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ESSAYS  
ON THE  
PREVENTABLE DISEASES  
OF  
SUMMER AND AUTUMN.

No. 1.

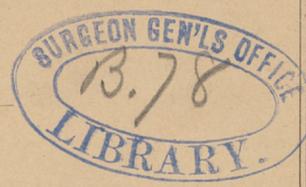
*EPIDEMIC CHOLERA.*  
ITS CAUSES,

PHENOMENA, AND MODE OF PROPAGATION;

*Together with the Means of Prevention and Proper Treatment.*

By MARSHALL CALKINS, A. M., M. D., *J*

Fellow of the Massachusetts Medical Society;—Member of the American Medical Association, etc., etc.



SPRINGFIELD:  
BICKFORD & BULLOCK, PUBLISHERS,  
1866.

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PHYSICS 350

LECTURE 1

MECHANICS

LECTURE 1

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PREVENT TABLE DISTANCES

SKETCH AND ALTIMETER  
PREFACE

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Entered according to Act of Congress, in the year 1866, by MARSHALL CALKINS,  
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trict of Massachusetts.

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## P R E F A C E .

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As an epidemic of Cholera to some extent prevails in our country the present season, and as a correct knowledge of its nature is not generally diffused among the people, the author has selected from the best writers on the subject, the most reliable information within reach, and embodied it in the following pages. Most of the best works on the subject have been examined. The lectures of Prof. A. Clark, of New York, the work of Dr. Burrall, the reports of committees, and boards of health in our seaboard cities, the contributions of eminent physicians of Europe, recorded in Braithwaite's Retrospect of Medicine & Surgery, the discussions of the American Medical Association, are the sources from which most of the facts have been obtained. It is believed that an acquaintance with the facts embodied in the present essay, will enable most persons to prevent the occurrence of the disease, and, in case of attack, to use, before it is too late, some efficient means of cure. It is also believed that the sanitary measures herein described, if everywhere observed, would not only prevent the occurrence of severe epidemics of Cholera, but would in time banish it from the earth. At any rate the general adoption of hygienic measures would so improve the physical condition of the race, as to make the spread of infectious diseases very limited, and their mortality comparatively small. Every educated physician, who loves the general weal more than private benefits, will assent to the proposition, that "prevention is better than cure." If he who restores many to health is great, he who keeps many from sickness is greater. The pages of medical history, recording its hygienic triumphs, are the brightest of all, for they display the highest glory of the healing art. And if the diffusion of hygienic knowledge, among all classes, is promoted by this essay, the object of the writer will be attained.

MARSHALL CALKINS.

SPRINGFIELD, Aug., 1866.

# EPIDEMIC CHOLERA.

## CHAPTER I.

HISTORY.—The term Cholera is derived from two Greek words signifying a flow of bile. Medical writers describe several varieties among which are Cholera Infantum, Cholera Morbus, and Cholera Asiatica ; the last variety is the subject of the following essay.

According to the testimony of Hindoo records, this disease originated in India as early as 1629. Prevailing more or less in that country every year since, it has at times become epidemic, and spread over the world until its victims have numbered fifty millions of the human race. More especially within the past hundred years it has been among the most destructive diseases of the East. The first great epidemic commenced on the marshy districts of the Ganges in the early part of June 1817. The predisposing conditions or causes were excessive humidity of the air, stagnant water, partially decayed food, the filthy habits of the people, and overcrowding. In the month of August it broke out at Jessore, a populous town on the Delta, and in a few weeks destroyed 6000 of its inhabitants. From this point as a center it rapidly spread to the surrounding provinces of Bengal, and in September following fell upon Calcutta. It then ascended the Ganges and its tributaries, everywhere spreading terror and death among the natives, and the English army stationed in Central India. The next year, 1818, found the disease still advancing from the East to the Western coast of India, and from North to South along the coast of Coromandel. During this and the following years it had extended over India and most of the countries of the East, Chinese Tartary, China, the Kingdom of Siam, the Phillipine and Molucca Islands. During the years of 1821-22 it extended over the Persian Gulf and the Syrian towns bordering on the Mediterranean. In 1823 it reached the shores of the Caspian, and appeared at Astrachan at the mouth of the Volga. Within these limits the disease lingered until 1828, when it broke out at Orenburgh, on the limits

of European Russia. In 1829 it somewhat extended its limits and in 1830 rapidly advanced into Russia and reached Moscow in September, where it prevailed through the winter. The next year it spread over the contiguous countries, over Poland, Prussia and Germany. While thus traversing the continent of Europe, in May, 1831, it prevailed in Mecca; and in August, in all the towns and villages of the Delta of the Nile.

In October it appeared in England, and advanced to Edinburgh in January, 1832. In February it prevailed in Sweden and the surrounding country and also in Holland and France. In the early part of June it crossed the Atlantic and commenced its ravages at Quebec. From here it spread over the British Provinces and the United States. Until late in the autumn it prevailed in New York City with alarming fatality.

The next epidemic, that of 1847-48, like the preceding, invaded Europe from the East, extending along the lines of travel across the continent and coming to New York in a packet ship during the winter of 1848-49. In June following, it overlept the barriers of Quarantine and became epidemic in the city; and before winter it had destroyed over five thousand of its citizens. In many other of the large cities of the United States it had a similar prevalence and was attended with a like mortality. Along the Mississippi and its tributaries the inhabitants suffered severely from its ravages.

In 1854 another epidemic, though less severe, prevailed in New York and in some of our Western cities. During the last year the disease was first announced at Alexandria in Egypt, where for a time the mortality was two hundred per day. It also appeared at Cairo and other places on the Nile, and at Mecca and Medina in Arabia. It extended along the ports on the Eastern coast of the Mediterranean sea, and on the 8th of July entered Constantinople, where its infection, aided by the effluvia of that filthy city, destroyed in a few weeks a thousand lives a day. From here it spread to other smaller places; in the East to Jerusalem and Damascus, in the West to the cities along the Gulf of Venice, to those of Spain and to Marsailles and Toulon. During the month of September it appeared in Paris and in Southampton in England. Crossing the Atlantic in ships, it has until recently lingered at Quarantine, but has now established itself in Brooklyn and New York. During the week ending July 21st there were over a thousand deaths in that city, many of which no doubt were of cholera or allied diseases.

