood, though changed in its character, owes this change rather to the arrest of the circulation and of secretion and absorption than to any poison infused into it.

Another class of physicians, with Dr. Nelson, of Montreal, at their head, insist that the choleraic poison, whatever it may be, once received into the system, when in a condition suitable to its development, acts by effecting what the chemists call a catalytic change (an entire transformation) of certain constituents of the

body, including some of its solid as well as its liquid constituents, into a special liquid (the rice-water discharge), hitherto unknown; also of converting deposits, the result of disease, into the same.

The consequence of this catalytic action is colliquation, arrest of circulation and of aeration. This theory, too, has its opponents, who contend that the cases of sudden death from cholera without colliquative diarrhea, or indeed any diarrhea at all, and especially those in which there is no rice-water discharge, but an ordinary diarrheal discharge, and which prove usually most speedily fatal, disprove it.

Dr. George Johnson, Professor of Medicine in Kings College, London, propounds the following theory:—

"I believe the true explanation of the arrest of blood in the lungs to be this: The blood contains a poison whose irritant action upon the muscular tissue is shown by the painful cramps which it occasions; the blood thus poisoned excites contraction of the muscular walls of the minute pulmonary arteries, the effect of which is to diminish, and in fatal cases

entirely to arrest, the flow of blood through the lungs.

"We have seen that the condition of the lungs after death during the collapse affords conclusive evidence that the arrest of the blood occurs, not in the capillaries, but in the branches of the pulmonary artery, before the capillaries are reached by the blood. We know that the walls of the arteries are muscular, and that they have the power of contracting upon their contents under the influence of a stimulus, such as cold, electricity, or mechanical irritation. I suppose that no physiologists at the present day would deny that spasm of the arteries is as real a fact as spasm of the muscles.

"The most interesting and conclusive evidence that arrest of blood in the lungs is the true key to the pathology of choleraic collapse, is to be found in the simple yet complete explanation which it affords of all the most striking chemical phenomena of the disease—the imperfect aeration of the blood, the fall of temperature, the dark and thickened appearance of the blood, and the suppression of bile and urine."

Dr. Bell, of Philadelphia, M. Marey, an eminent French physician, and many other eminent physicians adopt this view substantially.

Another view, and the one received by the great majority of the members of the profession, is that advocated by Dr. Gull, a distinguished English physician, Professor Alonzo Clark, and many other writers on the subject. It may be thus stated:—

Asiatic cholera is a specific poison introduced in some manner into the system, and, after a longer or shorter period of incubation, acting through the nervous system, and especially on the great sympathetic nerve and its ganglia, producing at first great excitement, but speedily still greater depression of the vital powers—causing a kind of tetanic contraction of the capillary vessels and arteries, and thus emptying all the blood-vessels of the surface into the great central veins, and preventing the oxygenation of the blood, by prohibiting its passage back to the heart through the lungs. This driving back the blood into the great central veins produces congestion and oppression of the liver, heart, kidneys, and alimentary

canal, and the effort of nature to relieve the system by violent purgation and vomiting only results in exudation of the serous fluid of the blood and secretions into the stomach and bowels, causing a rapid exhaustion and collapse. From this condition unassisted nature rarely rallies; but, in a few and exceptional cases, a reaction takes place, and a fever sets in which usually proves fatal.

Assuming that a spasm of the minute vessels is the cause of the collapse, the symptoms may be explained in the following manner:—

The blood, repelled from the surface upon the internal veins, forms bloody patches and congestions in some organs, but its fluid portion is forced through the extreme ramifications of the veins of the bowels into the intestines, carrying with it the epithelium, and forming the rice-water discharges. As the blood is drained of its watery portion, it seeks fluid from other tissues, and effusions are sometimes thus absorbed, while the secretions of saliva and tears are diminished, from a deficiency of water. At the same time thirst is induced.

The pain in the region of the heart, and nau-

sea, are due to the overloading of internal vessels, and the oppressed respiration to defective circulation of the blood through the lungs. The supply of blood to the left side of the heart, as well as to its muscular tissue, is diminished, and hence results a contraction of the left cavities of the heart and feeble heart beats. If the circulation of the capillaries of the heart is checked, then, according to all physiological and pathological experience, a paralysis of the heart is the inevitable result. The small pulse is due to a diminished supply of blood in the artery, and perhaps in some degree to arterial spasm. The bluish tint is caused by the defective respiration and circulation of unaerated blood. As a proof that the respiration is imperfect, appears the fact that cholera patients breathe out only a small amount of carbonic acid.

We give also in this connection the theory of the Eclectic School of physicians, relative to the disease, as laid down by Professors Freeman and Newton. It will be seen that it differs but slightly from that of Professor Clark:—

"The poison of cholera is undoubtedly in

the atmosphere, and is received into the blood through the air we breathe. Its first direct and most powerful impression is upon the ganglionic nervous system, greatly depressing all its functions. It also affects in some degree the cerebro-spinal system of nerves, and the tissues everywhere. It reproduces itself within the blood, and has a natural tendency to the free surface of the mucous membrane of the alimentary canal, whence it escapes with the profuse discharges set up there. When it thus escapes, there is a better chance for recovery than when there is no vomiting and purging. In these latter cases, which are comparatively rare, the patients nearly always die. The distribution of the branches of the different plexuses of the sympathetic nerve within the body, is to the mucous membrane and to the muscular tissue of the walls of the small branches of the arteries which they accompany. A tonic contraction of those vessels is necessary to a perfect circulation through the capillaries, and to move the column of blood onward to the heart. In cholera, this force is weakened, because the nervous center is poisoned; hence a passive con-

gestion of the capillaries ensues, and a stagnant condition of the blood in the large veins beyond, in which at last nearly all the blood in the body becomes accumulated. To relieve the congestion in the walls of the alimentary canal, the blood serum leaks through the weakened capillaries, and is thrown off in great quantities, carrying with it much of the poison. The fluid of all the tissues is absorbed into the blood to lessen its density, and, in its turn, escapes in the same manner, leaving the blood as observed after death—thick, black, and tarry. The latter condition is owing to the retained carbonic acid gas, and the secretions of the liver, kidneys, &c., and the want of oxydation. The walls of the air-cells of the lungs lose their tonic condition, and cease to be a proper medium for the interchange of carbonic acid for oxygen gas—hence a venous condition of all the blood, an absence of its bright arterial hue, and a resulting coldness, blueness, and shriveled condition of the surface. Under such conditions, and a weakened action of the small branches of the pulmonary arteries, the circulation in the lungs is greatly retarded, and the

left side of the heart draws all the blood from the pulmonary veins, to supply the empty arteries in the general circulation. Post-mortem examinations develop that all vessels in the left side of the heart are empty."

Having thus fully described the symptoms which characterize cholera, and the theories of the method in which the choleraic poison produces its baleful effects upon the system, we are prepared to ascertain the general principles on which treatment should be based, or, as the physicians would say, "the indications to be fulfilled" in the treatment. On these most physicians will agree.

In the first, or what some physicians would call the preliminary step, but which is, nevertheless, really cholera, the diarrhea which precedes the more violent purging, vomiting, and spasms, the first indication is to check the diarrhea without inducing inflammation or undue excitement of the system. It is to be understood and remembered, that the purging is an effort of nature to rid the system of the poison which it has imbibed; and though it is likely to be ineffectual, yet it should not be

checked in such a way as to leave the alimentary canal in a state of violent irritation, but, so far as possible, the highly excited nervous and vascular tissues of the intestines must be soothed and quieted. Those who have read carefully the statement given of the pathology of the disease, will recollect one feature of it, viz., that in the general vascular system, the small blood-vessels which approached the surface were greatly depressed and constricted, and the blood thrown from the surface inward upon the central veins and the vital organs. Another indication, then, is to restore the circulation upon the surface, to call the blood back from the internal organs, which are becoming oppressed by it, to run its usual course in the superficial veins and arteries. The accomplishment of this will fulfil a third indication, that of restoring the secretions from the liver, kidneys, salivary glands, &c., which have been suppressed by the overwhelming amount of work thrown upon them, and the want of vitalized or aerated blood to stimulate their action. The circulation fully restored, and the system relieved from the depressing influence

of the poison, the next indication will speedily be fulfilled. The liver will again secrete and send forth the bile, to restore healthy action in the stomach and bowels, and the kidneys once more undertake their functions of separating their secretion from the blood. The fifth indication is to moderate and control the reaction which now sets in, in such a way as to avoid congestion, local determination, or inflammation of the vital organs.

If the disease has passed beyond this stage before any attempts are made to grapple with it, the indications for treatment are somewhat changed. The tendency to spasm, which is closing with violence the superficial blood-vessels, and hurling the non-oxygenated blood—dark, thick, and viscid—upon the already overburdened vital organs, must be controlled and subdued, the surface circulation restored, and the secretions re-established—a work of great difficulty, but one which in most cases of considerable vital power can be accomplished.

Even when the symptoms of oppression of the lungs and heart have grown still more distressing, and the poor victim already cold and

deathly, except where the fierce fire of the disease burns and tortures stomach and heart, tosses in piteous distress from side to side, and finds no relief, his case may yet not be past all hope. If, even then, the blood can be impelled to the surface and the extremities, before it becomes too viscid for movement; if secretion can be re-established, and a free, glowing perspiration made to take the place of the clammy and fetid exudation which now bedews the skin, the limbs resume their vitality, and the misery at the heart be relieved, the patient may yet be saved; and to these objects all the resources of medical skill must be directed.

CHAPTER V.

TREATMENT OF CHOLERA.

Variety of opinions relative to the remedies to be employed in treatment—Dr. Nelson's list of remedies employed by eminent practitioners—The corking-up process, and its purpose—The East India physician's list—Different remedies proposed by distinguished physicians in late medical periodicals and works on cholera—Treatment of the preliminary stage—*Diarrhea*— Diversity of views—Some would encourage the vomiting and purging, by emetics and purgatives—Some give castor-oil—Others would check it by opium, or change the action by calomel and opium—Some use astringents, &c., &c.—Statistics of failure in eight hundred cases of premonitory diarrhea, treated by different methods—The treatment of the missionary physicians, at Constantinople, in diarrhea—Value of camphor—The treatment of cases of *collapse*—Treatment adopted in India and in Europe—Drs. Baly and Gull's report and statistics—*Calomel treatment*—Small doses—Results—Dr. Ayre—*Calomel and opium*—Dr. Burrows, Dr. Shapter, Dr. Bashan—*Stimulants*—Dr. Shapter, Dr. Blackall, Dr. Barclay—*Chloroform*—Mr. Vines, Mr. Butcher, Dr. Barclay, Dr. Blackall—*Cold water*—Dr. Arnot—*Salines*—Dr. Burton and Dr. Hawkins—*Bleeding—Saline injections into veins*—Results generally unfavorable—*Mineral lemonade*—Dr. Worms—Dr. Parrot in Paris—Treatment by chloroform—Dr. MacLean's treatment of cholera—His views in relation to the use of opium and calomel—Dr. Metcalfe's, Dr. Niemeyer's, and Dr. Drasche's views—*The consecutive fever*—Analysis of two hundred and

thirty-four cases treated by different remedies—Professor Clark's review of methods of treatment—Dr. Houston's prescription—Dr. Fuller's method—Dr. Grove's use of sulphur—Professor Horner and Dr. Hartshorne on chloroform—Stevens' use of saline mixtures—Dr. O. H. Smith—Injections of green tea and brandy—Drs. Streeter and Lowry on saline injections into the veins—Dr. Clark's own preferences.

NOTWITHSTANDING the general agreement among physicians relative to the objects to be accomplished in the treatment of cholera, there has been the greatest possible diversity in the modes of treatment for accomplishing those objects; and we can not but believe that in some cases the indications have been lost sight of, in the zeal with which a favorite remedy has been pressed. We propose to give, in the first place, an account of the different methods of treating the disease, which have been in vogue in different places, at different times, and by physicians of distinction; next, to indicate, so far as statistics can do so, the comparative results of these various methods in effecting the cure of the disease, and the proportions which terminated fatally; and, finally, to give in simple and plain language, a statement of those plans of treatment which have proved most success-

ful, and have won the largest measure of approval from the profession.

Dr. Nelson gives the following list of remedies, all of which have, he states, been recommended and prescribed by practitioners of eminence, and their success in curing the disease strongly affirmed. Bleeding, by opening a vein of the arm or foot, cupping, leeching, and bleeding from an artery; calomel, with or without opium, in grain doses every half hour, in doses of five, ten, twenty, thirty, sixty, or one hundred and twenty grains every half hour; emetics of mustard, ipecacuanha, tartar-emetic in five-grain doses, kitchen-salt in water, frequently; pressure over the liver to arrest vomiting; purgatives of castor-oil, Glauber's salts, croton-oil, aloes; sedatives, such as prussic acid, laurel water, &c.; injections of hot water, spirits, asafœtida, tobacco infusion, spirits of turpentine, brandy and water; stimulants, particularly brandy, sulphuric ether, carbonate of ammonia, creosote, strychnine, phosphorus, cacao rum distilled over horse-dung, camphor, capsicum, horse-radish, garlic; warm baths, hot oats, hot sand, hot ashes, mustard, a warm skin

fresh from a sheep; ice on the spine and back; astringents, especially sulphate of copper, acetate of lead, nitrate of silver in pills, muriated tincture of iron, lime-water with milk, extract of catechu, drinks of brandy-punch; acupuncture of the heart, galvanism, chloroform, internally and externally; quinine in large doses, ten, twenty, or forty grains; charcoal, subnitrate of bismuth, phosphorus, in doses of from two to ten grains; revulsives, such as scalding water, cantharides, strong nitric acid over the stomach, moxas, red-hot iron, heated hammers and flat-irons rubbed up and down the back; inhalation of nitrous oxide (laughing-gas), and of oxygen gas, and drinking of water impregnated with oxygen gas; the injection of saline and alkaline fluids into the veins, heated to a temperature of 110° or 112° Fahrenheit, or at other temperatures; opium, either alone, in large doses, or combined with other drugs.

To these might be added certain mechanical processes, and especially what Dr. MacLean, Inspector-General in the British army, calls *the corking-up process*, as recommended by Dr.

Gason and others, of placing between the buttocks a large, hard-rolled towel moistened with chloride of lime, and confining it in position with a roller, so as to prevent any discharge from the bowels, and if this was not sufficient, to plug the anus, and prohibit the patient from going to stool. The alleged object of this mode of treatment, which is accompanied by the internal and external use of chloroform, is to cause the re-absorption of the serous matter in the bowels.

An East India physician, with a grim humor, which would provoke laughter were the subject less serious, gives the following list of remedies, the most of which—all, indeed, except the two or three last—have, it is fair to say, actually been used:—

"Salt, mustard, vinegar and oil, pepper, red and black, every thing the castors afford, except tomato catchup and Jockey-club sauce—as if the cholera were chicken-salad; wine, whisky, rum and brandy, apple-jack and Old Tom—every thing the decanters, and nothing that the pitcher supplies; rhubarb, senna, and castor-oil; scammony, colocynth, jalap, and aloes;

ipecacuanha, tartar-emetic, and sulphate of zinc; calomel in all stages, and in doses of all sizes, from the homeopathic mite to the allopathic monstrosity; opium in all its forms, and by every imaginable mode of administration; ether, camphor, musk, castor; aromatic and stimulating tinctures; essential oils of peppermint, clove, and cinnamon; extracts of hyoscyamus and cicuta, prussic acid, subnitrate of bismuth, colchicum, cinchona, serpentaria, and capsicum; oil of vitriol, spirits of turpentine, and, for all we know, petroleum; brandy injections, soap injections, tobacco injections, warm drinks and ice water, tepid baths, cold baths, hot baths, vapor baths, hot sand, friction with irritating rubefacients, blisters, scalding water, mineral acids, red-hot irons, cold water pumped on the spine and the pit of the stomach, bleeding, cupping, leeching, oxygen gas, laughing-gas, injections of saline solutions into the veins, galvanism, electricity, chloroform, clairvoyance, hasheesh, inhalation, Perry Davis's pain killer, Radway's Ready Relief, Mrs. Winslow's Soothing Syrup, Phalon's Night-blooming Cereus, Constitution Life Syrup, and Mrs. Allen's Hair Restorer."

Some of these remedies have had their day and been exploded, but the diversity of treatment proposed for the epidemic the present season is sufficiently great. Professor Clark enumerates, as among the remedies which eminent physicians now recommend, the opium treatment, alcoholic stimulation; bleeding, either generally or locally; calomel, either in small or large doses; sugar of lead, camphor, morphia, oil of cinnamon, sulphuric acid, sulphur, creosote, chloroform, strychnine, electricity, galvanism, the wet pack, warm and cold affusions and douches, warm hip-baths; counter-irritation by means of blisters, moxas, burning alcohol, &c.; external warmth, emetics of salt, mustard, ipecacuanha, sulphate of zinc, &c.; ice and cold drinks, saline mixtures, camphor, quinine, injections of strong green tea and brandy, brandy internally, injections into the veins of salt and water, and of warm milk fresh from the cow; and, what the old physicians used to denominate the expectant treatment, giving little or no medicine except palliatives and trusting nature to effect a cure.

Dr. Jules Worms recommends a mineral

lemonade, composed of concentrated sulphuric acid, one part to two hundred, two hundred and fifty, or three hundred parts of water, to which he adds raspberry syrup.

In the discussions on the subject in the New York and Philadelphia Academies of Medicine, calomel, either alone or combined with spirits of turpentine, opium, bleeding, camphor, emetics of salt or mustard, chloroform, ice to the spine, and injections of warm starch, were the principal remedies indicated.

But we shall consider the modes of treatment more satisfactorily, and learn what is to be said for and against each, if we follow the progress of the disease, since the remedies for one stage may be inappropriate for another.