## CHAPTER II.

PREDISPOSING AND SPECIFIC CAUSES.—The predisposing causes are an atmosphere laden with the effluvium arising from the decomposition of animal matter, such as the effete materials passing off from the human body, feculence, offal and many other animal and vegetable substances in a state of chemical decay or change. The gases passing off from these materials when the ventilation is defective, as in tenement houses and the abodes of the poor, furnish a fit nidus of development for the specific cholera poison, as is shown by the history of the disease in all countries and seasons.

Among the specific sources of the poisonous exhalations predisposing to cholera are, cess-pools, sewers, privies, overcrowded apartments, slaughter-houses, markets, marshes and ponds drained of their water and their beds exposed to the heat of the sun, dampness along water-courses, in cellars and basements, and distilleries, bone-boiling establishments, hog-pens, etc. Impure water, containing animal and vegetable matter in a state of organic change, as that from muddy and filthy rivers, or the water from wells laden with dead earth-worms or rats, is often an exciting cause. High living, intemperance, the excessive use of tobacco or other stimulants and narcotics, adulterated tea and coffee, excessive indulgence of the passions, in short, anything that interferes with healthy nutrition, predispose the system to be affected by the specific cholera poison; but more especially mental excitement, melancholy, excessive grief, and above all, fear of the disease, prepare the system for its reception. An Eastern allegory well illustrates this idea. "On approaching the confines of Egypt, the Spirit of the Plague was met by the Good Genius of the land, of whom the Spirit of the Plague requested permission to slay three thousand of his people. The Good Genius seeing he had not power to refuse the request, reluctantly gave his consent. The Spirit of the Plague went into the land and accomplished his work of destruction, and on taking his departure was again met by the Good Genius, and charged with having destroyed thirty thousand, instead of the three thousand for which permission was granted. 'It is true,' said the Spirit of the Plague, 'that thirty thousand are dead, but I destroyed but three thousand; the rest were destroyed by Fear.'"

THE MORE SPECIFIC CAUSES.—Medical writers widely differ in regard to the causation of the disease. Various theories have been advanced, among which the following are the more important:—1st. That in cholera a certain element analagous to yeast enters the blood by absorption and produces a fermentation in its elements, which so changes its properties as to cause the symptoms of the disease. 2d. That there is a change in the atmosphere which, in connection with local, predisposing causes, such as filth and putrid effluvia, gives rise to the disease. 3d. That in the alimentary canal of the cholera patient a poison is produced, which, being absorbed by the moisture of the atmosphere, or diffused through the water of wells and cisterns, impregnates the systems of those by whom the infected air is inhaled and the poisoned water drank. 4th. That a peculiar poison in the matter discharged by the cholera patient, is developed by fermentation under an elevated temperature, and that, if disinfecting agents like sulphuric acid, chloride of lime or zinc, are mingled with the discharges, the disease will not be propagated. Of the truth of this theory very convincing evidence is adduced. 5th. That a deficiency of ozone in the atmosphere is the cause of cholera. 6th. That electrical changes are productive of the disease. Concerning the causative influence of ozone and electrical changes no reliable conclusions are as yet established. 7th. That fungus or fungoid spores, developed in the earth or air, introduced into the blood through the lungs, produce the disease; or that a fungus develops itself in the body, causing its usual phenomena. 8th. That like yellow fever, it is caused by certain unknown changes in the atmosphere or earth, as predisposing conditions, and that a special miasm, external to the body, is produced, which will reproduce itself, and so extend from person to person until a whole town or community is infected.

All these theories agree that there is a poison which causes the symptoms of the disease, and that the cholera consists in a process of poisoning as truly as if a person had taken an overdose of any noxious drug.

## CHAPTER III.

MODE OF PROPAGATION.—The disease may be conveyed from person to person by the emanations from the patients' discharges, by infected clothing, or by drink or food laden with the poison. Although equally exposed, some will escape, while others will be attacked. There must exist in the system certain elements upon which the cholera poison can act, and when these are not present the disease will not be produced. Those persons, the blood of whom is full of decaying and putrid particles, the intemperate, and filthy, are, as its history has always shown, the most susceptible, and are most often destroyed. After the ingress of the poison, there is a period of incubation varying in duration from a few hours to two or three weeks, during which the person will be more or less affected with cramps, diarrhœa, indigestion and debility. While the poison is gradually multiplying itself in the blood, he may travel hundreds and even thousands of miles, and then suddenly sink under the disease, on the railway or steamboat, at the hotel or in the private dwelling, and thus become himself the focus from which it may be diffused to healthy communities. Along the lines of travel instances of this kind are always occurring when the disease has gained a residence in a country, a case falling here and there among those who observe hygienic laws, and hundreds, sometimes thousands, yielding to its destructive energy among those who disobey the rules of cleanliness, and disregard the preventive measures suggested by the science of physiology. Although not contagious in the same sense as *small pox*, yet, the emanations from the discharges may infect susceptible persons, unless preventive measures are instituted; but when these are properly used those sick with cholera, may with comparative safety, be attended by nurses and physicians.

Dr. Snow describes four methods of propagation. "1st. Moist excreta on clothes and bedding of infected persons, may be carried by the vapor of water and enter the nostrils and mouth, and be swallowed."

"2d. Dry excreta on infected clothing may be wafted a short distance by the air when the clothing is moved or unfolded."

"3d. Nurses and those who attend the sick may introduce the poison into their systems, by not washing their hands before taking food."

"4th. Utensils used by the sick and not properly cleansed, may also contain the germs of the disease."

These views may be open to the objection of being too exclusive, but that the disease is communicable by human intercourse, and that the noxious element requires the existence of certain predisposing conditions in order to a prolific germination, are facts well established by its history.

The question of its contagiousness has excited a great deal of debate among medical men, and the conclusions of different observers have been diverse.

Physicians and nurses of good constitutions and habits have been constantly exposed to the disease in thousands of instances—have handled the bodies of the sick, inhaled their breath, but have failed to contract the disease.

There is nothing remarkable in the existence of these facts. The cholera poison does not always find, in the bodies of those exposed, the existing elements necessary for its development. The influence of the poison is successfully resisted by the healthy vital forces, while in other persons, less strong, it finds a fit soil for its development; and hence, the conclusion is evident that cholera is not communicable under all circumstances and conditions, but that it is infectious; that is, the cholera germs are transmitted to the alimentary canal of others through the medium of air, food or drink, and that their multiplication and development will depend upon the condition of the recipient at the time of exposure.

The conclusions of the Cholera Conference at Constantinople give the most reliable information upon its transmissibility and propagation. They are as follows:—

“Cholera is propagated by man, with a rapidity proportionate to the rapidity of his movements.”

“Its transmissibility is an incontestible verity.”

“The atmosphere cannot carry the disease at a distance, whatever be its condition, and it does not extend from one point to another in a shorter time than is necessary for man to carry it.”

“Man is himself the principal propagating agent, and there is reason to conclude that a single individual from an infected district, suffering from premonitory diarrhoea, is able to cause the development of a cholera epidemic.”

“The disease may be transmitted by articles of infected clothing when closely shut up from the outer air.”

“Although it is not fully proven that the bodies of patients dying

with cholera can transmit the disease, it is prudent to consider them dangerous."

"Communications by sea are most dangerous, and next to them is communication by railroad, which in a short time may carry the disease to a great distance."

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#### CHAPTER IV.

MODUS OPERANDI OF THE CHOLERA POISON AND THE RESULTING PHENOMENA.—The cholera germs, when introduced into the blood, circulate with that fluid, and act upon the ganglionic or sympathetic nerves, producing, or tending to produce, paralysis, thereby affecting all the organs over which they exercise the control of circulation, secretion, excretion, absorption and nutrition. The flow of the blood into the mucous membrane of the digestive organs is increased, while it recedes from the surface, leaving the skin and extremities cold. The internal congestion gives rise to a sensation of internal heat, and to the pouring out of the aqueous part of the blood, causing the characteristic rice-water discharges, while the remainder of the blood in the circulatory vessels, becomes thick, or tar-like—no longer fit for free movement through the capillaries—and a partial or complete arrest of its motion takes place. The irritation of the mucous membranes caused by the sudden congestion, and the chemical and putrefactive changes of the alimentary fluid contents, is reflected upon the spinal cord, causing spasm and cramp in various parts of the muscular tissues of the body.

The cholera poison acts more upon the ganglionic nervous system than upon the brain, especially that part of it which is the seat of intelligence, so that the sufferer, awe-stricken and terrified, views with a clear consciousness the approach of death through the failure of the animal functions. Digestion, assimilation, and those complicated processes by which air, water and food are converted into blood and tissue, are altogether deranged by the energy of the attenuated poison of cholera.

That it acts specifically upon the sympathetic nerves, is evinced by the existence of the functional derangements in all those parts supplied by and under their control.

The arteries have three coats, of which the middle is composed of circular, muscular fibres. These predominate in the small arteries, and are endowed with the property of contractility, by which their calibre is regulated. It is found that irritation of an artery, or of the sympathetic nerves supplying it, causes contraction of its calibre; and a poison that causes irritation of the tissues, or the nerves of the arteries, may cause an arrest of the current of blood through the minute arterial vessels. Extreme contractility of muscular fibre, or spasm, is one of the phenomena of cholera. Mr. Braithwaite remarks—"the disease consists in a tonic rigidity, spasm, or tetanic contraction of nearly all the arteries of the body, caused by some violent poison acting on the organic nerves, the sympathetic, and all its branches and connections." The small, terminal arteries, being most largely supplied with circular muscular fibres, are most completely contracted, and thus the blood is collected in the large venous trunks. When the arrest of the motion of the blood in the arteries has reached a certain point, the right, or venous side of the heart is congested, and the left, or arterial side is partially deprived of blood, in consequence of which there is yawning, and shivering, pain in the region of the heart, on account of the impeded circulation through it and its contiguous pulmonary vessels. If at this time the patient be bled, or bands tightly placed around the limbs so as to dam up the blood in the extremities, and prevent its rapid flow to the right side of the heart, the organ is relieved of its unusual distension, in its right ventricle, and the symptoms are partially relieved by the removal of the pressure. Or, if a remedy be given that is capable of destroying or modifying the intensity of the action of the poison, or has power to overcome the spasmodic contraction of the terminal arteries, the circulation will be restored, and the symptoms cease to exist. Or, in case no remedies are used, the impeded circulation of blood, by arresting the vital processes, causes such a relaxation of the muscular tissues of the arteries as to temporarily relieve the spasm, and thus produces what is called reaction, or fever.

In this disease we observe the same cycle of phenomena as occur in remittent and intermittent fevers, only more rapid and severe. The poison causes the spasm in the muscular tissues. The cold stage, the feeble pulse, cold extremities, chills and diarrhœa, are the necessary sequences.

The veins of the lower and upper extremities have valves which permit of onward, but prevent backward flow of blood; while those of the

abdominal viscera have no such arrangement; but the blood moves onward in them by the power of capillary attraction alone. Of course, when this capillary force is overcome, or in abeyance, in consequence of an arrest of the circulation, these veins must be very much distended and the more aqueous parts of their contents be filtered or forced out through their coats, thus causing the profuse watery discharges.

The blood thus forced to remain in these venous trunks, not provided with valves, cannot move onward from the right ventricle through the pulmonary artery into the lungs, because of the contraction or spasm of the pulmonary arterial capillaries. There is, therefore, no excretion from the venous blood, of carbon into the air cells of the lungs, and no absorption of oxygen. In accordance with these conditions, we find in persons who die in collapse, the lungs pale, dense in texture, containing less than their normal amount of blood and air; while the other internal viscera connected with the venous circulation are congested. The left side of the heart and the arterial system has less than the usual amount of blood, and hence the feebleness and smallness of the pulse.