First, then, the *premonitory stage of diarrhea.* What shall be done for this? "Arrest it," say most of the physicians. "Let it go on," says Dr. George Johnson, and, after him, Dr. Marey and others: "It is the effort of nature to rid itself of morbid and poisonous matter in the stomach and bowels." "That may be," reply the other physicians," and so are cough and bleeding at the lungs efforts of nature to

rid the lungs of morbific or foreign matter." "At least," replies Dr. Johnson, "if any thing must be done, give castor-oil only." To this the others object; but they harmonize but little better among themselves, in determining on the best remedy for arresting this premonitory diarrhea. On one point, however, they do agree, that the patient should keep perfectly still and in bed. "And what then?" inquires the reader, especially if he is also the patient. "Then," replies the East India surgeon, "keep him warmly covered, and make him wear a flannel band around his belly. An excellent application to the abdomen is a bag filled with ashes or bran, very warm and often changed; at the same time, if the weather be cool, let the temperature of the apartment be kept moderately high. Administer internally nothing, as yet, except half an ounce of castor-oil, with twenty-five drops of laudanum, in a cup of strong coffee.

But if the nausea and diarrhea continue—especially if the oil and coffee are rejected—if the pain in the abdomen and pit of the stomach becomes more distressing, and the

vertigo and flatulence, and thrillings of heat in the bowels increase, apply a large mustard poultice over the whole surface of the abdomen, so as to cover the pit of the stomach and administer a draught consisting of a tablespoonful of salt, dissolved in a tumbler of warm water; if the pulse has begun to sink, the extremities to grow cold, and the cramps to be painful, repeat the salt and water, doubling the quantity of salt, and adding a teaspoonful of red pepper. This will act as a *free emetic*, and will probably bring up a considerable quantity of dark bile—perhaps thick and vitiated; but that will depend, to some extent, on the intensity of the attack. The administration at this time of an active emetic is in accordance with the admirably expressed views of Dr. James Johnson, who says:—

"Of all the means which nature or art can bring into operation, the act of *full vomiting* is the most powerful in driving the blood from the trunk to the capillaries—from the internal organs to the periphery of the body. It is also the most universal excitant of secretion in every glandular structure of the living

machine. Nausea and retching are quite different in their effects from the operation of full vomiting; for they depress the power of the heart and nervous system, and prevent the blood from flowing to the surface; while full vomiting impels the circulation with such force into the superficial vessels, that it is extremely difficult to stop the flow of blood from the orifice of a vein during vomiting. I have seen the blood come from a vein, under such circumstances, with all the characters, or at least the appearance of arterial blood."

But this is the only time when it is surely an advantage to administer emetics; in the more advanced stages, they are of doubtful propriety

Dr. Nelson considers the castor-oil as unnecessary at first, but gives a grain of opium, and, if this is rejected, gives another, or, if the purging continues, repeats the dose. He then gives a lemonade made from tartaric acid (Dr. J. Worms, physician-in-chief of the Military Hospital of Gros-Caillou, would give a sulphuric acid lemonade instead), and, if necessary, also a mild rhubarb or castor-oil laxative.

Dr. Collins would give castor-oil first and

then rhubarb, carbonate of magnesia, and peppermint-water, and, if the diarrhea was obstinate, follow with catechu, kino, tannic acid, and opium; and having checked the diarrhea with this, administer five grains of blue-pill and one of opium. Dr. Bell, of Philadelphia, opposes the use of mustard poultices or plasters, but advocates dry rubbing with the hand, or with flannels and flesh-brush. Friction with ice he has seen tried with success, and bleeding, either from the arm or locally by cups over the bowels, he approves in many cases.

Dr. MacLean protests strongly and earnestly against opium and astringents of all sorts. He thinks it unwise to attempt to restrain the evacuations in general; but, if they are likely to go too far; as in rare cases they may, give sugar of lead, but no opium. He also has given in some of these cases pernitrate of iron, an emulsion of spirits of turpentine with some aromatic, and nitrate of silver in small doses.

Professor Hutchison, of Brooklyn, N. Y., is in the habit of administering in this stage an emetic of mustard or common salt, and

following it with small doses of calomel, every two or three hours.

The late Professor Horner, of Philadelphia, and many other very eminent physicians, recommend the internal use of chloroform in doses of fifty to seventy-five drops (about fifteen minims) every half hour, in orgeat syrup or gum mucilage and water, in the proportion of sixteen or twenty parts of the water to one of the chloroform. Dr. Hartshorne recommends for this purpose a sort of chloroform paregoric, composed as follows: Take of chloroform, two fluid drams; spirits of camphor and laudanum, of each one and a half fluid drams; oil of cinnamon, eight drops; alcohol, three fluid drams; mix, and make a tincture. The dose is from twenty to one hundred drops.

Statistics of death or recoveries from the administration of any remedies in cholera, or the premonitory diarrhea which precedes it, are not entitled to much weight, for, while they may be honestly recorded, there are several unknown elements which greatly impair their value. At the outbreak of any epidemic, the

symptoms of any disease are more severe, its tendency to a fatal termination greater, and its resistance of treatment much stronger than toward the decline of the same epidemic, and hence treatment which would have proved successful toward the close of the epidemic may fail entirely in the beginning. The constitution of the patient, his power of throwing off disease, the tendencies to spontaneous recovery, and the number of cases treated with each remedy, are all elements which must be considered, if our statistics are to be of any great value.

With these remarks, we introduce the following statement, based on eight hundred cases of cholera treated in the provinces, throughout England and Scotland in 1854, which represents the order of percentage of failure after the use of various remedies in premonitory diarrhea :—

	Per cent.	Or, including deaths as failures.
Catechu, kino, &c.	59.0	59.0
Salines, ...	41.9	41.9
Eliminants, castor-oil, &c., . .	25.0	25.0
Calomel, ...	24.0	25.3
Calomel and opium, ...	18.9	22.0
Stimulants, ...	16.0	21.8

	Per cent.	Or, including deaths as failures.
Chalk and opium,	13.8	17.1
Acetate of lead and opium,	11.2	14.0
Opium,	8.6	13.7
Chalk mixture,	3.6	5.0
Sulphuric acid and opium,	2.6	4.0

The missionary physicians in Constantinople, to whose entire plan of treatment we shall advert by-and-by, did not find opium, in combination with camphor, tincture of rhubarb, and some of the aromatics, objectionable as a remedy; on the contrary, it was their sheet-anchor, in controlling the diarrhea, and their extraordinary success is certainly a strong argument in its favor in such combination. Camphor—a diffusible stimulant, whose virtues are not half known to the profession, long as it has been in use—has not, except in these prescriptions of the missionaries, received the attention it deserved in the control of the early vomiting and purging of cholera. Its characteristic power of determining action to the surface, and producing free action of the capillary vessels, and its tendency to check diarrhea without producing inflammatory action, render it a very valuable remedy in cases of this class.

But if the treatment of the premonitory and incipient diarrhea has not been fully settled, and, owing to this diversity of opinion has not been fully successful, much more has this been the case with the stage of *impending and complete collapse*—the full development of cholera. In this stage, the methods of treatment have been very diverse and the results less satisfactory than could be wished. In this condition, "the life of all the blood is touched corruptibly;" it is a sluggish and thickened fluid, poisoned by retained excretions, and containing more than its natural proportion of small white bodies. At the same time, absorption, though not wholly suspended, is very imperfectly performed; and remedies, though sometimes successful, are very, very often inefficacious.

An eminent physician, who has had large experience in the treatment of the disease in India, in Europe, and in this country, urges that, in this stage, all the external appliances for rousing the action of the surface, and maintaining the circulation in the capillaries—bags of sand, bottles of hot water, or flannel cloths

wrung out in very hot water and covered with blankets—must be continued and increased; the mustard poultices should be often renewed, and the abdomen, thighs, and legs covered with them; frictions with hot cloths kept up with vigor and zeal, the patient kept on his back, and carefully covered, and, in addition to these external means of endeavoring to restore vital action, the following treatment should be adopted: A large injection of from three to four pints of as hot water as the hand can bear, with six ounces of brandy (whisky would probably be equally effective), and two drams (teaspoonfuls) of laudanum, should be thrown up the rectum, and, at the expiration of an hour, may be drawn off by a tube, when it will be found quite cold, and another enema of hot water without the laudanum and brandy immediately thrown up. At the same time administer by the mouth, every half hour, a teaspoonful of a mixture of equal parts of laudanum and spirits of camphor in a half ounce of brandy. At the expiration of an hour from the administration of the second injection, throw up a third, adding this time again the

brandy and laudanum. At intervals of half an hour, midway between the doses of laudanum and camphor, give five grains of *quinine*, either in the form of solution, or better, if attainable, in the sugar-coated pills. If this is rejected, repeat it immediately, and if the laudanum and camphor are thrown up, give a grain and a half of dry opium every hour, till the patient ceases to vomit. Apply, if possible, mustard poultices to the spine, and rub the limbs vigorously with dry, warm flannel, sprinkled with powdered mustard, and check the tendency to vomiting by linen cloths wrung out in hot water, and laid on the pit of the stomach. Appease the thirst by giving the patient bits of ice of the size of a hickory-nut, to suck or swallow whole, and, if the cramps are distressing, control and relieve them by the firm application of roller-bandages. This treatment may well be called heroic, but the eminent practitioner who commends it, asserts that it has very rarely failed, and that it is to be maintained till the withered, puckered, sodden fingers begin to become plump and warm with the heat of the returning circulation; and

then, when the signs of reaction are becoming marked, stop the injections, double the interval between the doses of quinine and between those of laudanum and camphor, and immediately give twenty grains of calomel. If, at the expiration of two hours, the evacuations have not become bilous and natural, repeat the dose. If they have, stop the quinine and the laudanum and camphor, and give ten grains of calomel, which should be followed up, at the expiration of two or three hours more, with a full dose of castor-oil (two ounces or more). If by this time, as will probably be the case, the patient has passed urine, and dropped into a restful slumber, he is saved, and requires henceforth only good nursing and simple farinaceous food, with mild tonics, to be restored to complete health.

In the rallying stage, it is important to watch the changes—to prevent recurrence of collapse on the one hand, and to ward off congestions of the head and viscera on the other. The first is averted by repose and external warmth, and by giving warm arrow-root in moderate quantities; the second, when the indications

are threatening, by small doses of calomel and castor-oil, with acidulated drinks.

Treatment in the Stage of Fevers.—The eminent Mr. John Fyfe, of Newcastle, England, who, in 1831, attended five hundred and seventy-nine cases of cholera, used to say that the duration of the consecutive fever was commensurate with the duration and severity of the collapse, and not much dependent on the kind of remedies employed. This is certainly far from being true of the Indian form of the disease, especially of those cases which have been treated with quinine; and even in England, and in this country, a very mild case sometimes precedes a dangerous fever; and sometimes after the severest collapse there is no fever at all. In England, under certain circumstances, the fever, unless strictly watched, proved more frequently fatal than collapse itself, though the symptoms were described as differing but little, if at all, from those of ordinary typhus—except, perhaps, in the greater rapidity with which they ran to a fatal termination.

There is apt to be much giddiness, pain in the head, and stupor. If the case is a mild

one, mustard poultices applied to the neck will relieve the head—and to the pit of the stomach. Should there be constipation, it may be corrected with simple laxatives. If the cerebral oppression is very serious, the back of the neck should be blistered, and the head shaved and kept cool with wet cloths, or even with ice. Small doses of calomel and castor-oil (as in a preceding paragraph) should be given, and great care should be observed to avoid errors of diet. The congestion which threatens the head is the chief danger, and it will often be necessary to *precede* the blister (which is sometimes applied to the scalp, and sometimes also to the calf of the leg) by leeches behind the ears, or on the neck.

In the report of Drs. Baly and Gull, to which reference has been previously made, are given the results of the treatment of cholera in this stage, as obtained from the replies of English physicians to questions upon this subject. A selection from this portion of that deeply interesting and masterly work, together with outlines of treatment in the different stages of cholera, condensed by Dr. Burrall and

others from a few recent publications, will form the remainder of this chapter.

The treatment by *small and repeated* (about five grains every half hour) *doses of calomel*, gave the following results:—

Of three hundred and sixty-five cases, there were one hundred and eighty-seven deaths and one hundred and seventy-eight recoveries.

Of seven hundred and twenty-five cases of complete collapse treated by Dr. Ayre on a similar plan, three hundred and sixty-five died. Other statistics on the same point are as follows:—

Of 69	cases,	35	died.		
" 30	"			18	recovered.
" 19	"	11	"	8	"
" 30	"	18	"	12	"
" 70	"	31	"	39	"
" 11	"	5	"	6	"

As to the treatment by *calomel*, *opium*, and *stimulants*, it was found that opium was a dangerous medicine in collapse, and the same was true of stimulants. Perchloride of carbon, and camphor and chloroform *produced reaction*, but it was not permanent.

"The results of this treatment were unfavor-

able, and not altogether so indifferent as when calomel was given by itself. Although opium and diffusible stimulants, brandy, camphor, and ammonia, were useful at an early stage of the disease, as collapse set in they not only failed to produce any favorable results, but often aggravated the symptoms. It seems well ascertained, that opium in large doses was at this period injurious, by increasing the cerebral oppression, and embarrassing the system during reaction. It was probably less and less applicable as the disease advanced to its characteristic development. Stimulants, especially the various preparations of alcohol, did not act as restoratives in collapse, but often increased the irritability of the stomach, and added to the sense of oppression in the region of the heart."

Dr. Burrows gives twenty-one cases, treated from July 20th to 25th, 1849: twelve were males and nine females. All the patients had a warm bath, and five grains of calomel with one of opium were given every two to four hours. According to urgency of symptoms, ammonia, brandy, wine, and chloroform were given, and cold water and ice freely.

Ages.		Of these there were	Deaths.	Recoveries.
Under 20, . .	6	3 not in *collapse*	0	3
From 20 to 40, .	12	3 in slight "	0	3
Over 40, . . .	3	11 in marked "	7	4
		4 in extreme "	4	0

In fourteen cases treated on the same plan, from Sept. 20th to Sept. 25th, seven males and seven females, the result was as follows:

Ages.		Of these there were.	Deaths.	Recoveries.
Under 20, . .	3	4 not in *collapse*,	0	4
From 20 to 40, .	9	2 in slight, "	0	2
Over 40, . .	2	8 in marked " but symptoms not extreme	2	6

Dr. Shapter, of Exeter, gives sixty-eight cases, of which forty-one recovered and twenty-seven died. He adds:—

"This combination (calomel and opium) appears to avert death more successfully than mercury by itself; nevertheless, those cases which recover, whether from incipient or complete collapse, are, if the use of opium be long persevered in, more likely to pass into consecutive fever than if no opium be given."

Sixteen cases were treated by Dr. Bashan with calomel and opium, brandy, ammonia, chloroform, mustard plasters, and the warm bath; in some cases, injections of acetate of lead were used. There were two recoveries and fourteen

deaths. Eleven were in marked collapse. Of other cases treated on a similar plan, in

	Deaths.	Recoveries.
27 cases of collapse there were	16	11
21 " in the incipient stage, there were	15	6

Dr. Shapter reported forty cases treated with *stimulants:* twenty-one died, nineteen recovered.

Dr. Blackall reported twenty-eight cases, males; five were treated with brandy and laudanum; ten with camphor, chloroform, and ammonia; seven with chloroform and brandy; three with turpentine; three with camphor alone.

Ages.		Of these there were	Deaths.	Recoveries.
Under 20, . .	10	2 not in *collapse*,	0	2
From 20 to 40, .	11	6 in slight "	1	5
Over 40, . . .	7	7 in marked "	6	1
		13 in severe "	12	1

Dr. Barclay's report of cases in St. George's Hospital:—

Stimulants were administered in large quantities in five cases, three recovered; in moderate quantity in fifteen cases, four recovered. They were altogether withheld in four cases; of these, two recovered. In no case in which collapse was complete did stimulants restore the circulation.

Mr. Vines, of Reading, says: "*Chloroform* was tried, but its effects were evanescent."

Mr. Butcher, of Ware, in a letter to Dr. Davies, speaks in high terms of the value of chloroform for arresting the early symptoms of cholera, viz., vomiting and cramps. It does not seem to have been successful in rallying patients under impending collapse, nor in arresting the onward course of the disease. Four cases of urgent cholera were treated by Mr. Butcher with stimulants, warm bath, and chloroform. Two died and two recovered.

Dr. Barclay's report from St. George's Hospital: Chloroform was administered in combination with camphor in three cases, two of which proved fatal. In one case it was employed in the premonitory stage every half hour for several hours, and was abandoned only when decided symptoms of cholera occurred. It was also administered near the close of another fatal case without apparent benefit.

Dr. Blackall says: "Seven cases were treated with chloroform. One of these was in a dying condition, and therefore not to be considered. Of four in collapse, three died and one recov-

ered; of two in approaching collapse, both recovered."

"*Cold water* was generally preferred, and good results were often observed when it was taken freely in repeated and copious draughts although it excited vomiting.

"Dr. Arnot administered a mixture of ice and salt in two cases; both recovered."

Salines, when administered at an early period and in a concentrated form, seemed to favor the discharges.

Dr. Burton reported twenty cases treated mainly by salines. Fifteen were males, and five females:—

Ages.	
Of 7 years there was	1
From 20 to 40 years, there were	11
" 40 to 50 " "	3
" 60 to 80 " "	4
Of unknown age, there was	1

Nine were in the premonitory stage, four in approaching collapse, seven in collapse when the treatment commenced. The saline mixture given was sesquicarbonate of soda, one scruple; common salt, one dram; chlorate of potassa, eight grains; water, half a pint. Occasionally the sulphate of magnesia was given.

largely diluted. There were six recoveries and fourteen deaths; three of the six recoveries were mild cases.

Dr. Hawkins reported that, of thirty-seven cases in Middlesex Hospital treated by mercurials and salines, seventeen recovered and twenty died.

The report states with regard to the effect of *emetics* :—

"The amount of evidence received in the communications is too small to admit of any definite conclusion as to the conditions under which these remedies are applicable; but the general deduction is, that in the early stages they were sometimes of use, and in collapse the effects were equivocal." As to *bleeding*, it is stated that "its general inadmissibility is to be inferred from its almost entire disuse." Heat was found useful in the early stage; the wet sheet favored reaction in mild cases, but when the disease was severe it proved useless or injurious. Frictions, chloroform liniments, and warm fomentations relieved the cramps, and, in the milder cases, stimulating poultices of mustard or turpentine were of some use in

relieving local symptoms and obviating nervous depression.