The effects of the preceding conditions, called symptoms, are subject to great variations in different individuals. Many persons in an infected district suffer from slight cramps, chills, flashes of heat, colic gurgling in the intestines, and bilious diarrhoea, who do not have the disease in its developed form. In other persons less vigorous, or unfortunate in receiving a large dose of the poison, the dejections gradually increase, and terminate in collapse.

STAGES OF THE DISEASE.—Prof. A. Clark describes four stages. “1st, That characterized by diarrhoea. 2d, That characterized by violent diarrhoea, vomiting and cramps. 3d, That of collapse. 4th, The stage of reaction, and the occurrence of typhoid symptoms.”

The preliminary diarrhoea continues on the average three or four days.

The matter vomited consists at first of the contents of the stomach, soon followed by a yellowish, greenish, and watery fluid, quite variable in color and consistency. Simultaneously with this emesis, frothy or whitish matter of an offensive smell, sometimes mingled with bloody mucus, pours away from the intestines in large quantities, and with alarming force. In some of the worst cases, these symptoms, the efforts of nature to rid itself of the poison, are comparatively mild, or entirely wanting. The organic forces yield at once, without opposition

to the destructive agent. Accordingly, the laborer has been known to vomit, and without other general symptoms, to fall dead at his place of employment; and without warning, the man of wealth has as suddenly expired amidst the retirement and the fancied security of a well-ordered home.

“With equal pace impartial fate  
Knocks at the palace door and cottage gate.”

The cramps sometimes occur at the same time in the extremities and trunk, but more usually begin in the limbs, and extend to the body. They generally continue while the diarrhœa lasts, but often cease late in the disease.

RECAPITULATION OF THE SYMPTOMS.—In the first stage there are chills, flashes of heat, slight cramps, diarrhœa, languor, general debility, and indisposition to mental and physical exertion. In the second stage there is violent vomiting, profuse watery intestinal discharges, severe cramps in the calves of the legs, thighs, hands and abdominal muscles, causing the most excruciating torture. In the third stage, that of collapse, the skin is cold and corrugated, of a bluish color, destitute of elasticity; the countenance presents a sharpened appearance, the eyes are deeply sunk in their orbits and wildly starting, the tongue is cold, and the breath chills the hand with which it comes in contact. Externally cold, internally the burning and heat is intolerable, and the patient loudly calls for cold water, of which he will drink enormous quantities, and vomit it as soon as taken. The pulse, scarcely perceptible at the wrist, varies in frequency from 80 to 130 per minute, and the respiratory movements are nearly twice as frequent as in health. The voice is changed to a hoarse plaintive whisper, and a cold sweat, a mere exudation through the skin, often bathes the surface of the body. At the epigastrium—the pit of the stomach—there is great distress, a sense of deep prostration often severe beyond description. In the last moments of life the intellect is often unclouded; the pulse, cramps, vomiting and purging cease, and

“The wild and stony eye  
Glares without sight on blackest vacancy.”

THE FOURTH STAGE, OR THAT OF REACTION.—When the disease does not terminate in death, there is a period during which a general fever affects the system, called *the reaction*. Caused by the cholera poison, and the retention in the blood of those materials which should have been removed through the organs of excretion, it presents the

usual symptoms of typhoid fever. From the symptoms of collapse, the patient, after a period varying in duration from twelve to forty-eight hours, gradually merges into another train of phenomena, such as burning and heat of the surface, rapidity of respiratory movements, palpitation, headache, ringing in the ears, loaded and red tongue, light colored renal discharges voided with difficulty, black, tar-like and offensive passages from the intestines. The occurrence, on the second or third day, of copious perspiration, is the beginning of convalescence ; but the continuance of dryness and heat of the surface, delirium and coma, prognosticate an unfavorable termination, the patient usually dying from the sixth to the tenth day.

CHANCES OF RECOVERY.—When the disease has advanced to collapse the chances of recovery are small, and any one who has knowledge of the condition of the great vessels, and their contents, the blood, and of the partial or complete paralysis of the nervous system of organic life, must perceive the utter impossibility of obtaining any marked benefit from medication. In the aged and infirm the chance of recovery is very small, but in the young and vigorous the prognosis is more favorable. Adults are oftener attacked than children, it may be for the reason that they are more susceptible to fear.

FALSE SIGNS OF RECOVERY.—When the reaction has commenced, the physician cannot be too vigilant in his efforts to prevent relapse on the one hand, and too much febrile excitement on the other. When the patient's constitutional vigor has been reduced by previous organic disease, we should not be too hopeful on the occurrence of imperfect reaction. The pulse may become full and regular ; the cramps and vomiting cease ; the evacuations from the bowels feculent, green and pitchy ; sleep may for a while return, and yet, from want of organic vigor, all may be suddenly lost. In the arrest of the movement of the blood in the pulmonary and cardiac vessels the great danger consists, and its removal is essential in the cure of cholera.

## CHAPTER V.

The public measures instituted for the prevention of cholera are *Quarantine and Sanitary Police*. Of the utility of the former there has been much variety of opinion among medical men; some contending that it cannot prevent the spread of the disease; others contending that, when strictly enforced, it may save a nation or continent from the scourge.

These different opinions have arisen from different views of the nature of the disease, and as the portability of cholera is fully established, the objections to Quarantine must have force against imperfections, and not against it when properly conducted and its rules rigidly enforced. As persons infected with the disease may travel by the aid of modern facilities across the ocean, and fly across a continent before it is developed, it is evident that it may be carried to the uttermost parts of the earth, unless the infected person be somewhere detained until the period of incubation has past. The duration of the period of detention, and the special means by which the objects of Quarantine are to be secured, are still subjects of discussion, but the rules laid down by Dr. Marsden, of Canada, in his exposition of this subject before the American Medical Association, are the most judicious and comprehensive that have yet appeared.

Although a proper Quarantine might preserve the people from the ingress of cholera, yet, there is such indifference upon the subject that there is no probability of its enforcement; and hence, the adoption of such sanitary measures becomes necessary as are efficient in the removal of all predisposing or exciting causes. The perfection of drainage, the removal of all filthy accumulations, the thorough disinfecting of streets, sewers, and all places pervaded with noxious gases, the abatement of nuisances, the supply of pure water, the inspection and destruction of adulterated and injurious articles of food sold in the market, are necessary for the public safety.

**SANITARY COMMITTEES.**—When the disease prevails in a community, a sanitary committee, consisting only of medical gentlemen, should be instituted in order to visit every house and tenement to enforce proper sanitary regulations. Whenever the hygienic conditions are

found to be bad, the sick should be removed to a hospital, and the proper means furnished for medical treatment.

**SPECIAL MEASURES FOR PREVENTION.**—The atmosphere is the most efficient disinfectant known to science, and the country is more free from malignant choleric diseases than the city, in consequence of its purity. Any poison in the air of the country is so largely diluted or attenuated that its effect on the organism is not sufficiently powerful to do injury. Cholera is most often developed wherever there are imperfect ventilation and decomposing organic matter, as in tenement houses, prisons, jails, on ship-board, or in the vicinity of filthy sewers, drains, and putrescent exhalations. Other conditions predispose to cholera, such as defective nutriment, want of cleanliness, cold drinks taken when the body is heated or fatigued, mental excitement, fear or anger. To escape the cholera requires the avoidance of its predisposing conditions, which may be arranged under the following heads :

1. Fear of the disease, by exciting the nervous system, renders it more susceptible to the effect of the cholera miasm, and hence cheerfulness and hope should be cultivated.
2. Avoid the use of nostrums—pills, bitters, and especially cathartics, and all artificial stimulants of a fermented character, such as beer, soda water, ale, porter, laudanum, paregoric, morphine, and all kinds of astringents which tend to derange digestion and diminish the organic force of the body.
3. Keep the temperature of the body as nearly uniform as practicable by clothing, or artificial means in heating or cooling rooms, for an atmosphere laden with moisture favors the development of the cholera poison ; and hence, the propriety and benefit of keeping fires in rooms unusually damp and illy ventilated. To secure this warmth, flannels should be worn over the trunk of the body, and damp clothing frequently changed for dry and clean.
4. Avoid all severe or exhausting labor, either physical or mental ; all sudden changes in diet, or in the use of tobacco, or tea or coffee. Let the meals be regular, consisting for the most part of plainly cooked meats, of beef or mutton, of rice, bread and potatoes, and fresh, ripe fruits taken as a part of meals, but avoided between meals.
5. Eat no luncheons or late suppers ; court sleep by retiring early to bed, in an upper, well ventilated, dry apartment. Studiously avoid all unripe articles of fruit, tainted meats, smoked fish, ham, fresh pork, veal, old cheese, adulterated or impure milk, which of itself destroys more children than almost any other cause.

6. Have the surroundings of dwellings kept clean ; all garbage removed ; water-closets, yards and vaults, disinfected by chloride of lime ; the traps under sinks and those connected to drains should be inspected, and carefully watched, that gases may not escape into the dwelling.

7. Avoid crowded assemblies and sleeping rooms, and near proximity to uncleanly persons, and all exposure to morning and evening air when there is no food in the stomach. The cholera poison is most rapidly developed during the dampness of night and morning, and hence the increased danger of exposure.

IMPORTANCE OF THE USE OF DISINFECTANTS.—Too much importance cannot be attached to the duty of thoroughly disinfecting, with chloride of lime or otherwise, without delay, all discharges from the stomach and bowels of persons under the epidemic influence, as well as all bedding, clothing, towels, and the like, which such discharges may have imbued ; and all privies and other like places to which such discharges may have access, should be kept flooded with solution of sulphate of iron, or of carbolic acid.

Dr. E. Harris has the following directions concerning the use of disinfectants :—

1. QUICKLIME.—To arrest putrefaction, to act as a rapid dryer, and to decompose certain moist and hurtful effluvia, strew the dry lime upon the earth ; or, distribute upon plates, etc.

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 1 lb. 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 solutions diluted in eight or ten times the quantity of water.

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 generating 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 syphon, or lampwick, 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 wine glass 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 to 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 (saltpetre) 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, on sides of stables, prison cells, privy vaults, etc. 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.—Is to be used as an immediate and most effective disinfectant. Dilute the saturated solution of this salt in from 10 to 500 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, etc.

10. CHARCOAL.—As a disinfectant or deodorant for extensive use in masses of putrescent material, and for local purification, fresh charcoal is of great value. The British Sanitary Commission in the Crimea ordered whole shiploads 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 be properly 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.

In the ordinary emptying of privies or cess pools, use may be made of perchloride of iron. But where disease is present, it is best to use chloride of lime or Condry'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 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 soaking 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 Condry's fluid (permanganates), 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 Condry'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 afterwards when at wash be actually boiled in the washing water.

Woolens, bedding, or clothing, which cannot be washed, may be disinfected by exposure for two or more hours in chambers constructed for the purpose, to a temperature of 210 to 250 degrees Fahrenheit.

For the disinfection of interior of houses, the ceilings and walls should be washed with quicklime water. The woodwork 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.

## CHAPTER VI.

The treatment of cholera may be divided into the hygienic and the medicinal.

Concerning the former there is a general agreement among all intelligent physicians, while the utility of medicine is still doubtful except in the first stage.

As soon as attacked the services of a physician should be secured, for while many persons may have some knowledge of the disease and its treatment, the experience and knowledge of one educated in all the sciences of medical study, are necessary in order to secure the judicious use of the best means of care. Every one pretending to have specifics for cholera should be avoided—as the experience of all intelligent men proves that there are no remedies known that are infallible. The means to be used must vary, more or less, according to the stage of the disease, the surroundings of the patient, his constitutional tendencies, habits, and the symptoms existing at the time.