No permanently favorable effect was produced by oxygen or galvanism. "The results of saline injections into the veins are, as in 1831 and 1832, generally unfavorable. Its value can not, however, be determined by statistics collected from various sources. The operation in all its details is a delicate one, and requires not only a careful discrimination of the cases to which it is applicable, but also an exact attention to the physical characters and composition of the fluid to be injected, and other collateral circumstances. Until these points receive greater elucidation, the results obtained can form no sound basis for an opinion respecting its merits. * * * * In an adult, not more than from forty to sixty ounces, at the rate of from two to three ounces per minute, should be injected without intermission. The operation may be repeated according to the necessities of the case, and this is for the most part to be preferred to throwing in double the quantity at once. Cases have terminated successfully where such an amount

of injection has been repeated five or six times."

The salt to be used for injections into the veins should be composed nearly in the following proportions of the various ingredients :—

Chloride of sodium (common salt)	.	60 parts	by weight.
" potassium,	.	6 "	"
Phosphate of soda,	.	3 "	"
Carbonate of soda,	.	20 "	"

One hundred and forty grains of this are to be dissolved in forty ounces of distilled water.

"As to the temperature, it has been found that one hundred and ten degrees Fahrenheit is not injurious." The addition of a small quantity of alcohol to the saline injections was tried in 1832, and repeated with success in 1848.

M. Worms says of his treatment in collapse: —"The patient is left in absolute repose. Frictions are not used unless required to ease the cramps; every half hour, a glass of lemonade (sulphuric acid, syrup, and water), of one to two parts of the acid to five hundred of water, is given, and advantage is taken of the instant after the vomiting for its administration. Wine and ice are allowed *à discrétion.*

"I think it worthy of notice that the lemon-

ade, which is very effectual in controlling the alvine evacuations, produces a different action upon the vomitings, which are prolonged in duration and frequency. But this prolongation has a favorable influence, and is generally the indication of a happy termination."

It will be observed that the acid acts as an emetic, and M. Worms states that the vomiting has a favorable influence upon the course of the disease. This medicine is also antiseptic.

In the *Gazette Hebdomadaire* of December 8th, 1865, Dr. Parrot gives an analysis of sixty-three cases of cholera, treated in La Charité Hospital. The treatment consisted in the administration of from four to eight grammes* of chloroform daily in severe cases, and from two to four in mild ones. It was mixed with one hundred grammes of water, and syrup of quinine twenty grammes. This mixture was given in tea, a tablespoonful every half hour; at the same time iced beef-tea was given very frequently in small quantities. Warmth was applied to the skin, and dry and stimulating frictions were used. Chloroform given in this

* A gramme = about 15½ grains, troy-weight.

way calmed the anxiety and epigastric pain, and seemed to diminish the frequency of the vomitings, which were also less painful.

Of the sixty-three patients, fifty-three were grave cases, five moderate, and five mild. There were twenty-five recoveries and thirty-eight deaths, but three died immediately after admission, and two at the close of two hours. Two young women in the third stage of consumption were also among the victims; two others had inflammation of the glands of the bowels, and one had organic disease of the heart. Forty-eight cases came from the city; *fifteen* were taken sick *in the wards*, and of these, *thirteen died;* twenty had looseness of the bowels previous to the characteristic symptoms, and among twelve the diarrhea lasted more than eight days. In the period of reaction, a large blister was sometimes placed over the pit of the stomach, and where there was a foul tongue and loss of appetite, ipecacuanha was given. Only *two* deaths occurred *during reaction*, the symptoms of which were benign.

This report is somewhat imperfect, since it does not state the comparative number of

deaths among the mild and severe cases. Dr. Parrot is of opinion that, making proper allowances for those in a dying condition, as well as those laboring under previous diseases, the recoveries would nearly balance the deaths. It is worthy of notice that thirteen of those who were attacked in the hospital died, and that only two deaths occurred during reaction.

The following outlines of treatment are extracted from lectures on the subject by Dr. MacLean, which were contained in recent numbers of the London *Lancet*.*

"Secure the best hygienic conditions possible for your patients; avoid crowding them, give abundance of water to drink, and ice to suck; correct cramps and inordinate vomiting by the internal and external use of chloroform; apply external warmth and extra bed-clothes if they are grateful to the patient, but if they make him restless, do not press them. If the cuticular discharge is excessive, wipe the patient dry from time to time, disturbing him as

* Lectures on the Treatment of Cholera, by Deputy Inspector-General MacLean, M.D., Professor of Military Medicine. London *Lancet*, Feb. 3 and 17, 1866, and May number of American edition of the *Lancet*.

little as possible. If vomiting be not excessive, and if the remedy does not excite it, ten drops of the mixture I have recommended (see Formula No. 3) in the premonitory diarrhea, may be given from time to time, chloroform being substituted if vomiting be urgent. As soon as vomiting ceases, you must support the patient by proper nutriment. At first I begin usually with thin arrow-root, well boiled, and flavored with a little aromatic. I give this, commencing with a teaspoonful at a time, giving now and then a teaspoonful of brandy in it, never overdistending the stomach. Instead of water, I now quench thirst with milk containing a little lime-water, and flavored, if it be at hand, with a few drops of curaçoa. This may be often given to the patient with a little soda-water. As reaction proceeds, I substitute strong beef-tea, or, better still, essence of meat, using it in the same cautious way, spoonful by spoonful, at proper intervals; later still, eggs beaten up with a little brandy, and flavored as before with curacoa, are often relished. The greatest caution is required not to disgust the patient, not to re-excite vomit-

ing, not to over-stimulate, so as to bring on cerebral symptoms, during the febrile reaction. When patients are thus carefully nursed, it is seldom that reaction is excessive. Nothing but mischief may be expected from over-anxiety to hasten forward convalescence by too freely pressing food and stimulants on the patient." Dr. MacLean also says: "When I first went to India, it was a common practice to withhold water, especially cold water, from cholera patients. Following the routine of the day, I have acted in this way, and I was taught by personal experience the folly of this article of prevailing medical belief. There is no necessity to give large draughts, but let not the fact that a portion of almost every supply is vomited, lead you to withhold it entirely.

"Cramps are best relieved by the use of chloroform, given in doses of five or six minims in a little water; and if vomiting be excessive, a little may be sprinkled on a pad of lint covered with oiled silk or gutta-percha tissue, and applied to the epigastrium; or spongio-piline may be used for the purpose. I have used chloroform in this way, both exter-

nally and internally, very freely, and always with good effect."

In the same lectures from which the preceding extracts were taken, an opinion is strongly expressed against the use of opium. It seems, however, to refer especially to its use in large doses, or during collapse.

"In the stage of collapse, if it is retained, it is—it must be—useless. But when reaction sets in, the opium, previously inert, begins to act, and is at once a serious hinderance to the restoration of the secretions, and if the quantity given has been large, often hastening on cerebral symptoms, ending in coma."

The same eminent physician says of the administration of calomel:

"Calomel has been used to fulfil every indication in turn, according to the peculiar belief of the prescriber. Some give it as a purgative, others as a sedative, not a few 'to stimulate the secretions.' I have seen it given as a cure for vomiting. Then we have a pretty numerous class who give it for no reason in particular. Calomel is the trump-card in their hands; so, like good whist-players, 'when in

doubt,' as men are apt to be in dealing with cholera, they 'play trumps'—they give calomel. I have seen it given in every conceivable way, and for every possible or impossible end; in grain doses every hour or half hour, and, by heroic practitioners, in scruple doses again and again. But, gentlemen, it is the old story. Calomel is of no use during the stage of collapse; but by-and-by, when the powers of life begin to revive again after the shock is over, the first thing the system has to deal with and to dispose of, is twenty or thirty grains of calomel. What results? Very often vomiting of that 'green-paint looking matter' of which I spoke appears, and you know how hard it is to stop that; or bilious diarrhea is excited, which soon brings the case to an end. At the best, it disturbs the stomach and interferes with nutrition. At such a time nature needs the helping hand of the physician to sustain and assist her in the life and death struggle, instead of being searched and goaded by powerful drugs, prescribed no matter with what intention. Called to see a case of cholera a few months ago, I found calomel in

combination with opium being 'poured in' every hour. I ventured respectfully to ask the reason why; the patient being in a state of collapse, the medicine was accumulating in the stomach like water behind a barrier. 'What,' I asked, 'do you expect will be the action of all this calomel when the barrier gives way—when the functions begin to be restored?' The prescriber was not very sure, thought perhaps it might have a 'cholagogue action—stimulate the bile.' I might have asked, is it not conceivable that nature will do this herself? And why not stimulate the kidneys as well? Why concentrate all your attention on the bile? Is the biliary more in abeyance than any other secretion? and so on. I do not think these are impertinent questions. I recommend you to put them to yourselves when you are tempted in moments of doubt to prescribe, as D'Alembert said we sometimes do—using physic as a strong but blind man uses a club in a crowd, hitting friend and foe with equal impartiality."

In a recent meeting of the New York Academy of Medicine, Dr. John T. Metcalfe gave

very briefly his views with regard to the treatment of cholera. He recommended in the first stage rest, warmth, quiet, pure air, and proper diet. Frictions of the extremities, inhalations of chloroform, or hypodermic injections, may be used against the cramps. Warmth should be applied to the pit of the stomach, and cold water allowed freely. In collapse, no large doses of opium should be given; external warmth should be applied, and cold water administered internally; the cold water to be used, even if it causes vomiting. Consecutive fever is to be treated on general principles.

Dr. Niemeyer, an eminent German medical writer, is of opinion that every one attacked, even with a slight diarrhea, during a cholera epidemic, should send immediately for a physician, and in the mean time go to bed, keep warm, and drink several cups of hot coffee* or herb tea, the object being to produce perspiration. If there is any delay in the arrival of the physician, the patient should take small doses of opium, in the form of paregoric or

* Hot coffee has with some persons a decided laxative effect.

laudanum. He considers opium in the early stage of the disease as one of the most effectual remedies, and recommends the Russian Cholera Drops.* He himself gives the tincture, or Dover's powder. If the patient improves under this treatment, then it is continued in small doses, until a firm stool passes from the bowels; if the patient grows worse, calomel in one grain doses should be substituted, and cold water applied to the abdomen. The patient is also allowed to swallow small pieces of ice, or small quantities of ice-water. As collapse approaches, stimulants are indicated, and by preference iced champagne, which stimulates the nervous system without affecting injuriously the coats of the stomach and intestine. The ethereal oils, carbonate of ammonia, and other sharp substances, are less desirable. In practice among the poor, rum and water may be given. Sometimes a cup or two of hot, strong coffee, may be advantageously taken between the draughts of water. Although the coffee will not be long retained, there will be an improvement in the pulse and temperature of the skin before its

* The ingredients of these are given further on.

ejection. A cessation of the discharges caused by paralysis of the muscular walls of the bowel, shown by the continued asphyxia, indicates an increased necessity for stimulant, and the reappearance of the discharges shows that the bowels are recovering their tone. Frictions with mustard may be used for cramps, but there is a little danger in the employment of mustard poultices lest they be left on too long, and cause obstinate and painful skin-diseases. After reaction, great care should be used in the preparation of food, and the diet should consist of milk, broth, and toast, until the passages become normal.

Dr. Drasche considers that the following remedies, which have been at different times brought forward as cures for cholera, have not fulfilled the expectations formed of them. Venesection, calomel, ipecacuanha, salines, terchloride of carbon, spirits of ammonia, nitric acid, trisnitrate of bismuth, nitrate of silver, hydropathic measures, strychnine, phosphorus, aqua calcis, valerianate of ammonia, hydrated oxide of iron, sulphuric and manganic acid, pyroligneous acid, gunpowder, castor-oil, croton-oil, chloride of lime, chlorinated water, chlorate of potash, chlo-

ric ether, chloroform, animal charcoal, hashe esh, stachys anatolica, protoxide of nitrogen, oxygenated water, salt, used in baths and for enemata and injections into the veins, injection of the bladder with warm water, inhalation of aromatics, transfusion of blood, electricity, and curative gymnastics. He attaches great importance to a rigid diet in the very commencement, nothing but soups being allowed. From a neglect of this precaution has arisen the disappointment which many physicians have found in remedies for the diarrhea. Only a limited quantity of fluids may be taken, and this, if possible, warm. If the thirst is excessive, ice may be allowed. Patients have stated that the use of cold draughts was followed by marked intestinal rumbling, and soon after a watery dejection, in spite of preventive medicines. His remedy for the diarrhea is opium, which he prefers to give in the form of tincture. Should the diarrhea continue several days without amendment, astringents should be substituted for the opium. Of these he prefers rhatany and tannin in doses of five grains each.

As the collapse approaches, stimulants are

indicated, to excite the nervous system and quicken the circulation. He likes the ethereal oils, as of cinnamon, mint, and juniper; musk has also a similar action. If the time presses, diffusible stimulants, as warm wine, champagne, rum, or punch, may be employed. Sulphuric and acetic ethers (stimulant antispasmodics), have also a decided action upon the cramps and vomiting. Used for inhalation, they improve the pulmonary circulation, and relieve dyspnœa. The effect of ether, thus employed, has often been surprising, especially with young persons. In a short time after the commencement of the inhalation, the pulse has improved, the temperature of the body risen, the cyanosis lessened, the cramps have diminished, and reaction has set in.

As an additional means of restoring the circulation, frictions should be employed, and the body enveloped in warm coverings. Mustard poultices are also considered as very useful. If reaction is imperfect, stimulants should be used, mild or strong, as the circumstances require. If excessive, ice may be applied to the head, and cold water allowed. If there is a tendency to

cerebral congestion, leeches and cups should not be employed. To restore the urinary secretion, mild diuretics, such as seltzer water, citric acid, or citrate of potassa, are indicated. If necessary, warmth may be applied to the loins, and frictions made with digitalis ointment, the oil of juniper, or turpentine. A free use of cold water is also allowable.

If the diarrhea continues during reaction, astringents, such as tannin, extract of calumba, and extract of rhatany, should be administered. The same remedies are indicated if diarrhea is present in consecutive fever. Vomiting and hiccough are treated by mustard poultices to the pit of the stomach. So long as the period of reaction continues, the patient must remain in bed and confine himself to a diet of soups alone.

For the diarrhea and vomiting which sometimes continue during convalescence, nux vomica is a suitable remedy. So long as there is any indication that the digestive organs are still suffering, the diet must consist principally of nutritious soups.

An analysis of two hundred and thirty-four

cases of *fever following cholera*, treated by different remedies, shows the following results:—

56	cases were treated by				salines,	of which 21	died.
22	"	"	"	"	mercurials,	" 6	"
101	"	"	"	"	*aperients*,	" 8	"
1	"	"	"	"	diuretics,	" —	"
21	"	"	"	"	stimulants,	" 14	"
3	"	"	"	"	external irritants,	" 2	"
5	"	"	"	"	nourishment alone,	" 2	"
23	treatment not recorded,					3	"
2	not treated by medicine,					1	"

"In the practice of one practitioner at Paisley, the remarkable number of one hundred and three cases of consecutive fever occurred in one hundred and ten cases of cholera, sixty of which passed into the fever without having had collapse. In all these cases, calomel and opium were used as the permanent treatment in the previous stages. There is no evidence whether the opium was given in unusually large doses. The result, however, corresponds with the large proportion of cases of consecutive fever in the metropolitan hospitals, in which the use of opium, combined with chalk, appears to have been attended with a similar result."

Professor Alonzo Clark, of the New York

College of Physicians and Surgeons, after a very careful statement of the different theories and modes of treatment in cholera, in his lectures, thus sums up his views of treatment. Beginning with the stage of diarrhea, he says:—

"The first rule should be to send the patient to bed, after a warm bath, and sufficient bed covering to induce a gentle soft perspiration; the administration of cathartics, especially of the saline class, must be carefully avoided. There is no doubt that cholera has been produced through the injudicious use of cathartics. It will be required that you check the diarrhea. Among the medications used for this purpose, opium has generally been resorted to. A favorite prescription consists of equal parts of the tincture of paregoric, catechu, cloves, and capsicum, given at proper intervals in proper doses. Some advocate the use of quinine, as an anti-miasmatic, and it is claimed that it will often alone check the diarrhea. The pernitrate and persulphate of iron have also been used. Acetate of lead and camphor are recommended by others. Dr. Houston has great con-

fidence in the following pill:—Sugar of lead, powdered camphor, of each, twenty-four grains; morphia, two or three grains; oil of cinnamon, five drops; mix, and make twelve pills.

"One every two, three, or four hours, according to the urgency of the symptoms. Hope's mixture is another favorite with many. Rest, and rest in bed, however, is as important as any medication.

"Passing to the serous diarrhea, when vomiting and cramps may soon be expected to make their appearance, other remedies are demanded. Dr. Fuller advocates the use of sulphuric acid, as having almost sovereign power to arrest the disease in this stage. Cox, of England, introduced this mode of treatment first. It is claimed as infallible. But so many infallible things have been proposed in cholera, that any claim to infallibility must be doubted. Chloric ether is added to the sulphuric acid, and the treatment is generally preceded by opium. Then mustard over the stomach, and frictions.

"*Sulphur*, too, has been proposed, and used with a view to destroy the supposed fungi. Dr. Grove gives precipitated sulphur with bi-

carbonate of soda suspended in water, spirits of lavender and whisky.

"*Creosote* has also been declared to be infallible. Possibly it may be serviceable.

"*Chloroform.* The late Prof. Horner used this remedy in 1832. Dr. Hartshorne, of Philadelphia, has stated it to be very successful. Dr. Davis at one time placed great reliance on it, in doses of from seven to ten drops every half hour. The general report, on the whole, is in favor of chloroform, and also of sulphuric acid, so that we may be justified in continuing their use. Chloroform has also been used by inhalation to allay cramps and vomiting; but the difficulty is that, to attain the object, the patient must be kept under a slight degree of anæsthesia for a longer period of time than would be admissible.

"Prof. Frazer, of McGill College, Montreal, gives *strychnia*, and recommends its use—1-48 part of a grain of the acetate given in solution and repeated every fifteen to five minutes, up to eight or twelve doses, or until some perceptible effects are produced. He claims a success of twenty-one cases in twenty-five; and of

the fatal cases, four are reported as having advanced to reaction. It has been tried by others, and the results have not been so favorable.

"*Collapse. Electricity* and galvanism have been tried in the stage of collapse. They seem to rouse the vital energies a little; the temperature has been observed to rise from eighty-eight to ninety-two in the mouth, under their application; but on the whole, while they do possess the power of stimulating the energies of the system temporarily, it can not be said that life has been saved by these means. Wet sheets have been used, according to the plan of the hydropaths; but although slight reaction may be produced, they can not be considered as a curative agent. The same may be said of cold effusions, the warm hip-bath, and cold douche, followed by putting the patient into a warm bed, and enveloping him in blankets. Still these means can not be rejected as adjuvants.

"The inhalation of *oxygen gas* has produced temporary stimulation, but no ultimate favorable results.

"*Counter-irritation*, often of the most violent kind, has been resorted to. Casper dipped

rags into alcohol, laid them on the skin, and set them on fire; but the patients did not get well for all that. A noticeable fact is that counter-irritation produces not much redness of the skin in cholera. All the means embraced under this head have failed to be of any signal service; yet they have done no harm, and possibly may enable us to do something.

"*External warmth*, though generally disagreeable to the patient, moderately applied has generally been received with favor, to supply and restore the heat of the body which has been lost.

"*Emetics* have been resorted to, to arouse the patient from collapse. Common salt or mustard, ipecacuanha or sulphate of zinc have been used for this purpose. But though they may arouse the patient to a certain extent, their effect is but temporary.

"*Ice and cold drinks.*—A distinguished writer remarks that the experience of the last epidemic has confirmed the efficacy of the use of cold water and ice. There is, it is true, a disposition to eject them; but still they allay

the suffering of thirst, and, to some extent, supply the water which the blood has lost.

"Among the agents which have been recommended and used in the stage of collapse are *saline mixtures.* Dr. Stevens, of Jamaica, was probably the first to recommend them. The theory on which this treatment is based is to supply the loss sustained by the blood from the copious discharges. But, as has been stated in a former lecture, analysis of the evacuations have shown them to contain a less proportion of saline constituents than normal. Some physicians, however, speak highly of this treatment, when the patient can swallow and retain liquids; and some very favorable figures are given in the report of Gull and Baly. But it must be constantly borne in mind that nothing is so uncertain and unreliable as figures in the treatment of cholera. The mixture in question, generally used, consists of bi-carbonate of soda, half a dram; common salt, one scruple; chlorate of potassa, seven grains, dissolved in water, every hour. Another solution used consists of common salt, half a dram; tartrate of soda, twelve grains, phosphate of soda, eight

grains. This saline treatment of Stevens does not, however, seem to have been as successful in the hands of others as in his own. Gull and Baly say that, while at times it seemed to have aided recovery, at other times it increased the evacuations and the danger. One thing may be said in its favor—that when it is mainly used, other more injurious treatment is avoided —a negative benefit.

"*Camphor* has been used to allay vomiting and cramps with good results. It is certainly believed to be a safe remedy; it is a good diffusible stimulus, and may be given in connection with chloroform.

"Dr. O. H. Smith, in a summary of his treatment of cholera in the hospital at Williamsburg, states that to restrain the rice-water discharges, he resorted to injections of strong green tea, two ounces, with brandy one ounce, and from five to ten grains of acetate of lead, repeated after every discharge. A pill of quinine, camphor, and calomel was given every half hour, mustard placed over the whole abdomen, and small doses of brandy and water given every few minutes. This treatment gen-

erally allayed the discharges. This favorable report induces us to recommend the treatment to further trial. Dr. Smith refers to the cases of two children who were attacked with the serous discharges of cholera, and to whom the parents administered two tablespoonfuls of brandy, which rendered them completely drunk. There were no more discharges, and the children recovered. The report on the whole, however, is unfavorable to the general use of brandy internally.

"Another plan consists in leaving the patient alone without any treatment, and this plan has been followed by some who became discouraged with the unfavorable results of all other treatment. Dr. Hutchison expresses his doubt whether treatment of any kind is much better than no treatment.

"One more plan remains to be noticed—the injection of saline fluids into the veins. But though in a number of instances a marked improvement has been noticed in the patients by the temporary establishment of reaction, the ultimate history of these cases is death. Dr. Streeter says that the experience of the last epi-

demic in England has demonstrated the inefficacy of the treatment. Dr. Lowry claims four successful cases of twenty-six, and if such good results can be obtained, it would be proper; for, it must be remembered, that it is only resorted to in extreme cases of collapse. Part of the art of obtaining success by this procedure, seems to be to inject very slowly. Drs. Gull and Baly think it worthy of further trial. It does not seem that a very complex formula in the composition of the fluid to be injected is required. The main constituent of the blood which has been lost is water, and it would be safe to use distilled water simply, with perhaps a little chloride of sodium.

"A pamphlet was published in Canada, in 1854, in which Dr. Bauvel reported one success out of four cases of collapse, treated by injection into the veins of milk fresh from the cow. The pamphlet is interesting.

"We will now review what treatment seems to be best adapted to each stage. In the *first* stage, rest in bed, after a warm bath, and some astringent and stimulating medicine; opium, quinine, and astringent preparations of iron, or

a pill like that of Doctor Houston's. There are many chances that under this treatment the patient will recover.

"*Rice-water stage.*—Dr. Fuller's treatment of sulphuric acid may be resorted to; the testimony in favor of it is very decided. Chloroform, also, with or without camphor, after the mode of Horner and Hartshorne, deserves further trial. So also the strychnia treatment perhaps, though this is more doubtful.

"In *collapse*, but negative results are derived from electricity, affusions, etc. Better results are obtained from frictions, the moderate application of heat, the free use of ice and cold water internally; and the saline treatment may yet be tried. Regarding the ice-bags of Chapman, applied to the spine to influence the ganglionic system of nerves, it is a point entirely new, and it would be extraordinary if we did not hear of successes, especially as long as the treatment remains in the hands of its author.

"*Stage of Reaction.*—When the collapse passes off, it does so slowly, the pulse increasing in force gradually, warmth returning in the

same manner, and the secretion of the kidneys returns little by little. The dangers are chiefly of an inflammatory kind, unless the patient has been injudiciously treated. The chief dangers are from pneumonia, continued disease of the alimentary canal, dysentery, or the changed condition of the blood. Diluents will be of service here, as the great point seems to be to restore to the blood its healthy constitution. No antiphlogistics can be used—hardly diaphoretics. We must be very careful not to do too much.

"A word regarding food during cholera. If there is any thing that the patient has a full and unmixed disgust for, it is food. The best plan is not to urge food until reaction, when dissolved food, as beef tea and the like, can be given."

CHAPTER VI.

TREATMENT OF CHOLERA—CONTINUED.

Dr. Bell's treatment—Bleeding, when justifiable—Drs. Hill, Brady, Plummer, and Steadman on the use of chloroform—Dr. Bullar on the use of the hot mustard-bath as a remedy—Consecutive fever aggravated by the use of opium and stimulants—Dr. Braithwaite's views—He favors the use of chloroform, mustard-baths, and a stimulant of compound spirits of ammonia and chloric ether—Dr. George Johnson's theory of elimination and use of castor-oil—Dr. J. C. Hutchison's views—He prefers the expectant treatment—Gives ice and beef-tea, and, in some cases, an emetic of mustard, or common salt—Dr. Collins's treatment—Calomel and opium, with external irritants—Dr. Nelson's practice—Opium in small doses to check diarrhea, followed by tartaric acid lemonade, and occasionally a little oil or rhubarb, to restore healthy action to the bowels—Dr. Burrall's suggestions—Dr. W. W. Hull's advice—Objections to his prescription for popular use—The treatment adopted by the missionaries at Constantinople—Laudanum, camphor, and rhubarb in the first stage, and laudanum, capsicum, ginger, and cardamom tincture in the second stage, with mustard and other external irritants—The treatment of "an experienced physician" of Massachusetts—Expectant, mainly, with small doses of laudanum and camphor—The treatment adopted by the Eclectic school of physicians—Camphor, kino, geranía and capsicum, or other diffusible and permanent stimulants—Dr. Sayre's circular—Circular of the Metropolitan Board of Health—Statistics of the results of different methods of treatment—Recipes of distinguished physicians—Philippine Islands remedy.

Dr. Braithwaite, in his *Retrospect* for January, 1866, thus sums up the views of some of the more eminent of the English practitioners in regard to the modes of treatment for cholera, at the present time.

Bleeding.—With respect to this mode of treatment, the reader ought to notice particularly the following directions of Dr. Bell:

"When the exudation from the bowels or skin is yet flowing freely—for in different forms of the epidemic either symptom may predominate—and when the heart is heard to be struggling in an extraordinary state of excitement, and, in the active endeavor to overcome obstruction, it is *churning* as if it would burst—a sound difficult to describe, but, once heard, never to be forgotten; when, I would say, the sound of the heart conveys to the listener the impression that it is laboring with unabated vigor of reaction, the lancet can not be used too promptly; but when the attack has continued for four or five hours—when the purging has become less copious; and when, instead of manifesting a continuous struggle, the heart appears only to be roused up to reac-

tion at intervals; when the natural warmth of the skin is a little more extended on the neck and chest, and the patient, though still tossing uneasily, is not now in his previous agony, I would hold my hand and trust to medicine for some hours to come; I would then wait until I observed him rest a little more quietly, and bear the weight of the bed-clothes for a time, and until the heart's action continued comparatively tranquil for half an hour or an hour; then, indeed, on the very first symptom of renewed distress, or even sooner, I would bleed without hesitation, till the thick, tarry blood that at first is squeezed and kneaded from the arm with difficulty, flows freely from the orifice, and becomes changed to a fair florid hue.

"All depends upon the period at which bleeding is resorted to. If early in the congestive stage, or just previous to its second accession, it is invariably successful; if just as the congestive stage is passing off, when the pulse begins to acquire a little power, it is invariably fatal."

This fact Dr. Bell explains in the following

manner. In the first stage the heart is excited to the utmost by distension of its cavities from behind, and opposition to its action by spasm of the capillaries in front; bleeding gives relief from the pressure *à tergo*, and probably aids in relaxing the spasm, while, at the same time, by relieving the congested state of the great secreting organs, it enlists their sympathies in support of the vital actions, and the power of the heart being unimpaired, it can now carry on the circulation with vigor. But in the second stage, the heart's energy is much exhausted, and its vital irritability impaired by long-continued distension, and syncope and relapse will be the probable effects of bleeding. If then we can not bleed, what are we to do? We must use those medicines which will invigorate and regulate the circulation generally, and control the tendency to periodical disturbance

We think, however, that bleeding will never be a favorite remedy with British practitioners.

Emetics.—Ipecacuanha, tartar-emetic, mustard and water, etc., are all more or less useful. The state of nausea relaxes spasm, and the act

of vomiting seems almost for the time to stimulate, as well as to have the effect of nausea. Many of the most successful cases are those in which free vomiting exists, encouraged by copious draughts of cold water or mustard and water. Nature herself often does this unassisted, and for our own part we would never discourage vomiting.

Chloroform.—This we think will prove to be the most important remedy in the *early stage* of cholera. Chloroform has been found to be wonderfully efficacious in relaxing all kinds of spasmodic action. In epilepsy, tetanus, hysteria, puerperal convulsions, etc., we have found it to be invaluable. *Chloroform, therefore, will be a valuable remedy in the earliest stages of cholera*, and will, we think, supersede bleeding, emetics, and all other remedies. Its relaxing effects can be watched with the greatest nicety, and accompanied or followed, if *reaction does not come on*, by the very gentle and judicious use of stimulants. We find one of the earliest records of the use of chloroform, in cholera, in the *Lancet* for Nov. 4, 1848, by Dr. J. Hill, of the Peckham Lunatic

Asylum, who used it at the suggestion of Mr. F. Ferguson, the assistant surgeon.

Dr. Hill says:—

"The following is our usual mode of treatment: Place the patient in bed in warm blankets; give a glass of brandy in hot water, with sugar and spice; apply friction to the body by means of warm flannels, and an embrocation composed of compound soap liniment compound camphor liniment, laudanum, and ext. belladonnæ; apply to the whole surface of the body bags filled with heated bran; place the patient under the influence of chloroform by inhalation, and keep him gently under its effect as long as the bad symptoms recur (which they frequently do on its effect ceasing and his regaining consciousness). Give in the intervals small quantities of brandy and water, and thin arrow-root or milk for nourishment, along with milk and water, or soda-water with a little brandy for drink. Avoid every thing else in the shape of medicine, and trust to the efforts of nature in rallying from the poison of the disease.

"Of course great caution is necessary in ad-

ministering the chloroform, and in not pushing it too far. In some instances the patient will sleep for twenty minutes or half an hour—in others, for several hours; and on waking will again be seized with a return of the vomiting and cramps, when the chloroform must again be resorted to, and the patient kept in a great measure under its influence till these symptoms abate. One of our cases required its use at intervals for twenty-four hours. Again, the reaction after its use may be so great as to require gentle blood-letting, which occurred in two of our cases, both being persons of full habit of body and sanguine temperament, the one a nurse, and the other a male farm-servant.

"Should the simple apparatus commonly used in the hospitals for administering it be not at hand, a small teaspoonful may be poured upon a towel and will answer very well."

It would seem that chloroform acts well as a sedative given internally.

Mr. P. Brady, of Harrow, gives the following case:—

"Mary Parratt, aged sixty, ordinarily enjoying good health was on Saturday, the 29th

ult., attacked with slight diarrhea, for which the usual homely remedies were used. On the following morning, at six o'clock, A. M., the diarrhea became profuse; excessive vomiting supervened, accompanied by spasms in the calves of the legs, fingers, and toes. Notwithstanding the urgent nature of the symptoms, reliance was still placed on the favorite remedy, brandy without avail, however; the dejections became incessant, the spasms increased in intensity, and at nine o'clock, A. M. on Sunday, the 30th ult., I was called in to see the patient, who, it was affirmed, was in a 'dying state.' Believing, from the description given, that I should have to treat genuine malignant cholera, and having predetermined, should such a case present, to try the effect of chloroform administered internally, I took with me the following mixture:—

℞. chloroform, one dram; spirits of turpentine, one ounce; distilled water, three ounces. Mix.

"On my arrival, I found the patient presenting all the symptoms of malignant Asiatic cholera in an advanced stage; the features collapsed and ghastly; extremities and tongue

cold; burning sensation in the stomach and gullet; pulse rapid and scarcely perceptible; voice diminished to a whisper; stomach exceeding irritable, and the dejections from the bowels presenting the characteristic rice-water appearance; and all the voluntary muscles of the body were affected by spasm, so that the patient actually writhed in agony. I immediately administered a large teaspoonful of the chloroform mixture (containing about six minims of chloroform and forty of turpentine) in a wine-glass of dilute brandy, and applied mustard to the calves of the legs and surface of the bowels and chest. Thirst was relieved by drinking plentifully of water nearly cold. Notwithstanding the irritable state of the stomach, I had the satisfaction to find that the chloroform draught was retained, as well as the fluid drunk after it, and was followed by no vomiting. I now (half an hour after the draught) gave two of the following pills:—

℞. Calomel, ten grains; inspissated (dried) ox-gall, twenty grains, mixed and divided into four pills.

"In an hour after the administration of the chloroform, vomiting ensued of a portion of the

fluid drunk, slightly tinged with the gall; this soon subsided, the diarrhea had apparently ceased, and the cramp diminished in frequency and severity. I now administered a second dose of the chloroform mixture, and soon after repeated the pills. The stomach retained both; she soon felt decided relief; the pulse rose in power and became slower, the spasms less frequent, and in an hour after the second dose, she was bathed from head to foot in a warm perspiration, and expressed herself comparatively free from all uneasy sensations. The attack had been completely subdued, leaving behind a good deal of pyrexia and debility, from which she is now rapidly recovering."

Mr. G. Plimmer relates another case of cholera in which chloroform was given as a medicine. He says:—

"I determined on giving chloroform, after giving calomel with opium, which was immediately rejected. I gave the following mixture: Chloroform, six minims; brandy three drams; water, two and a half ounces. I gave a third part, which was thrown up in

half an hour; I gave him a second dose, which was retained; the vomiting and diarrhea ceased; the spasm less severe. I gave him, in two hours, the remaining part, and during the next six hours I administered, in two doses, six minims more of the chloroform, with the most decided benefit, and he is now, the 17th inst., convalescent. To the extreme tenderness over the region of the epigastrium I applied flannel soaked in rectified spirits of turpentine. I observed there was no urine secreted, and I am firmly of opinion that the usual remedies would not have met this case. I candidly confess I had no hope of success, from its severity, and, but for Mr. Brady's case, I believe I should have lost my patient."

Mr. Steadman gives the following case of English cholera treated by the same remedy.

"About three o'clock on the following morning I was hastily aroused by her husband, as the patient had become much worse. All her symptoms had increased to an alarming degree; the spasm was universal and excessively violent, 'as if knots were being tied in her bowels:' vomiting incessant; countenance livid and cold;

articulation feeble, praying to be released from her sufferings. As all the medicines had been rejected, I thought it fruitless to continue them, but at once decided upon administering chloroform. A mixture composed of the following was prescribed:—

℞. Chloroform, grains fourteen; brandy, one ounce; distilled water, six ounces. Mix.