No specific directions can be given that are always to be followed. Only such a course of general treatment can be presented as is best for the majority of cases.

FIRST STAGE.—During the prevalence of cholera, every case of diarrhoea should be treated as of the greatest importance. The patient, if possible, should take a warm or hot air bath, followed by brisk friction with a coarse towel. The friction should be as rapid as possible, and the greatest care taken to produce redness and heat of the skin, and free circulation of blood in the extremities. When the application of the bath is impracticable, thorough friction as above is very useful.

The following is an excellent method of applying heat: Wet a sheet in hot chlorine water and wrap around the body, and cover the whole with oiled silk of the best quality, tightly drawn, so as to exclude the air. Outside of the oiled silk a large hot blanket should be bound tightly around the entire body and limbs, in the usual manner of a pack. The oiled silk prevents the escape of the heat which accumulates and brings on reaction. The pack can be applied separately to the trunk and limbs, leaving open a small space under the pelvis, so that the dejections can be passed without the necessity of disarrang-

ing the applications. When properly used this is one of the best methods for applying heat and moisture to the body, and bringing on reaction and perspiration. It may be continued three or four hours, and then removed and dry flannels used in stead. Chlorine water may be prepared as follows : Chlorate of potass. pulv. eight drams ; Hydrochloric Acid, four drams. Add the acid to the chlorate of potass. in a mortar. Stir the compound until the fumes of chlorine gas escape, then add two quarts of water. Add this to three gallons of hot water, and wring out the sheet in it before applying.

After a pack or the bath and friction, the patient should be placed in a clean bed suitably provided with warm blankets, and external dry heat applied either by means of bottles of hot water or hot bricks, or bags of hot sand or salt.

The mind of the patient should be quiet, and all sources of excitement removed. The dejections should be made into a bed-pan, containing chloride of lime, and the tendency to frequent movements resisted as much as possible. The use of solid food should be abandoned, and warm gruel, if anything, taken in its stead. As a general rule, drinks of any kind tend to excite movements, and should be avoided.

The apartments should be well ventilated, and disinfected, by diffusing through the air chlorine gas. A folded sheet, sprinkled with a solution of chlorinated soda, should be placed under the pelvis, in order to disinfect the bed-clothes and the accidental discharges.

SECOND STAGE.—The treatment in this stage should be more thorough than in the first, as the cramps and rice-water discharges are in progress. The measures for the application of heat are now more needed. This object can be easily attained by a simple apparatus contrived for the purpose of heating air, by means of a spirit lamp, and conducting it through a tube under the bed clothes. This should be continued until the body is thoroughly warmed. Hot, dry applications may be applied to the whole trunk of the body, but wet ones are liable to produce chilliness whenever they become a little cold.

All the discharges, whether vomited or intestinal, should be received into vessels containing a disinfecting fluid prepared by adding a tablespoonful of the solution of permanganate of potash to a pint of water, or some other preparation of a disinfecting agent equally effective.

The bed clothing and the patient's linen should be disinfected by

boiling water, or by air heated to the temperature of two hundred and fifty degrees (Fahrenheit) for several hours. When the vomiting is severe, the patient may be allowed to swallow small pieces of ice.

He should also be directed to expand the lungs as much as possible, so as to introduce air into their cells in order to favor oxydation.

Dr. Chapman, of England, has recently advanced a theory that the disease is best treated by the application of ice to the spine, with a view to affect the nerves that preside over the circulation of the blood. While his theory is sustained by many facts, it has not yet been thoroughly tested.

The majority of physicians most experienced in the treatment of cholera, allow patients to drink water freely, and although it is quickly vomited, it gives apparent relief.

Water drank as hot as can well be borne, is often one of the best means to arrest vomiting.

THIRD STAGE—In this stage of the disease but little can be done more than to attend to the comfort of the patient. The introduction of hot air under the bed clothes is recommended to favor reaction. Means similar to those used to arouse one from the coma of opium, such as pouring cold water on the epigastrium, have been suggested with a view to awaken the action of the nervous system. Dr. A. Le B. Monroe describes the *methodus medendi* of the process as follows :

“The pit of the stomach is one of the most sensitive portions of the body ; it has a peculiar sensibility which will not tolerate even a slight blow without suffering. The semi-lunar ganglion and great sympathetic, with its extensive and important connections, is powerfully excited, and the over-charged heart is roused to action by the direct and reflex nerve force. The effect is compounded of shock, to an extreme degree, and a permanent powerful excitation of the *vis nervosa*, causing more or less intense pain and distress, dependent on the length of time it is applied. The heart is compelled to contract and send forward its dark blood to be aerated in the lungs, and then to be distributed over the whole system, carrying life and activity to all its functions. Galvanism could do no more. Indeed, I do not believe it would do as much.

“And what would it do in the collapse of cholera? If cold water should be deemed inadmissible (as I do not think it would), why not use warm or quite hot water? If the views of an English physician, Dr. George Johnson, recently published in the *Medical News*, in regard

to the pathology of the disease are correct, as I believe, I should have great confidence in the plan. It would not eliminate the poison which determines its nature, but it might rouse the sinking powers, giving time and opportunity for such treatment as would be necessary to this end."

Dr. L. Q. Bowerbank, speaking of the treatment of the negroes sick with the disease who refused to take the ordinary medicines, says :

"The rule was to place the patient on a mattress on the floor, placing by his side a bucket filled with ice water. These patients received little or no care, were not rubbed and covered up with blankets, but my experience was that the majority of those left to their own resources got well."

There is a tendency among many physicians to give alcoholic stimulants in this stage, with a view to bring on reaction, but experience has proven them to be injurious rather than beneficial. The use of them tends more to deaden the sensibilities of the nervous system than to awaken them to increased activity.

The existence of cholera is mainly known by its characteristic intestinal discharges and by its tendency to collapse. No other disease sufficiently resembles this to be confounded with it.