"A fourth part was given immediately, which had a partial but most satisfactory effect; an abatement of all her symptoms was the immediate consequence. In two hours a disposition to a recurrence manifested itself, when a second dose of the mixture was administered, which entirely controlled all spasms, vomiting, and purging. She expressed herself 'very comfortable,' and fell into a quiet sleep. At nine o'clock I again saw her, and found her suffering only from some febrile symptoms, accompanied with much exhaustion. She was ordered cold rice and mucilaginous drinks, and had the chalk mixture with nitric ether prescribed. A dose of ox-gall (ten grains) was given in the course of the day, which produced three bilious evacuations and some disposition

to vomiting, which soon passed away. In two days she was declared convalescent. In 1832, when the cholera visited this place, my patient was attacked; but she declares her sufferings then were nothing in comparison with her late disorder. The two remaining doses of the chloroform mixture were ordered to be carefully preserved in case she had any return of her symptoms. A daughter, grown up, who had assiduously attended upon her mother, was, on Wednesday evening; seized in precisely a like manner, except that the dejections were more abundant and frequent; and the mother, without hesitation or appeal for advice, gave her the two remaining doses of the mixture. The same magic result followed; the first dose was only partial in its effect; but the second completely subdued the disease. When I called on Thursday, the gratifying announcement was made to me of the success of my medicine in a second case.

"Perhaps I am not justified in calling these decided cases of Asiatic cholera; but the disease in its latter stage, in the case of the mother,

assumed a much more severe type than our English form usually bears.

"Without offering any remarks upon the *fons et origo* of the malady in its worst form, and with prospective fears for its soon visiting our shores, I am but too happy (in conjunction with Mr. Brady) in being able to report so favorably of a remedy which I believe only requires to be more extensively tested to be appreciated."

Hot Mustard Bath.—An interesting case relieved by this remedy is just related by Dr. Bullar, who says:—

"The patient was in the collapsed stage of cholera. His naturally red face was of purple blue; his surface livid, cold, and shrunken, with the washerwomen's hands. He had rice-water vomiting and purging, was doubled up with abdominal pain, and writhed with cramps in his calves, drawing the strands of his gastrocnemii muscles into rigid cords, which the nurse and porter were rubbing, to ease his torture. His pulse was barely perceptible. No urine had been passed since his attack.

"No one who had seen the cholera of 1832 and 1849 could mistake the nature of such a case.

"Had a slipper-bath been available, I should have used one; but as he had been placed in a house adjoining the infirmary, and only used occasionally for infectious cases, where were only hip and foot-baths, I had him seated in a hip-bath half filled with very hot water, with three-fourths of a pound of powdered mustard in it, with his feet in a hot water foot-bath, with a quarter of a pound of mustard mixed with it. The water was as hot as the nurse's hands could bear—almost scalding hot. That the water should not be merely warm, but very hot, and renewed by degrees to keep up the heat, is most important; and the medical attendant should superintend this himself. Gradually his face improved in color; the cramps ceased; he did not vomit; and after half an hour, as he expressed a great wish to get to bed and to pass a stool, he was moved to a close stool, dried, a clean shirt put on, and he was placed in bed, well covered with blankets, and with hot tins to his feet and hands. His pulse,

though weak, was not easily felt; and his hands though still cold, were warmer.

"The contrast was striking. When placed in the bath, he was writhing with pain and cramps; when placed in bed, he said he was comfortable, had no pain, and wanted to sleep. While in the bath, he drank freely of milk and water with lumps of ice in it, and was urged to swallow, in the intervals of drinking, small lumps of ice. Shortly after being placed in bed, he suddenly ejected a large basinful of milk and water, and was not sick afterward. An hour after he had been placed in the bath, reaction had so far advanced that there were good hopes, and four hours afterward he was out of immediate danger. He was ordered to take iced-milk in smaller quantities, to swallow ice, and to have broth and tea. He had but one stool, of rather a yellower color, the same evening. No reaction fever followed; and, except weakness, he was on the second day well.

"Having seen, with Dr. Lake, a case of much less severity, in which reaction went on from the time he applied Dr. Chapman's ice-bag to

the spine, I had one prepared, and on his being placed in bed, it was applied; but, as it made him chilly and prevented sleep, it was not persevered in. This coldness from an ice-bag is a proof that reaction has occurred, and that it is not needed."

In this case the hot mustard bath was beneficial not only in restoring the capillary circulation to the skin, but in relaxing the spasm of the organic muscles generally. But, as Dr. Bullar truly remarks, neither this nor any other remedy will avail when the dose of the poison has been so virulent and so large that "the disease begins with death."

Calomel.—The treatment by calomel was at one time much praised; but we think that it did not deserve all the praise given to it. It was certainly a better treatment than that by opium and stimulants, which was then much practiced It left the cases more to nature.

Cold Water.—This is one of the best remedies. The patient will drink enormous quantities, and perhaps vomit it as rapidly as he drinks it. Nevertheless, it ought to be taken copiously and without restraint. Effervescing

draughts in large quantities are an agreeable form.

CONSECUTIVE FEVER.—It is too true that even if the first stage of cholera be got over, the patient frequently sinks from the consecutive fever; but we think that the more easily the spasm is overcome, the less stimulants, opium, and other violent treatment be adopted, so much the milder will be the reaction and consequent fever.

In his "Synopsis" Dr. Braithwaite gives his own view of the treatment necessary, as follows:

"On the first attack of real Asiatic cholera, do not stimulate—do not interfere with either vomiting or purging*—but use the utmost diligence in giving *chloroform*, both by inhalation and internally. Teach the nurse how to do it, as you can not be everywhere, and can not be both doctor and nurse. Relax the cramps and spasm by chloroform, and, if necessary, carefully stimulate by ammonia or champagne; but *not until the spasm is overcome.* The cir-

*The premonitory purging of cholera may be cautiously treated in the way we treat English cholera; but if it prove to be the real Asiatic cholera, we think that all astringents ought to be at once given up.

culation will then be resumed, and not be followed by the dangerous reaction, which formerly killed so many patients. But avoid all stimulants if you can, and let the reaction come slowly, and if you feel compelled to stimulate, let it be by compound spirits of ammonia, champagne, or other mild wine. Give copious draughts of cold water, and even encourage vomiting. Give copious saline effervescing draughts, if agreeable.

Do not give opium at all; let the purging alone. It is supposed that it does more good than harm by *eliminating* the poison, and some even increase the purging by giving castor oil. Encourage vomiting by large quantities of cold water, with a little mustard in it if necessary. The muscles of vomiting are so energetic that the water will often be ejected with violence; but keep repeating the cold water, which is always greedily swallowed. There seems to be no specific power in calomel or any other medicine. Apply external cold or warmth, as may be most agreeable. The best way to apply warmth is to wrap the patient up in a blanket wrung out of hot water, and over this hot-wet blanket

place three or four other blankets. The hot blanket can at any time be renewed, and, if you like, you can, during its renewal, wipe the body over with a towel or sponge wrung out of *cold* water. The skin will be powerfully stimulated by this treatment to draw the blood back from the central veins, as soon as the contraction of the pulmonary capillaries will allow the blood to get round to the left side of the heart. Another method is to place the patient in a hot hip-bath, with his feet in a foot-bath, the hot water to have about a pound of flour of mustard in it, and to be kept hot by adding hot water as required till reaction sets in and the cramps and spasm relax. We have said nothing about bleeding, because, although we think that the practice was correct as laid down by the several writers mentioned, yet we have in chloroform and other antispasmodics all the good effects of bleeding without the danger. And as to stimulants, they are generally injurious; a combination of compound spirit of ammonia with chloric ether is one of the safest and best stimulants we possess, and champagne and other sparkling wines are now

so cheap and good that we should recommend them before all others.

The theory of *Elimination*, under which the disease is treated by purgatives, to remove from the system the morbid poison, has been explained in CHAPTER IV. Its most vigorous advocate is Dr. George Johnson, professor in King's College, though Dr. Watkins, Dr. Marey, and others are converts to it. This method of treatment differs from those which give a single dose of an emetic or purgative in the premonitory diarrhea, in that its advocates rely on these remedies only, and especially on castor-oil throughout the disease. The success which Dr. Johnson reports has not attended the administrations of this remedy in the hands of other physicians. The following statement, drawn from his published lectures, is from the *London Examiner*:—

"In the cholera epidemic of 1849, the cases brought into King's College Hospital were treated, in accordance with accepted doctrine, by liberal doses of brandy and opium, to stimulate the circulation and to check discharge. Under this treatment the mortality was very

great, and it was changed for an administration of large quantities of salt and water. This excited frequent vomiting, and rather increased the purging, but it increased the number of recoveries. Observation of the results of these two opposite modes of treatment produced the train of thought which led Dr. George Johnson, when he himself had charge of the hospital during the epidemic of 1854, to act on his conclusion that the commonly received theory of choleraic collapse is erroneous. He gave emetics and purgatives with fair success, and in all cases of premonitory symptoms in medical officers, pupils, nurses, or other patients of the hospital, he gave castor-oil, a treatment invariably followed by recovery. During the epidemic of 1849, several nurses and patients so seized had been promptly treated by opiates, passed into collapse, and died.

"In a number of the *British Medical Journal*, Mr. Watkins tells us that having observed in 1854 the mortality under treatment by opium, at a time when the epidemic was increasing both in number of cases and severity, he treated twenty-one cases by repeated doses of castor-

oil, and nineteen recovered. His colleague treated seven cases by full doses of opium, and every one died."

Dr. J. C. Hutchison, Professor of Surgery in the Long Island College Hospital, Brooklyn, and President of the New York State Medical Society, remarked at a meeting of the New York Academy of Medicine, in March, 1866, that he had seen the two epidemics of 1849 and 1854—the first in the Mississippi Valley, the latter in New York. His most valued experience has been that cholera patients should be disturbed as little as possible. He had seen a number of instances in which the patients left to themselves went through the collapse, and reacted without any treatment, while, in a number of other cases, the same result followed with no treatment but ice and beef-tea.

For the purpose of arresting the vomiting, he had found no treatment more successful than an emetic of mustard or common salt. Repeatedly he had noticed the patients, after the administration of these articles, to eject large quantities of undigested food, which had often remained in the stomach for twenty-four

hours, and then the vomiting would subside. The treatment, it is true, does not succeed in every case, but still in a sufficiently large number to warrant its use, and he considered it better, from his experience, than opium, chloric ether, creosote, etc. After the emetic he generally gave small doses of calomel every two or three hours, when frequently bilious stools would appear and the patients recover.

For cramps, *forced extension* he considered the best remedy. He had resorted to anæsthesia and the hot air-bath, but without much success.

He noticed that the patients who vomited and purged most freely generally did the best, unless the discharges were involuntary. This led him to believe that the vomiting and purging was, to a certain extent, an effort to rid the system of the morbid matter.

Opium he considered harmful. In five cases he had resorted to transfusion, or rather infusion of a saline solution into the veins. The effects were striking as far as the temporary revival of the patients from collapse was concerned; but ultimately they all died.

Dr. G. T. Collins, a prominent physician in St. Louis during the prevalence of cholera there in 1849 and subsequently, advocates the following treatment in the different stages of cholera.

When the diarrhea is caused by indigestible food, and the evacuations are not particularly thin, or frequent, and without vomiting, a dose of castor-oil will be sufficient, in most cases, to carry off the indigestible matter and restore the bowels to a natural condition.

If the looseness of the bowels continues, the following may be used:—

Take of Powdered rhubarb and carbonate of magnesia, each	20 grains.
Compound tincture rhubarb	1 dram.
Peppermint water	1 ounce.

Mix—To be taken at one draught.

For a still continued looseness of the bowels, denoting considerable intestinal irritation, the same dose may be repeated, with the addition of 20 drops of laudanum.

If the diarrhea does not abate under the treatment already advised, more positive remedies should be resorted to without delay.

In a choleraic atmosphere, where a general disposition to looseness of the bowels prevails,

and ordinary remedies for the diarrhea appear to be almost powerless, I have found the greatest benefit from the use of an astringent powder, modified to meet the conditions of the case. I have used it in all stages of the intestinal disease, from simple looseness of the bowels to the most profuse and frequent discharges, if unattended by spasms, with the most gratifying results. When decided symptoms of cholera have set in, its use should be discontinued.

The following is an excellent form for general use, and is applicable to diarrhea in every stage:—

Take of Catechu and kino, each..... 1 dram.
Pulverize thoroughly, and add
Tannic acid..... 20 grains.
Powdered opium..... 5 grains.
Rub together very carefully, and divide into ten powders.

The efficiency of this prescription depends materially on the thorough trituration and mixture of the ingredients.

If for a simple diarrhea, one-half of one powder may be taken in a little syrup. If the diarrhea continues, repeat the same quantity after each evacuation, or increase the dose.

Having completely checked the looseness of

the bowels, after the lapse of a few hours, or on going to bed, take as follows:—

Take of Blue pill..... 10 grains.
Opium..... 1 grain.
Mix, and divide into two pills.

If the diarrhea is peculiarly stubborn, and especially if the patient is addicted to the free use of alcoholic stimulants, it will be found necessary to take the entire astringent powder at one dose, repeating it after each stool.

If the rice-water discharges have commenced, this is a sure indication of malignant cholera. The disease has commenced its attack, and mild measures will no longer prevail. Give immediately the following:—

Take of Calomel..... 10 grains.
Nitrate of Potash..... 10 grains.
One powder.

To be repeated every half hour, till the evacuations are of a decidedly bilious character. The nitrate of potash will keep up a flow of the urine, or, if already arrested, which is most probable at this stage of the disease, will restore it.

Calomel is one of the most reliable remedies we have in the collapsed stage of the cholera.

Its good effects, however, are in a great degree lost, if administered while profuse evacuations from the bowels and ejections from the stomach are going on. The remedial agent is expelled before it can produce its characteristic action upon the functions. This was the result of my experience in the first cases I treated with calomel. Where the discharges were moderate, and the calomel was retained, the effect was most decidedly beneficial. Where the vomiting is excessive, chloroform has been found invaluable, relieving the spasms and allaying the irritability of the stomach. It should be administered as follows:—

Take of Chloroform..... 1 dram.
Oil of turpentine..... 1 ounce.
Water..... 3 drams.
Mix.

Give a teaspoonful of this mixture in a little weak brandy and water; spearmint water may be drank to relieve the thirst. In half an hour the dose may be repeated, followed shortly after by the calomel powder. The chloroform mixture will arrest the excessive drainage, enable the stomach to retain the remedy until its desired alterative effects are produced on the

organs, and the secretions again flow in their natural channels. Then we are delighted with the almost simultaneous development of the re-animated functions. A change is seen in the entire system. The pulse beats, warmth returns to the extremities, the features expand, the hue of death passes into the flush of life, and we know that the grim tyrant has released his hold on the victim.

This distressing symptom is seldom absent long after the commencement of the diarrhea. It may frequently be alleviated by draughts of spearmint tea, or spirits of camphor in a small quantity of water.

If the sickness of the stomach and vomiting is an early symptom, and it is clearly evident that it arises from eating improper food, or in consequence of overloading the stomach with that which of itself might, in moderate quantities, be harmless, and if it is clear that the food has not passed from the stomach into the intestines, this is the time for an emetic. The organs of digestion are thus relieved, and the predisposition to disease at once subdued. For this purpose use:—

Pulv. Ipecacuanha.....20 grains.
Calomel..... 5 grains.

Let this be taken in about half a wine-glass of water. If it be taken in a large quantity of water, vomiting will commence too rapidly, and the contents of the upper portion of the stomach only will be emptied. For the same reason, draughts of tea or warm water should not be taken until retching comes on. It may then be drank moderately to promote the vomiting. The calomel is used as a cathartic, and will serve to carry off any portion of the undigested food that may have passed into the intestines.

The patient should be restricted to broth or gruel till the symptoms have been absent for a day or two.

Do not be in haste to resume the use of solid food.

In advising the use of an emetic, I desire to be distinctly understood as to the time when it should be employed. If it is not taken before the contents of the stomach have been ejected, or have passed into the bowels, it should not be taken at all. Except for the purpose of evacuating the stomach of its un-

wholesome contents, no benefit can arise from it, and at a later period it will be almost sure to do harm. The very few exceptions to this restriction can only be known and acted on by the advice of a thoroughly competent physician.

If the discharges from the bowels are now only moderate, and are not characterized by the thin rice-water appearance, use this mixture:—

Take of Carbonate of soda..... 1 dram.
Oil of sassafras..... 5 drops.
Laudanum .....60 drops.
Water..... 6 ounces.
Mix.

Take one table-spoonful every half hour or hour, till distress, sickness of the stomach, and inclination to vomit are entirely subdued.

If the attack of diarrhea and vomiting commence abruptly and at the same time, or very nearly so, and if the evacuations resemble or approach in appearance rice-water, it is a dangerous case. The disease has been working insidiously and stealthily into the system, but has not been made apparent by any unusual disturbance of the functions till this sudden

outbreak. The tongue will probably be clean, and the only indication of the terrible malady will be the unusual commotion in the stomach and bowels. If the pulse be full and strong, take one dose of the chloroform mixture. Should it be thrown from the stomach, repeat the dose in a few minutes, with a very little weak brandy and water, or mint tea, and, without delay, administer as follows:—

Take of Calomel.....20 grains.
Powdered opium..... 1 grain.
Mix, and divide into two powders.

One to be taken immediately, and repeat it in one hour. Drink of brandy and water, or spearmint tea. Green mint is best, if it can be had.

After the alarming symptoms have subsided, use the soda mixture, one table-spoonful every hour, or half hour, as the case may require. If there is retention of the urine, give calomel as before directed. A mustard plaster, large enough to cover the region of the stomach and liver, should be applied. As the disease subsides, the evacuations will become very dark. Convalescence will be slow, and extreme cau-

tion must be exercised in regard to diet. Remember, no solid food must be taken into the stomach until several days have elapsed after recovery is supposed to be complete, and then it must be partaken of in great moderation.

Mr. Branon, aged fifty-eight, a tall, muscular and powerful man, journeying westward in August, 1850, with his wife and two daughters, while stopping temporarily at the Monroe House, St. Louis, was suddenly attacked with violent purging, vomiting, and spasms. When I saw him, his pulse was small and quick, discharges like rice-water, extremities cold. I directed the chloroform mixture, followed, in half an hour, by calomel 10 grains and pulverized opium 1 grain—repeated twice. Mustard plasters were applied to the stomach and extremities. Bowels opened with bilious evacuations. Recovered rapidly, and on the fourth day expressed himself as well as ever in his life. The next day he was to have taken passage with his family on a boat bound for St. Paul. Up to this time, he had been restricted, in his food, to broth, gruel, or soup. No longer feeling the necessity for such restraint, he par-

took of a little mutton with bread, butter, apple-sauce, though very sparingly. This was at about 2 o'clock, P. M. At half-past four he was in a state of relapse, and died during the night.

Such instances were not uncommon, and must serve to impress the patient with the great necessity for particular prudence in regard to partaking of solid food for a considerable period of time after convalescence.

It happens occasionally, during the cholera period, that patients complain of *distress at the stomach*, probably with headache and impaired appetite, but no diarrhea. The tongue will be coated. This will be the first symptom, and should not be neglected. Ten grains of calomel, or a dose of castor-oil, with a blister over the stomach, will usually be sufficient in such cases.

Spasms may occur at any stage of the disease. Sometimes, though rarely, they present the first indications of the malady. Spasms, however, usually occur in combination with the other symptoms. Stimulating embrocations and friction to the parts affected are the

means generally resorted to for relief. I have found ice applied to the part affected productive of beneficial results. Ice is admissible in any stage of the disease. The chloroform mixture should be resorted to.

Delirium rarely occurs. Occasionally, however, there is an obstinate determination of blood to the head, with inflammation of the brain. The case requires immediate attention. Call in the aid of a physician without delay; in the mean time applications of ice should be made to the head, and I have known ice, broken fine and rolled up in a cloth, placed along the spine, to afford prompt relief.

If the symptoms of congestion are not relieved at once, the patient passes through the different stages of purging, vomiting, collapse, delirium and death.

When we see the cold, shriveled skin of the cholera patient covered with beads of clammy sweat, our first and natural impulse is to apply heat, in every possible shape, externally. Experience, however, has shown that many of these applications are useless—indeed, they are worse than useless, for they only serve to tor-

ture the already suffering patient, who is unusually sensitive to the pain occasioned by heat, although the effect even of boiling water is not apparent to the observation. Dry friction is almost entirely useless, except when directly applied to the muscles contracted with spasms. In this way great relief may be obtained.

The very best application for a cold surface and cold perspiration I found to be as follows:—

Take of Lard..... 1 pound.
℞ Red pepper..... 2 ounces.
Mix.

Simmer well together, and apply quite hot, with a piece of flannel, to the entire surface, rubbing briskly until warmth is restored to the body.

The above preparation, kept warm and faithfully applied, will do more towards restoring a natural glow to the body and checking the cold perspiration, than any external stimulant of which I have any knowledge.

Olive oil, saturated with camphor and red pepper, may be used with great advantage. Cajeput oil is also highly recommended. I

have never tried the latter, but believe it would be beneficial.

Stimulating ointments were used quite extensively in the hospitals and in private practice during the two visitations of cholera with which we have been afflicted. These are of various kinds — mercurial, turpentine, savin, etc. Their use would no doubt prove salutary; but I am confident that the simple preparation of lard and pepper, as advised, will answer as good, if not a better purpose, in all cases.

Recovery will always be slow, and its progress must be carefully watched. It will be constantly necessary to act with reference to any possible local disturbance of the system that may occur, particularly as to the development of inflammatory symptoms. The brain, the liver, the bowels, the stomach, are, each and all, liable to be attacked. The symptoms very much resemble those of typhus fever. Very little need be done through the agency of internal remedies while the febrile symptoms are mild and no particular organ is involved. If, however, there is high fever, the pulse becomes

full and hard, the skin dry and hot, the tongue dry and coated, the face flushed, in the absence of a physician, procure the following:—

Take of Tartar-emetic..... 2 grains.
Spearmint water..... 4 drams.
Water..... 1½ ounces.
Mix.

Take two tea-spoonfuls every hour, till the alarming symptoms abate. In all cases where, during convalescence, there are indications of inflammation of the brain, liver or other organs, administer the tartar-emetic as directed. Be very careful in having the prescription put up, and be very precise as to the exact quantity and the stated interval of time directed.

Ice is a useful application to the head in cases of inflammation of the brain, and where the liver or stomach becomes the seat of the disease, apply mustard plaster over the affected part. The patient must be restricted to a very rigid diet, and, on the abatement of the more aggravated symptoms, must observe the most temperate and regular habits. Thus, by careful nursing and watching, the convalescence of the patient may be conducted to a favorable termination.

Dr. Nelson, whose large and ample experience entitles his views to respect, allows his patients to drink moderately of cold water during the earlier stage of vomiting and purging, and when the vomiting has nearly subsided, though the irritability and tendency to retching remains, gives a grain of opium or less, and keeps the patient as quiet as possible. If this is thrown up, he gives a second dose of the same amount. He has seldom found it necessary to repeat the dose more than once. Within half or three-fourths of an hour he feeds the patient with a spoonful of water or tartaric acid lemonade, and, if this does not disturb the stomach, repeats it in a few minutes, gradually increasing the quantity as the patient can bear it. After an hour or so, a cup of good broth or beef-tea may be given, and, in due time, other appropriate nutriment. Perfect quiet and a horizontal posture must be maintained. The diarrhea being checked for twelve hours or more, he regards it as proper to move the bowels gently by a small dose of castor-oil, or compound tincture of rhubarb, but all irritating cathartics, like aloes, jalap, salts, magnesia,

or senna, should be carefully avoided. To aid in repairing the waste of the system, he then recommends the use of nourishing food, selecting that which is easy of digestion, but avoiding slops, and he would give also an occasional glass of pure Madeira, Teneriffe, or Port wine, or a rum or whisky punch, not too strong. His rule is to watch the patient carefully, not to interfere except to aid nature in her efforts to rid the system of the morbid poison, and to endeavor to sustain the patient in the period of exhaustion. He has very little faith in mustard poultices, blisters, pepper ointments, or w ıshes, or other means of irritating the skin, though advising the use of blankets, etc., when they are agreeable to the patient.

Dr. Burrall says, after recounting the various modes of treatment proposed, very modestly: "Without venturing any positive opinion upon a subject which is still involved in so much obscurity, it would seem that, judging the disease by its origin in the midst of highly malarious influences, and in the presence of animal filth, by its tendency to produce putrid alterations in the blood, its spasmodic character, and

its disposition to fall upon the nervous system, a medicine containing quinine, in combination with an astringent and antiseptic, like sulphuric acid, an antispasmodic like chloroform, an anti-irritant like opium, which also possesses other valuable properties, and some diffusible stimulant, would fulfill the prominent indications for treatment in the early stages of the disease. With the approach of collapse, opium should be discontinued. Abstinence from food is also indicated in the commencement of the diarrhea, and simple unirritating nutriment as the disease progresses

Ice taken internally tends to relieve thirst, and modifies the irregular distribution of heat. Cold drinks are more eagerly sought for by cholera patients than warm, and are recommended by good authority, especially in collapse. Judging from analogy, the coverings for the body should be light or warm in the algid stage, as the sensations of the patient may dictate.

Applications of dry cold along the spine have been apparently found so useful as to be worthy of a trial. The assertion that the cir-

culation in the sympathetic ganglia cannot be affected by ice applied along the back is denied; perhaps the effects of this remedy are due in some degree to the influence which impressions made on cutaneous nerves produce upon internal organs.

As Dr. Worms recommends sulphuric acid so warmly, and as emetics have sometimes been found so useful in rousing the system from collapse, this medicine, which acts as an emetic (antispasmodic) in the algid stage, and is also tonic and antiseptic, seems to offer some hope of usefulness.

Dr. W. W. Hall, editor of the *Journal of Health*, gives the following advice in the number of his periodical for January, 1866 :—

"The term 'looseness,' as applied to Asiatic cholera, as a premonitory symptom, is simply this: if in cholera times a man passes from his bowels, even but a single time, a dirty lightish colored fluid, of consistence and appearance, a few feet distant, of a mixture of half and half milk and water, that is a premonition of cholera begun, and he will be dead in perhaps twenty-four hours at farthest; and as the pas-

sages become less frequent and of a darker or thicker, or greener and thicker nature, there is hope of life. It does not require two such passages to make a looseness; one such is a looseness, and a very dangerous one. Nor does it require a gallon in quantity; a single tablespoonful, if it weakens, is the alarm-bell of death, in cholera times. An unusual costiveness is a dangerous thing, and demands medical advice."

Of the "uneasiness" attending the looseness of the bowels, he says:—

"Speaking, then, of that sensation of uneasiness, without acute pain, in the region named ('the belly'), it comes on more decidedly after an evacuation of the bowels. In health, this act is followed by a sense of relief or comfortableness; but when the cholera influence is in the atmosphere, even a regular passage is followed by something of this sort, but more and more decided after each action over one in twenty-four hours. The feeling is not all; there is a sense of tiredness or weariness which inclines you to take a seat; to sit down and may be to bend over a little, or to curl up on a

bed. This sensation is coming cholera, and, if heeded when first noticed, would save annually thousands."

In regard to treatment he is very explicit:—

"Cholera being a disease in which the bowels move too much, the object should be to lessen that motion; and as every step a man takes increases intestinal motion, *the very first thing to be done in a case of cholera is to seek* QUIETUDE. It requires but a small amount of intelligence to put these ideas together, and, if they could only be burnt in on every heart, this fearful scourge would be robbed of myriads of its victims. There can be no cure of cholera without quietude—the quietude of lying on the back. Perfect quietude on the back is *the first*, the IMPERATIVE, the ESSENTIAL step towards the cure of any case of cholera.

"The second step to the making of this quietude more perfect is, the binding a cloth around the belly pretty firmly. This acts beneficially in diminishing the room within the abdomen for motion. This bandage should be about a foot broad, and long enough to be doubled over the belly; pieces of tape should be sewed to

one end of the flannel, and a corresponding number to another part, being safer and more effective fastenings than pins. If this cloth is of stout woolen flannel, it has two additional advantages—its roughness irritates the skin and draws the blood to the surface from the interior, and by its warmth retains that blood there; thus preventing that cold, clammy condition of the skin which takes place in the last stages of cholera.

"The *first* step, then, to be taken where cholera prevails, and its symptoms are present, is to lie down on a bed.

"Bind the abdomen tightly with woolen flannel.

"Swallow pellets of ice to the fullest extent practicable.

"Send for an established, resident, regular physician. Touch not an atom of the thousand things proposed by brains as 'simple' as the remedies are represented to be, but wait quietly and patiently until the arrival of your medical attendant.

"But many of my readers may be in a condition, by distance or otherwise, where it is not

possible to obtain a physician for several hours, and where such a delay might prove fatal. Under such circumstances, obtain ten grains of calomel and make it into a pill with a few drops of gum water; dry it a little by the fire or in the sun and swallow it down. If the passages do not cease within two hours, then swallow two more of such pills, and continue to swallow two more at the end of each two hours until the bowels cease to give their light-colored passages, or until the physician arrives."

"In many bad cases of cholera the stomach will retain nothing fluid or solid, cold water itself being instantly returned. A calomel pill is almost as heavy as a bullet; it sinks instantly to the bottom of the stomach, and no power of vomiting can return it."

This is certainly heroic treatment, and it may be questionable whether so powerful an agent, and one capable of doing so much mischief, should be intrusted to unskilled hands to administer. For the effect of these large doses of calomel in cholera, see Inspector-General Maclean's views, in CHAPTER V.

The mode of treatment adopted by the Mis-

sionaries at Constantinople, in the late epidemic there, as well as in the previous cases of 1848 and 1855, has been widely published, but, as it is in many respects better than any other popular prescription hitherto made, we deem it best to introduce it here. It was communicated by Rev. Dr. Hamlin, one of the Missionaries, to the *Christian Mirror*, published at Portland.

"DEAR SIR:—The cholera, which has just left us, after committing fearful ravages, is making its way into Europe, and will probably cross the Atlantic before another summer has passed.

"Having been providentially compelled to have a good degree of practical acquaintance with it, and to see it in all its forms and stages during each of its invasions of Constantinople, I wish to make to my friends in Maine some suggestions which may relieve anxiety, or be of practical use.

"I. On the approach of the cholera, every family should be prepared to treat it without waiting for a physician. It does its work so expeditiously, that, while you are waiting for the doctor, it is done.

"II. If you prepare for it, it will not come. I think there is no disease which may be avoided with so much certainty as the cholera. But providential circumstances, or the thoughtless indiscretions of some member of a household, may invite the attack, and the challenge will never be refused. It will probably be made in the night, your physician has been called in another direction, and you must treat the case yourself or it will be fatal.

CAUSES AND SYMPTOMS.

"III. *Causes of attack.*—I have personally investigated at least a hundred cases, and not less than three-fourths could be traced directly to improper diet or to intoxicating drinks, or to both united. Of the remainder, suppressed perspiration would comprise a large number. A strong, healthy, temperate laboring man had a severe attack of cholera, and after the danger had passed I was curious to ascertain the cause. He had been cautious and prudent in his diet. He used nothing intoxicating. His residence was in a good locality. But, after some hours of hard labor and very profuse perspiration, he

had lain down to take his customary nap right against an open window through which *a very refreshing breeze was blowing.* Another cause is drinking largely of cold water when hot and thirsty. Great fatigue, great anxiety, fright, fear, all figure among inciting causes. If one can avoid all these, he is as safe from the cholera as from being swept away by a comet.

"IV. *Symptoms of an attack.*—While cholera is prevalent in a place, almost every one experiences more or less disturbance of digestion. It is doubtless in part imaginary. Every one notices the slightest variation of feeling, and this gives an importance to mere trifles. There is often a slight nausea, or transient pains or rumbling sounds when *no attack follows.* No one is entirely free from these. But when diarrhea commences, though painless, and slight, it is in reality the skirmishing party of the advancing column. It will have at first no single characteristic of Asiatic cholera. But do not be deceived. It is *the cholera* nevertheless. Wait a little, give it time to get hold, say to yourself: 'I feel perfectly well, it will soon pass off;' and in a short time you will

repent your folly in vain. I have seen many a one commit suicide in this way.

"Sometimes, though rarely, the attack commences with vomiting. But whatever way it commences, it is sure to *hold on.* In a very few hours the patient may sink into the collapse. The hands and feet become cold and purplish; the countenance, at first nervous and anxious, becomes gloomy and apathetic, although a mental restlessness and raging thirst torment the sufferer while the powers of a life are ebbing. The intellect remains clear, but all the social and moral feelings seem wonderfully to collapse with the physical powers. The patient knows he is to die, but cares not a snap about it.

"In some cases, though rarely, the diarrhea continues for a day or two, and the foolish person keeps about, then suddenly sinks, sends for a physician, and, before he arrives, 'dies as the fool dieth.'

COURSE OF TREATMENT.

"I. *For stopping the incipient diarrhea.*— The mixture which I used in 1848 with great

success, and again in 1855, has, during this epidemic, been used by thousands, and although the attacks have been more sudden and violent, it has fully established its reputation for efficiency and perfect safety. It consists of equal parts, by measure, of laudanum, spirits of camphor, and tincture of rhubarb. Thirty drops for an adult, on a lump of sugar, will often check the diarrhea. But, to prevent its return, care should be always taken to continue the medicine every four hours in diminishing doses—twenty-five, twenty, fifteen, ten, nine, when careful diet is all that will be needed.

"In case the first dose does not stay the diarrhea, continue to give in increased doses—thirty-five, forty-five, sixty—at every movement of the bowels. Large doses will produce no injury while the diarrhea lasts. When that is checked, then is the time for caution. I have never seen a case of diarrhea, taken in season, which was not thus controlled; but some cases of advanced diarrhea, and especially of relapse, paid no heed to it whatever. As soon as this becomes apparent, I have always resorted to

this course: Prepare a teacup of starch, boiled as for use in starching linen, and stir into it a full tea-spoonful of laudanum for an injection. Give one third at each movement of the bowels. In one desperate case, abandoned as hopeless by a physician, I could not stop the diarrhea until the seventh injection, which contained nearly a tea-spoonful of laudanum. The patient recovered, and is in perfect health. At the same time I used prepared chalk in ten-grain doses, with a few drops of laudanum and camphor to each. But whatever course is pursued, it must be followed up, and the diarrhea controlled, or the patient is lost.

"II. *Mustard poultices.*—These should be applied to the pit of the stomach, and kept on till the surface is well reddened.

"III. The patient, however well he may feel, should rigidly observe perfect rest. To lie quietly on the back is one-half the battle. In that position the enemy fires over you, but the moment you rise you are hit.

"When the attack comes in the form of diarrhea, these directions will enable every one to meet it successfully.

"IV. But when the attack is more violent, and there is vomiting, or vomiting and purging, perhaps also cramps and colic pains, the following mixture is far more effective, and should always be resorted to. The missionaries—Messrs. Long, Trowbridge and Washburn—have used it in very many cases and with wonderful success. It consists of equal parts of laudanum, tincture of capsicum, tincture of ginger, and tincture of cardamom seeds. Dose, thirty to forty drops, or half a tea-spoonful in a little water, and to be increased according to the urgency of the case. In case the first dose should be ejected, the second, which should stand ready, should be given immediately after the spasm of vomiting has ceased. During this late cholera siege no one of us failed of controlling the vomiting and also the purging by, at most, the third dose. We have, however, invariably made use of large mustard poultices of strong pure mustard, applied to the stomach, bowels, calves of the legs, feet, etc., as the case seemed to require.

TREATMENT OF COLLAPSE.

"*Collapse.*—This is simply a more advanced stage of the disease. It indicates a gradual failing of all the powers of life. It is difficult to say when a case has become hopeless. At a certain point the body of the patient begins to emit a peculiar odor, which I call the *death odor*, for, when that has become decided and unmistakable, I have never known the patient to recover. I have repeatedly worked upon such cases for hours with no permanent result. But the blue color, the cold extremities, the deeply sunken eye, the vanishing pulse, are no sign that the case is hopeless. Scores of such cases in the recent epidemic have recovered. In addition to the second mixture, *brandy* (a table-spoonful every half hour), bottles of hot water surrounding the patient, especially the extremities, mustard plasters, and friction, will often in an hour or two work wonders.