The medical treatment of cholera is almost as various as the opinions of medical men are diverse, and the fact that so many remedies have been used by different physicians, and that so few of them have ever held for a long time the confidence of the profession and the public, is very forcible evidence that no plan of medical treatment yet devised is of much service except in the first stage.

Dr. Thomas Watson, speaking of the treatment of this disease, in England, says : "If the balance could be fairly struck, and the exact truth ascertained, I question whether we should find that the aggregate mortality from Cholera, in this country, was any way disturbed by our craft." This confession of the inability of medical science to cure, of course was designed to refer to the success of treatment in the stage of collapse, and not to that of the first stage. The deficient circulation of the blood in fully developed cases, and the rapidity of exosmosis through the mucous membranes of the alimentary canal, make the absorption of medical substances very slow, and sometimes, no doubt, impossible. And hence the use of large doses of crude drugs is worse than nothing ; for they are either swept away with the discharges, or in case they happen to remain, their medicinal force is not efficient until

reaction takes place. The large quantities of drugs are then absorbed, and often poison the patient.

METHODS AND REMEDIES USUALLY EMPLOYED.—The treatment by opium has been extensively used, but it has failed to be of benefit except when used in small doses in the first stage. This result might have been expected from the properties of the drug. In small doses it operates as a stimulant, promoting the circulation of the blood and cutaneous secretions, and arresting the pouring out of serum into the intestinal canal, and hence, used in the first stage, it no doubt is a valuable agent. In large doses it only hastens the death of the patient, especially when used so as to have its operative effects take place in the stage of collapse. The same remarks apply to alcoholic stimulants. Venesection has been extensively used in this disease, but has fallen into merited disuse on account of its ill success.

Calomel has likewise been extensively used in both large and small doses, and the drug in large quantities is generally considered of little avail, while small quantities well triturated in sugar, in order to facilitate its absorption are more highly approved.

Of the use of calomel in general, Prof. A. Clark says: "I would not say that calomel is an enemy of mankind, but say this, that it can be used *less than it habitually is*, to the advantage of man." Of the plan of treating cholera with small and frequent doses of calomel, the Professor remarks, "This plan of treatment is not based on a safe foundation, and I am disposed to say that it is still doubtful whether it is better than none at all." According to Dr. Clark, recent investigations show that there is no physiological or pathological reason for giving calomel, as many of the profession have supposed, the liver not being congested, nor the gall bladder destitute of bile, this secretion being found in a modified form in the rice water discharges.

Electricity and galvanism, and the inhalation of oxygen gas, have been recommended, with a view to arouse reaction, but have not been attended with success. Cold wet sheets, the douche, or cold affusions, the measures sometimes employed by the Hydropaths, have been attended with temporary reaction but have not succeeded to any considerable extent.

Dr. R. T. Trall the champion of exclusive hydropathic treatment indirectly confesses its inability to cure cholera. He says, (Hydropathic Encyclopedia, vol. ii, p. 141 :—)

"In indicating the appropriate hydropathic treatment of this disease,

I feel no small degree of embarrassment, not that I regard the water-cure, which I claim to be a sufficient system in all functional diseases, as an exceptional failure in this, but because it has no power to reclaim the dead, and in many cases an attack of this disease is a death stroke."

*Camphor* has been recommended highly as a preventive and a remedy in cholera. It enters into the composition of most of the popular compounds for cholera, and, no doubt, has a very beneficial effect in the arrest of the disease. According to Sundelin, in small doses it raises the pulse, rendering it both fuller and more frequent, diffuses a sense of warmth from the stomach throughout the whole body, and augments the action of the skin. Vogt is of opinion that no doubt can remain of the stimulant qualities of camphor. Stille in his *Materia Medica* observes, that the primary action of small doses (grains i to grains xv) of camphor, is to stimulate and excite the nervous and vascular systems, and through them the whole organism, but the excitement is of short duration, and is not followed by exhaustion or depression. Jorg says, camphor acts as a stimulant to the brain and intestinal canal. The ordinary tincture of camphor contains one part of the gum to nine of spirits of wine. The dose of the drug as a preventive is ten drops on sugar three or four times a day. It should not be given in water, as it is not sufficiently soluble in it, in order to permit of absorption. When seized with the disease the patient should be wrapped in warm blankets, a hot brick or bottle of hot water placed to the feet, and ten drops of the tincture given every ten to twenty minutes. In more severe cases the drug is recommended in doses of twenty drops to a teaspoonful every fifteen minutes, until reaction occurs. The absorbents of the mouth convey the drug when mingled with sugar more directly into the circulation than do those of the stomach, for it must pass through the portal veins and liver before arriving at the centre of circulation. In the stage of collapse *veratrum album* is recommended as useful to produce reaction. This drug is well known as a powerful hydragogue cathartic and sedative in large doses, but in small doses like many other medicines it has an opposite effect. The United States Dispensatory calls it a general stimulant to the secretions in small doses.

As cholera originates in filth and consists in septic changes in the blood which produce the derangement of the nervous and vascular systems, it is evident that the indications are to arrest these septic changes

by the use of antiseptics, to overcome their injurious results in the production of muscular spasm, by the use of antispasmodic remedies, and to favor the capillary circulation and supply the loss of heat by the use of stimulants and hot air baths. As an antiseptic agent sulphuric acid has been highly recommended by Dr. Worms, and greater success is claimed for it than for almost any other treatment. The per-centage of deaths under the use of this remedy as he states, was from one to two in a hundred, whereas the usual mortality is from 40 to 50 per cent. It is best used in the form of mineral lemonade made by adding ten to fifteen drops of concentrated sulphuric acid to a tumblerful of water sweetened, either with a tablespoonful of simple syrup of sugar, or of raspberry syrup, or any other flavoring substance that is not injurious, and is palatable to the patient. The use of the bisulphites of soda, or magnesia in arresting septic changes in the blood in other diseases, in fevers, diphtheria, small pox, etc., is claimed to be very much more successful than any other treatment. Whether or not these would prove more efficacious than sulphuric acid unencumbered with alkalies, in the arrest of the blood charges of cholera, has not yet been determined by experience. They are certainly worthy of trial. A tumblerful of the lemonade made as above directed may be taken in connection with the hygienic treatment above described, every hour, in the first stage, and in the second stage every half hour, immediately after vomiting, so that it may the longer remain in the stomach. The dose of the acid should be regulated according to the age of the patient. Two or three drops for a child, ten for a woman, and fifteen for an adult man will be sufficient. Dr. Worms says it is seldom that more than three or four doses are needed to arrest the diarrhœa. While relieving the diarrhœa it operates as an emetic, increasing the frequency and duration of vomiting, and proves a powerful means to cause reaction in collapse.