"*Thirst.*—In these, and in all advanced cases, thirst creates intense suffering. The sufferer craves water, and as sure as he gratifies the

craving the worst symptoms return, and he falls a victim to the transient gratification. The only safe way is to have a faithful friend or attendant who will not heed his entreaties. The suffering may be, however, safely alleviated and rendered endurable. Frequently gargling the throat and washing out the mouth will bring some relief. A spoonful of gum arabic water, or of camomile tea, may frequently be given to wet the throat. 'Sydenham's White Decoction' may also be given, both as a beverage and nourishment, in small quantities, frequently. In a day or two the suffering from thirst will cease. In a large majority of cases it has not been intense for more than twenty-four hours.

"*Diet.*—Rice-water, arrow-root, Sydenham's White Decoction, crust water, camomile tea, are the best articles for a day or two after the attack is controlled. Camomile is very valuable in restoring the tone of the stomach.

The typhoid fever.—A typhoid state for a few days will follow all severe cases. There is nothing alarming in this. It has very rarely proved fatal. Patience and careful nursing

will bring it all right. The greatest danger is from drinking too freely. When the patient seems to be sinking, a little brandy and water, or arrow-root and brandy, has revived him. In this terrible visitation of the cholera, we have considered ourselves perfectly armed, and equipped, with a hand-bag containing mixture No. 1, mixture No. 2 (for vomiting, etc.), a few pounds of pounded mustard, a bottle of brandy, a paper of camomile flowers, and a paper of gum arabic.

"I lay no claim to originality in recommending this course of treatment. I have adopted it from suggestions of able and experienced physicians. Having been the only doctor of many poor families living near me, I have tried various remedies recommended by physicians, but I have found none to be at all compared with the above. During the recent cholera, I cannot find that any treatment has been so successful as this."

"An experienced physician" gives in the *Boston Commonwealth* the following directions for popular treatment of cholera. Though of the "expectant" rather than the heroic style

of practice, they are none the less valuable on that account :—

"Let me say that these curative directions may be relied on. I have seen, professionally, two or three hundred cases, and many more in hospitals. In my own practice I have not lost a single one.

"Summarily, remember always, that this disease is of the intestines solely, commencing with diarrhea until two or three evacuations occur per day, causing generally no pains, and so slight as to cause no alarm. This is *strictly*, and in itself, the disease; and, in distinction from ordinary diarrhea, *must be stopped;* and this cannot be done with too great promptness.

"Indeed, immediately that the epidemic influence manifests itself in a community, the inhabitants of which should adopt a stringent diet, avoid all purgatives and every purgative aliment, living principally on rice in its various modes of preparation, fresh meats (that is, not salted), roasted or boiled, or beef or mutton, boiled eggs, chicken broth or soup, very little salted, and warm drinks instead of cold ones.

Avoid as poisonous all acid fruits and vegetables. Even potatoes have been discharged undigested after a lapse of twenty hours, and that by a robust man, previously of good health. Every kind of fermented drink, as beer, ale, porter and cider, is also very bad. In no case, during the prevalence of the disease, should warm or fresh bread be used, and none less than a day old.

"Should one feel attacks, by the diarrhea or dysentery, the most perfect quiet *in bed* should be enjoined, with a light and nutritious diet, with warm drinks, with injections of laudanum, in one or two table-spoonfuls of warm water—a dose of laudanum being from a tea-spoonful to a table-spoonful, according to the force of the diarrhea. If, with this treatment, the *diarrhea is checked*, although the debility of the stomach continues, or, so to speak, the inclination to vomit, it is of no consequence; the same thing occurs in taking blood from a patient in the ordinary way. His nausea is of no importance, neither his faintness and prostration, provided the bleeding is stopped, because, as soon as this is effected, all these cease spontaneously.

So in this disease, suppressing the discharge from the blood-vessels of the intestinal canal by opiate and astringent injections, the patient is *saved.* At the same time he might take ten or twelve drops of saturated tincture of camphor, as a restorative and antispasmodic cordial, every hour, until it produces a copious perspiration. At the same time, he should be kept well covered in bed, with hot bricks or bottles of hot water to his feet.

"Mustard plasters on the bowels, when there is much pain, are of excellent effect.

"As soon as the patient feels himself relieved, he believes himself cured and able to go about his usual occupations, and is generally anxious to go out; this, however, is extremely hazardous; and, that the cure may be thorough and complete, he should be *kept in bed and wholly quiet for at least two or three days;* a relapse is fatal.

"It is necessary to inculcate the greatest cleanliness of person and habitation; quietude of mind; to avoid fruits and vegetables; not to use strong or fermented liquors, or to eat, except very lightly; thus an attack will be

avoided, and, when not so, it will be rendered less dangerous."

Dr. Freeman, one of the professors in the Eclectic School of Medicine in New York, thus details the treatment of cholera adopted by the physicians of that school in Cincinnati, during the epidemic of 1849, which raged there with great severity. They claim to have been successful in 95 per cent. of their private practice, and in 75½ per cent. of their hospital practice, under this method of treatment.

"There is, firstly and primarily, a partial suspension of the functions of the nervous system of organic life, from the action of the poison; and secondly, internal congestion, with coldness of the surface, great loss of the fluids of the body, and cramps of the muscles as a resultant. This is to be relieved by applying artificial heat and the use of diffusible stimulants—more or less powerful, according to the stage of the disease—which relieve by powerfully exciting the ganglionic nervous center, and through it the arterial circulation. The capillary congestion is relieved, the discharges cease, and all the parts gradually resume their normal

functions. The progress of the disease is so rapid that every family should have the means of relief at hand in the house, so as to apply them, and not wait for their physician, who may be detained elsewhere or not be found. The premonitory symptoms must not be neglected, but the person should immediately lie down, and maintain the recumbent posture until entirely relieved, so as not to make any demand on the nervous energies. Bottles of hot water and hot steaming-bricks should be placed at the feet and round the body, a strong mustard plaster over the epigastrium, blankets thrown over him, hot mint or ginger teas given internally, and sweating should be promoted as promptly as possible.

"In addition give a pill of the following: R. Gum camphor, grains 10; gum kino, grains 10; geranin, grains 10; capsicum pulv., grains 2; mix. Make 10 pills, and take one every two or three hours. Or, neutralizing cordial (Ec. Disp.), ounces 1½; tincture of berries of xanthoxylum fraxineum, ounces 1½; mix. Take a tea-spoonful every one or two hours.

"In the active stages, when the rice-water dis-

charges have set in with powerful crampings, no time must be lost with inefficient measures. The patient should be immediately wrapped in a hot blanket, dipped in hot water and wrung nearly dry, and then enveloped with dry ones, and the most powerful cataplasm of pure mustard placed over the stomach and limbs. Administer every ten, fifteen, or twenty minutes a tea-spoonful of the tincture of the berries of xanthoxylum fraxineum, or 'Hunn's Life Drops' (R. Oils of anise, cajeput, cloves, and peppermint, each one ounce; rectified alcohol, 4 ounces); or of a mixture of the two preparations in equal parts. If the stomach cannot be made to retain them, give them diluted as an injection. Their action is powerful and immediate, and likened by the patient to 'the effect of an electric shock.' Vomiting may be generally relieved by giving every five or ten minutes a tea-spoonful of—R. Peppermint and spearmint water, each one ounce; paregoric, 2 drams; mix.

"In the worst stages of collapse, except in persons of very feeble vitality, or prostrated by some other disease, the vigorous and intelligent

application of the treatment above indicated is generally sufficient to rally and save the patient. Good nursing, and an occasional dose of the same remedy, if there be symptoms of relapse, will be sufficient in the convalescent stage.

"In the cholera season, fatigue, large draughts of cold water, and exposure to unusual conditions should be avoided. All the matter vomited or purged should be received into a vessel containing chloride of lime or wood charcoal pulverized, or a solution of sulphate of zinc, or caustic soda, etc., to destroy the poison, which, if it escapes into the atmosphere, assists materially in increasing the intensity and virulence of the epidemic. If it should be thrown on the floor or clothing, they should be carefully cleaned. No basin should be emptied in the open air, in the gutters of the streets, or on the ground, as is often done by the poorer classes in the crowded and filthy quarters of a city."

The Health Commissioners of New York, before they were superseded by the Metropolitan Board of Health, caused their Resident

Physician, Dr. Lewis A. Sayre, to prepare for publication a circular addressed to the people of the city, in view of the probable approach of cholera. It was as follows:—

"The undersigned, having been requested by the Commissioners of Health of the City of New York to publish such information as may be of use to the people at large in view of the anticipated approach of an epidemic of cholera, would most earnestly call the attention of the public to the following statement of facts, and beg their careful consideration of the suggestions advanced:—

"Whatever differences of opinion may exist in regard to the cause and mode of propagation of the cholera, all now agree in their observations in this acknowledged *fact*, that its greatest ravages and most fearful mortality is among the FILTHY, the *vicious* and the *destitute;* and, in fact, it is almost confined to the *imprudent*, the *intemperate*, and those who injure themselves by taking *improper medicines.*

"*Cleanliness*, therefore, is of the first importance—both of your person and of your houses—particularly your yards, sinks, privies

and cess-pools, where fresh chloride of lime should be daily sprinkled, and the adjoining walls and fences surrounding them repeatedly whitewashed.

"Be careful that there is no stagnant water either in your cellars or yards, and, if your basements are damp, use fire in them frequently, to burn up the foul air and cause a more perfect ventilation.

"Remove all garbage at least once a day, and twice if possible, and permit nothing to remain on the premises to undergo decomposition.

"Keep your houses well ventilated.

"Be temperate in all things, both in eating and drinking. Be temperate in exercise, in labor, both physical and mental. Keep good hours. Take proper food, in reasonable quantities, at proper times. Plainly cooked meats, with boiled rice, bread, and thoroughly cooked potatoes, should form the ordinary base of diet.

"Abstain from all unripe fruits, and stale or partially decayed vegetables. But, above all, avoid excess in intoxicating drinks of every kind.

"Wear flannel next the skin, and at all times maintain the natural temperature of the body by a sufficient amount of clothing. Avoid all exposure to sudden changes of temperature, and if accidentally exposed to a storm, remove your wet boots and clothes as soon as possible.

"The cholera is not the necessarily fatal disease which it is commonly believed to be, but is a disease that is both *preventable* and *curable*. It is always preceded by symptoms of languor and debility, with *diarrhea*, and in this stage is almost always curable; but if neglected at this period, and the diarrhea permitted to continue until collapse comes on, it is then almost always fatal.

"At the very commencement of the disease, *go to bed and stop there until you are well*, with warm flannels around your body, warm bricks or bottles of hot water to the feet, if necessary; and, if there is a tendency to vomit, apply a mustard plaster over the stomach. If you have not got a bed, *lie down* on the floor, and keep yourself warm, but by all means retain the horizontal position all the time—not even getting up to attend to evacuations, but use a bed-

pan or other convenience for that purpose. And immediately send for some qualified physician for advice. But, above all things, abstain from taking any of the advertised nostrums that will flood the city, and swallow no medicines unless prescribed by a competent physician.

"The Commissioners of Health are doing all in their power for the purification of the city and the protection of the people; but it must be evident to all that they can not do everything, and would therefore respectfully call upon their fellow-citizens to co-operate with them in every possible way in their power.

"Sources of filth and impurity may exist without the knowledge of the public authorities, and every citizen should feel the necessity of keeping a watchful supervision over his own premises; and, when individual efforts are inadequate for their removal, they should call upon the Board for aid and assistance.

"*Fear* and *despondency* are the great sources of danger in all epidemics, but more especially so in cholera than in any other.

"While, therefore, we would urge upon all

our citizens the use of every prudential and precautionary measure, let them preserve a calm and composed state of mind, a cheerful heart, and dispel all fear; and, by a confiding trust in an all-wise and merciful Providence, we can reasonably hope to escape this scourge if we implicitly obey His laws.

"LEWIS A. SAYRE, M. D.,
"*Resident Physician.*"

The Board of Health in turn published a circular, briefer but equally calculated to be of service to the community. It was the following:—

"TREATMENT OF CHOLERA.

"Cholera is almost invariably preceded by a painless diarrhea, and this is in all cases to be promptly treated. When diarrhea is present, go to bed, and maintain a position on the back. Use abundance of blankets, and send for a physician.

"A physician can always be obtained by applying to the nearest Police Station.

"Stay in bed until you are well. Do not consider yourself well until you have had a

movement from the bowels. Abstain from all drinks. Apply mustard plasters to the bowels.

"In the absence of a physician, an adult can take ten drops of laudanum and ten drops of spirits of camphor. A child of ten years may take five drops of laudanum and five of camphor. A child of five years may take three drops of laudanum and three of spirits of camphor, and these doses may be repeated every twenty minutes, so long as diarrhea, or pain, or vomiting continues. This will save time; *but in all cases send for a physician.*

"*Do not get up to pass the evacuations*, but use the bed-pan or other conveniences. *Never chill the surface of the body by getting out of bed.*

"Remove immediately all the evacuations from your rooms, scald all the utensils used, or disinfect them with chloride of lime; scald, also, your soiled clothing. By order of the Board of Health.

"EMMONS CLARK, *Secretary*."

We subjoin some farther statistics, carefully collected, of the results obtained from treatment by different remedies. We need not

repeat what we have already said concerning the sources of fallacy in all these tables of statistics; they cannot be relied on with certainty to show the advantages or disadvantages of any mode of treatment; yet, where collected as these were, with great care, they have an approximative value.

The first is from the French *Gazette des Hôpitaux*, of November 25, 1865, and refers to hospital cases in Paris during the prevalence of cholera there in the autumn of 1865.

The following carefully arranged table of twenty-five cases is interesting, as showing the results of treatment by purgatives. The diarrhea was treated with sulphate of soda in purgative doses. Ipecacuanha was used when there was a furred condition of the tongue. These were the principal medicines given.

From October 20 to November 1 there were *thirteen deaths* among fifteen cases; from November 1 to November 9, two deaths among ten cases. The latter were among children, and during the decline of the epidemic.

DATES.	PROFESSION AND AGE.	CONSTITUTION.	RECOVERY.	DEATHS.
Oct. 20.	Mason, 48 years.....	Debilitated.	.....	Oct. 21.
" 20.	Mason, 26 years.....	Good	.....	" 26.
" 21.	Mason, 53 years.....	Good.....	.....	" 22.
" 22.	Mayor of city, 66 years.	Good.....	.....	" 24.
" 23.	Miller, 36 years.....	Good.....	Nov. 5th..	.....
" 24.	Gardener, 36 years....	Feeble	.....	Oct. 29.
" 24.	Fruiterer, 49 years....	Good.....	.....	" 29.
" 25.	Laborer, 29 years.....	Good.....	.....	" 28.
" 25.	Fruiterer, 52 years....	Good.....	.....	" 28.
" 28.	No profession, 33 years.	Good.....	Nov. 2d...	.....
" 28.	Scieur de long, 47 years.	Good.....	.....	Oct. 31.
" 30.	Infant, 15 months.....	Good.....	.....	" 30.
" 30.	Infant, 2 years.....	Good.....	.....	Nov. 1.
" 31.	Gardener, 41 years....	Good.....	Nov. 11th.	.....
" 31.	Infant, 3 weeks.....	Good.....	.....	Nov. 1.
Nov. 1.	Infant, 9 months.....	Feeble	.....	" 2.
" 3.	Infant, 18 months.....	Feeble	.....	.....
" 3.	Joiner, 47 years	Good.....	Nov. 11th.	.....
" 3.	Scieur de long, 18 years.	Good.....	Nov. 11th.	.....
" 3.	Journalist, 30 years...	Fair	.....	.....
" 4.	Child, 8 years	Weak.....	.....	.....
" 4.	Child, 6 years	Weak.....	.....	.....
" 4.	Child, 2 years	Weak.....	.....	Nov. 8.
" 7.	Child, 12 years	Good.....	.....	.....
" 9.	65 years....	Worn out..	.....	Nov. 10.

The following table is taken from the "Report on the Results of the different Methods of Treatment pursued in Epidemic Cholera, in the Provinces throughout England and Scotland in 1854; being supplemental to the Metropolitan Report, addressed to the President of the General Board of Health. By the Treatment Committee of the Medical Council, 1855."

Table of the Total Number of Cases (3,727) *of Cholera treated in the Metropolitan Hospitals and Districts, and in the Provincial Districts throughout England and Scotland, showing the percentage of Mortality.*

	Collapse Cases.	Consecutive Fever.	Deaths.	Percent'ge of Deaths.	
				Total Cases.	Collapse Cases.
Of 2,142 *cases treated by alteratives,*					
637 took calomel, small doses	416	94	315	49.4	75.7
767 " " larger doses	590	160	353	46.0	59.8
472 " " with opium	295	140	169	35.8	57.2
80 " other preparations of mercury	59	17	42	52.5	71.1
186 " salines	140	40	94	50.5	67.1
Of 865 *cases treated by astringents,*					
488 took sulphuric acid	307	65	235	48.1	76.5
27 " other mineral acids	21	3	11	40.7	52.3
201 " chalk mixt. and chalk and opium	79	32	55	27.3	67.0
81 " acetate of lead and opium	65	26	50	61.7	76.9
36 " opium	15	14	11	30.5	73.3
13 " preparations of iron and alum	7	2	6	46.1	85.7
19 " gallic acid and other astringents	9	4	5	26.3	55.5
Of 548 *cases treated by stimulants,*					
114 took ammonia	90	18	70	61.4	77.7
154 " ether	73	22	65	42.2	89.0
138 " brandy	108	25	87	63.0	80.5
31 " chloroform	23	7	15	48.3	65.2
111 " other int'nal and ext'nal stim'nts	80	16	50	45.0	62.0
Of 172 *cases treated by eliminants,*					
150 took castor-oil	134	19	104	69.3	77.6
21 " emetics	21	1	17	80.9	80.9
1 " olive oil	....	....	....	....	....

We add a few of the recipes which have had the greatest popularity among the members of the medical profession.

RECIPES.

No. 1.—*In Diarrhea and Cholera.*

Take of Chloroform..... 2 drams.
Spts. Camphor, Laudanum, of each. 1½ Fl. drams.
Oil Cinnamon..... 7 drops.
Alcohol..... 3 Fl. drams.
Mix.
Dose, from five to thirty minims or more, as required.

No. 2.—*Russian Cholera Drops.*

℞. Ethereal Tinct. Valerian..... 2 drams.
Wine of Ipecac..... 1 dram.
Paregoric..... 20 drops.
Oil Peppermint..... 5 drops.
Mix.
Dose, twenty drops every hour.

No. 3.—*To Promote Reaction in Cholera and Diarrhea.*

℞. Oil of Anise, Oil of Cajeput, of each. 1½ Fl. drams.
Haller's Acid Elixir, Tinct. Cinnamon, of each..... 2 Fl. drams.
Mix.
Dose ten, fifteen, twenty drops, with fifteen or twenty drops of laudanum, at short intervals.

No. 4.—*A Modification of No.* 3.

℞. Oil of Anise, Oil of Cajeput, Oil of Juniper, of each..... ½ dram.
Sulphuric Ether..... ½ ounce.

Haller's acid Elixir..... ½ dram.
Cinnamon Water..... ½ ounce.
Mix.
S. Ten drops every quarter, half, or every hour.

No. 5.

℞. Chloroform..... 1 drachm.
Oil of Turpentine..... 1 ounce.
Distilled Water..... 3 drachms.*
Mix.
S. Dose a tea-spoonful.

No. 6.—*Diarrhea and Collapse.*

R. Muriate of Ammonia, Chlorate of Potassa, of each..... 1 dram.
Paregoric..... 1½ ounce.
Cinnamon Water..... 4½ ounces.
Mix.
S. A tea-spoonful to be given at short intervals until one is retained. Then the same quantity every two, three, or four hours.

No. 7.

R. Laudanum, Spts. Camphor, Spts. Turpentine, of each..... 3 drams.
Oil of Peppermint..... 30 drops.
Mix.

S. A tea-spoonful in brandy and water for diarrhea, a table-spoonful for cholera.

For an enema, add a tea-spoonful of laudanum to a table-spoonful of prepared starch.

No. 8.

Dr. Barrutt's treatment, founded on that adopted by M. Leclerc in 1854.

* Probably should be three ounces.

For Adults.

R. Ext. Belladonna, a quarter grain every half hour until color returns to the surface and pupils dilate. Then it should be given every second or fourth hour, until the urine appears, when it should be stopped entirely.

For Children.

R. Tinct. Belladonna (London Phar.)..... 1 dram.
(The tincture of the London Pharmacopœia is about half the strength of that of the U. S. Dispensatory.)
Water ..... 1 ounce.
Mix.

S. A dessert-spoonful every ten minutes, with the same restrictions. This medicine relieves choleraic diarrhea, but not an ordinary diarrhea. The pupils dilate, and in correspondence the skin becomes warm and dry, and this warmth may become excessive if pushed too far. With this treatment, in Mauritius, there were only ten deaths in fifty-eight cases treated in 1859, and during 1862 the mortality was small, only eighteen dying. As a drink, the white of egg, beaten up in a glass of cold water, allays this more than an effervescing draught. When cramps have been severe, Dr. Barraut has seen excellent effects from subcutaneous punctures with a lancet, moistened with a solution of tincture of atropine.

If it be true that there is a vascular spasm present in cholera, and that belladonna is efficacious in arresting the disease in its early stages, it may be accounted for by the relaxing influence of the drug upon organic muscular fiber through its effect upon the nervous system.

Philippine Islands Remedy.—At the first appearance of the symptoms, rub the whole body, especially the bowels, with a brush dipped in brandy. Give a cup of warm mint or imperial

tea, containing sixty drops of ether, and wrap the patient in a warm covering. If perspiration does not appear in four minutes, give another cup of tea containing eighty drops of ether, when it is said that perspiration is sure to follow. Occasionally a third cup is required, with 120 drops of ether. (It is a question whether this treatment would not be equally effectual without the frictions, external warmth being substituted.)

CHAPTER VII.

THE TREATMENT OF CHOLERA CONTINUED.

Common sense advice to the reader—All who can should send for a physician, if attacked with diarrhea—Advice for those who for good cause cannot do so—The best remedies and method of treatment pointed out—Best actually and relatively to their situation—The first stage—"Go to bed and keep there"—What to take—Prescription—Mustard poultices—Injections of starch and laudanum—A gentle laxative after the diarrhea is checked—Treatment of the violent stage of vomiting, purging, and cramps—Prescription—Dose—In *Collapse*, what is to be done—Very little absorption or secretion in this stage—Danger of large doses of opium or calomel in this stage—How to treat the reaction—The consecutive fever—This to be treated mostly by good and careful nursing—The larger proportion of the cases of cholera treated in this way recover—The theory of the treatment—Use of emetics of mustard, or salt and water—There must be some fatal cases of cholera, some which "commence with death"—The number comparatively small, and may be made smaller—Opinion of an English physician in regard to its necessary mortality—The fatal influence of fear—Views of several physicians—Dr. Brigham's remarks—Counsel to the reader.

HAVING thus given in detail the various modes of treatment advised by eminent practitioners, we come to the work of recommending that mode of treatment which our own experi-

ence and observation has satisfied us is most likely to prove successful, though we cannot too strongly reiterate the advice of Dr. Hall and others, that, if a competent physician is within reach, he should be sent for; that no one of the various preparations advertised as cholera medicines, whose preparation is secret, are worthy of being trusted, and that it is at the peril of the life of the patient, if they are used. We are nevertheless aware that there may be thousands of cases of persons into whose hands this book may fall, who, from distance or other causes, cannot procure a physician until it is too late, and for them it is right that we should give plain and simple directions which they cannot mistake.

This fact limits somewhat the range of medicines which we are at liberty to recommend, for a remedy may be good in itself and well adapted to arrest the progress of the disease, and yet it may be a drug whose administration cannot be safely trusted in inexperienced hands. We have therefore to decide, in the first place, what is the very best remedy for the cure of the different stages of the disease, and secondly

what is the best which can be with safety trusted to persons without medical knowledge to administer. Fortunately, in this case, the two conditions coincide.

In the premonitory step of diarrhea, the first thing to be done is to lie down and remain in a recumbent position. As Dr. Sayres has well said in his Circular: "Go to bed at once, and, if you have no bed, *lie down on the floor; and stay there. Do not get up on any account.*" If it is necessary to have an evacuation from the bowels, use a bed-pan, if you have or can get one; if not, use rags, towels—anything rather than get up. If the looseness or diarrhea continues, and produces languor or exhaustion, take a pill of half a grain of opium and a grain of camphor, and stick to the bed. If you are sick at the stomach and throw this up within fifteen or twenty minutes, take another. *Don't talk and don't be frightened;* keep perfectly quiet and in bed, and in all probability you will feel well within twelve hours. Then, if costive, take two tea-spoonsful or three of aromatic syrup of rhubarb, kept by all good druggists. Perhaps a better remedy still is the

following, which should be kept in the house as a remedy for diarrhea. Any ordinarily skillful druggist can put it up:

Take of Laudanum, two drams,
Spirits camphor, two drams,
Aromatic syrup of rhubarb, four drams.
Mix.

The dose of this for an adult is a tea-spoonful, or, as tea-spoons are of varying size, sixty drops, to be taken in a little sweetened water. If the first dose does not check the diarrhea and alter the character of the discharges, give the same dose at the end of two hours, and if necessary to check the looseness, a third dose of say seventy-five drops at the end of two or three hours more. It will rarely be the case, however, that a third dose is necessary. It may be well, if the first or second dose checks the discharge, to give, at the end of four hours, thirty drops to prevent a recurrence of the attack. It is well, in connection with this, to apply a mustard poultice to the pit of the stomach, and keep it there till the skin is well reddened.

If the *painless diarrhea* has not excited the attention of the patient until it has become

copious, and is accompanied with *slight chills* and *thirst*, and a feeling of great weariness and languor, use the remedies above named in a little larger doses, and throw up injections of starch, boiled as for starching linen, and add one hundred drops of laudanum to the tea-cupful. Use one third of the tea-cupful for each injection, and follow this up until the diarrhea is checked. Within twelve hours after it is checked, it will be well to administer a table-spoonful of good castor-oil, or, better, the same quantity of aromatic syrup of rhubarb, to move the bowels gently, and carry off any morbid matter which may be retained in them.

The thirst, which even at this stage is very severe, will be best allayed by giving to the patient small bits of ice, not larger than a chestnut or hickory nut, to suck; or, if these cannot be had, a little lemonade made of tartaric acid instead of lemons; or, if the stomach will tolerate it, after the medicine has been long enough down, give a tea-spoonful of cold water at a time, increasing it gradually to a table-spoonful, and follow with beef tea or oatmeal gruel.

If the attack is still more violent and accompanied with *vomiting*, *purging*, and *cramps* of the limbs, the following remedy will be found more efficacious than any other.

Take of Chloroform (pure)..... 2 drams.
Spts. of camphor and laudanum,
of each..... 1½ Fl. drams.
Tinct. of ginger and tinct. of cardamom seeds, of each..... 3 Fl. drams
Mix.

Of this from twenty to forty drops may be given in a little water, and, if the first and second dose are rejected, give a third. This will allay spasm, and check the vomiting more promptly than any other remedy. For the cramps, which are often very distressing, friction with the warm hand, patiently kept up, and occasionally a little spirits of camphor rubbed into the calves of the legs, will ordinarily be sufficient. If this does not control it, mustard poultices to the calves of the legs and over the stomach will seldom fail.

Should the patient unfortunately have passed into the stage of *collapse* before any medication is attempted, the cure is not to be regarded as hopeless. There is in this stage but very little absorption of the medicines administered until

reaction comes on, and therefore it is unwise to give very much medicine internally, to remain inert during this condition and act with a fearful violence when the reaction takes place, if it ever does. To do this is not to benefit the patient, for before reaction there is little or no effect from the medicines, and after it, the patient who has escaped death from the collapse is almost sure to meet it from the typhoid fever which follows in these overdosed cases. The bits of ice should still be fed to the patient, bottles of hot water kept around him, the frictions of the limbs maintained to relieve the cramps, and iced beef tea or mutton broth fed to him to repair the waste of the system. Wine whey, mild cordials, and Huxham's Tincture of Peruvian Bark, in doses of a tea-spoonful in a little sweetened water every half-hour, will prove of advantage in this stage. When symptoms of reaction appear, discontinue the Huxham's Tincture, give camomile tea freely, and continue the beef tea, arrow-root, and mutton broth, a little boiled mutton being added, and an occasional glass or part of a glass of old Madeira or Teneriffe wine. At the end of

twenty-four, or at the farthest thirty-six hours after reaction has taken place, give a table-spoonful of castor-oil or syrup of rhubarb, to remove from the bowels any morbid matter which may remain there, and there will usually be no typhoid fever follow. The administration of large doses of opium or of calomel, early in the disease, is one of the most common causes of this too often fatal reaction. If it does occur, and there is giddiness, pain in the head and stupor, apply mustard poultices to the back of the neck and the pit of the stomach, keep the head cool by applying cloths wet with cold water, give bits of ice sparingly, and nourishing food, wine whey, &c., as the patient can bear it. Sometimes blisters are required to the calves of the legs, and behind the ears. The rhubarb is the best laxative where one is needful, and good nursing is better than active medication. These cases, however, so generally come under a physician's care, that there is very little need of directing domestic treatment.

By following the course we have indicated, a course which any intelligent person can fol-

low easily and well, the greater part of the cases of cholera will recover. Its policy, as any man of ordinary sense can see, is to help nature to rid itself of the disease, not by giving another poison to counteract the effect of that which is now sapping the foundation of life, but by aiding her efforts to throw off the poison, moderating them when excessive, and stimulating them when they begin to flag. If there is anything else which may be safely recommended in the early stage, it is the administration, in the very first onset of the diarrhea, of a table-spoonful of unground mustard, or a tea-spoonful of salt in a half tumbler of water, to produce a prompt and healthy emetic effect. By means of this, the morbid matter, if in the stomach, will often be thrown off, and the subsequent tendency to painful vomiting prevented.

There are cases of cholera, however, which no medication, be it ever so skillful, can control, or prevent from passing rapidly on to death. In some of these, the disease, as an able English physician has well remarked, "seems to commence with death." That faint yet pene-

trating odor of the charnel-house, which no one who has ever smelled it can mistake, is perceptible from the very beginning, and as it increases in strength, the certainty of a fatal termination grows stronger, till the poor sufferer, pulseless and sightless, gives up the struggle for breath and expires. In the present epidemic, as it has developed itself in western Europe, or at our quarantine grounds, these cases are rare, but they do occur, and when a quack or nostrum-vender professes that his method or his remedy will cure ninety-nine or even ninety-five cases out of every hundred cases of the disease, you may be sure there is deception somewhere. No medicine, and no mode of treatment ever yet discovered, has accomplished that result, and it is not presumption to say, that none ever will.

The disease is, however, so far amenable to remedies, that it was not a rash declaration of an eminent English physician that he would rather have cholera twice than small-pox or diptheria once.

We deduce from this history of the disease, the folly of that senseless panic and fear which

has often prevailed in the presence or expectation of the epidemic. It was well said by an eminent physician: "If anything could render cholera contagious it would be the enervating influence of Panic—as when, wanting a contagion of its own, it rides on the contagion of fear. For fear diminishes the nervous power, depresses and enfeebles the action of the heart, detracts the blood from the extreme vessels, and deranges the secretions."

The late Dr. Amariah Brigham, in his valuable treatise on Cholera, published in 1833, says:—

"The tendency of Fear is to produce and spread spasmodic complaints, and to become epidemic during great public calamities. It not only disposes a person to be affected by a contagious disease, but actually produces a disease and symptoms similar to the premonitory symptoms of cholera." He calls attention to the fact, that a person whose mind is constantly on the alert to detect some symptoms of disease of the stomach or bowels, who anxiously watches the effect of everything he eats or drinks upon the organs of digestion,

will be very certain to create in them a morbid sensibility, which will be followed by indigestion, diarrhea, or other derangement; and suggests that there is great reason to apprehend that many, very many cases of cholera, if not produced by fear alone, are aggravated by it to a dangerous degree; and cases of "common cholera" are transformed, through the influence of fear, into the malignant and fatal. "At the present alarming time, no duty of medical men, and of all those who have influence over the faith of others as regards the epidemic, seems more imperative than that they should steadily endeavor to quiet public alarm, and constantly abstain from creating any fear about the prevalence of the disease, and its contagious nature. Hundreds will die of *common cholera*,* if they are not assured and made to believe that the disease which affects them is not *the cholera* which their fears suggest. In such cases every look, and question, and action of a physician is very important. He has it in his power not only to endanger the lives of the sufferers, but to spread around a far more dan-

* Cholera morbus.

gerous contagion than that of cholera—the contagion of fear; to drive from the bed of sickness the anxious relatives and useful attendants, palsy the hand of charity, and create in those who are obliged to attend upon the sick a disposition to a disease closely allied to, if not identical with, malignant cholera; for the passion of fear falls in and unites with the disease, and attacks and paralyzes the same organs."

We say thus to our readers, one and all, do not suffer yourselves to become alarmed; remove the causes of cholera where they are removable, avoid intemperance either in eating or drinking, but avoid also with equal care the watchful scrutiny of every symptom which may be tortured into the possible approach of cholera. The prudent and temperate have no occasion for apprehension, and the disease is neither so contagious as to render the care of those sick with it dangerous, under proper precautions, nor so fatal as to be unmanageable in judicious hands. The missionaries of Constantinople, though attending thousands of cases, were none of them attacked with any thing beyond the incipient diarrhea, and in

those cases in which physicians have attended vast numbers of cases, there have been comparatively few of them victims to the epidemic.

We cannot, indeed, doubt its *portability*, which has been so fully and completely demonstrated; but, by proper precautions, this may be so far prevented that it will be hardly more infectious or dangerous to the attendant than continued fever.

Keep up, then, stout hearts and cheerful countenances. Do not, like Job's war-horse, scent the destroyer afar off; but, if it comes, meet it without fear, with unfaltering trust in God, and a determination to do your duty to your fellow-men. Then, "though a thousand should fall at thy side and ten thousand at thy right hand, it should not come nigh thee. There should no evil befall thee within, should any plague come nigh thy dwelling."

APPENDIX.

I. MORTALITY OF CHOLERA.

There has been hitherto a remarkable uniformity in the mortality from cholera. In 1830–'32, in Great Britain and on the Continent, the deaths in private practice were about 39.5 per cent., in hospitals 57.25 per cent. In 1849, in New York, the whole number of cases reported outside the hospitals in fifty-two days were 2,631, of which 915 died, or 34.78 per cent.; in the hospitals there were 1,621 cases, of which 880, or 53.71 per cent., died. In Egypt, Turkey, and Italy, during the present epidemic, the number of deaths was about 55 per cent. of the whole number of cases. In Paris it did not exceed 50.7 per cent. in the whole number of cases. The whole number of deaths in the city from the disease were nearly 5,500, and the number of cases between 11,000 and 12,000. In Naples, the ratio of deaths was only about 42 per cent. Seville, Spain, was visited with great severity; like

most of the towns of Spain, it was in a very filthy condition, and 9,000 of its citizens are said to have fallen victims to the epidemic.

In Malta, the proportion of deaths to the whole number attacked was about 67 per cent.

In Toulon there were 1,282 deaths. In Gibraltar there were 1,061 cases, and 574 deaths, or about 54 per cent. The cause and progress of the disease in Paris was very carefully noted. The first fatal case occurred December 18th; the disease reached its culminating point Oct. 15th, on which day 264 deaths were reported. It had entirely died out on the 22d of November, thus running its course in 66 days.

II. THE BURIAL OF THE DEAD.

There has been, in previous epidemics of cholera in this country, a tendency to too speedy burial. In the epidemic of 1832, burial was usually ordered in six hours after death, and there is too much reason to believe that there were instances, not very numerous it is to be hoped, in which the living were consigned

to the grave. The condition of collapse is not one from which we should beforehand predict the recovery of a person who had apparently expired; yet there have been a considerable number of cases in which such an event has occurred. On the other hand, the warmth of the body after death, especially of the head, chest and arm-pits, has led many to suppose life still remained, when it had actually departed. But, except in cases of very great urgency, it would be better that twenty-four hours should elapse, between death and burial.

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