Antispasmodic remedies are generally prescribed in cholera with a view to produce relaxation of spasm. Among the most efficient of these are chloroform, sulphuric ether, lobelia and belladonna. Chloroform is a valuable remedy for congestion, and a powerful agent in overcoming cramps, and in quieting the nervous system, and stimulating the circulation. It enters into the composition of one of the following prescriptions. Sulphuric ether is used for a similar purpose. Lobelia, a remedy seldom used by the majority of physicians, is one of the most powerful anti-spasmodics known. It has a specific ten-

dency to arouse to action the sympathetic nerves, and can be given with more safety than any other remedy equally powerful in allaying spasmodic action. Tobacco has been used for a similar purpose, but it is far more dangerous than lobelia. I have seen lobelia used combined with tincture of capsicum in several cases of cholera in the stage of complete collapse, and reaction and complete recovery were the results. It is generally prescribed in the first stage, as an emetic, and in combination with capsicum, with a view to relax spasm, and at the same time stimulate the organs of circulation. I have seen the statement made that it is a cathartic. Nothing is farther from the truth. It tends in small doses to produce a free circulation of the blood, to cause copious perspiration, to relax spasm, and does not, like opium, chloroform and belladonna, tend to narcotize the nervous system, which is one of the dangers to be avoided in the use of remedies for cholera. Belladonna is well known as a very efficient antispasmodic. Dr. Barraud treated the disease with this drug with more than ordinary success. It is certainly indicated in the first and second stages, when the cramps are severe.

Stimulants have always been prescribed in this disease, with results more or less satisfactory, according to their kind, and the skill of the prescriber. Opium in small doses operates as a stimulant. Camphor, chloroform, sulphuric ether, veratrum album, and many other drugs have the same tendency to increase the movement of the blood in small doses. Indeed, many writers of extensive observation think the primary effect of most drugs in very small doses to be stimulant, or opposite to their effects in large and poisonous doses. Capsicum is no doubt one of the best and safest stimulants known, and as it has no tendency to lessen the sensibility of the nervous system, it is eminently valuable in cholera. It enters into the composition of many of the compounds used for this disease. Oil of turpentine is another stimulant, possessing valuable properties in the cure of this disease.

#### MOST COMMON PRESCRIPTIONS AND RESUME OF TREATMENT.

PRESCRIPTION NO. I.—Dr. H. Hartshorne's *Compound Tincture of Chloroform*.—Chloroform, two drams; tinct. camphor, tinct. opium, of each one dram and a half; oil of cinnamon, eight drops; alcohol, three drams; give five to thirty drops, or more as required.

No. 2.—DR. WM. SCHMOLE'S PRESCRIPTION of *camphor*, *veratrum album*, and *morphine*. Acetate of morphine, one grain ; pulverized gum camphor two grains ; tinct. *veratrum album*, one dram ; French brandy, two ounces : dose, a teaspoonful every two to four hours, to arrest diarrhœa and produce reaction.

No. 3.—RUSSIAN CHOLERA DROPS.—Ethereal tinct. *valerian*, two drams ; tinct. of *ipêcac*, one dram ; camphorated tinct. of opium, twenty drops, oil of peppermint, five drops ; mix : dose, twenty drops, every hour.

No. 4.—COMPOUND OF LOBELIA, CAPSICUM AND MYRRH.—Tinct. *lobelia*, tinct. *capsicum*, tinct. gum myrrh, of each one ounce : dose, a teaspoonful every half hour, to bring on reaction ; for an emetic, every ten minutes until vomiting is produced.

No. 5.—FROM DR. BURRALL.—Tinct. opium, tinct. camphor, oil of turpentine, of each three drams ; oil of peppermint, thirty drops : dose, a teaspoonful in brandy and water for diarrhœa, and a tablespoonful for cholera.

No. 6.—Dr. Barraut recommends one-fourth of a grain of extract of belladonna every half hour until the surface becomes warm and the pupils of the eyes dilate. For children he recommends the tincture in from three to ten drop doses, every fifteen minutes until it dilates the pupils and causes warmth of the surface, when it should be discontinued.

No. 7.—COMPOUNDS USED BY THE AMERICAN MISSIONARIES AT CONSTANTINOPLE IN 1865.—*For the Diarrhœa* : R. tinct. opium, tinct. rhubarb, spirits of camphor, equal parts : from thirty to sixty drops, repeated as needed. No. 8.—*For Vomiting* : tinct. opium, tinct. *capsicum*, compound tinct. cardamom, tinct. ginger, equal parts : dose, from thirty to sixty drops as needed.

No. 9.—DR. HOUSTON'S PILLS FOR CHOLERA.—They consist of acetate of lead, pulverized camphor, of each twenty-four grains ; morphine two grains ; oil of cinnamon, five drops : make twelve pills : one every one, two or three hours, as needed.

The hypodermic use of morphine is recommended by some as unusually successful. Quinine, no doubt, may be used in the same way with great benefit in malarious districts, especially when the stomach will not tolerate medicine. These various remedies are more or less valuable, according to the degree of skill with which they are used, but are of comparatively little importance when contrasted with the proper

hygienic treatment before described. As an illustration of the effect of obedience to hygienic laws and the use of disinfectants, ventilation and cleanliness, I close this essay by appending Prof. F. H. Hamilton's method of dealing with the disease in Blackwell's Island Hospital. The report explains itself.

NO. 64 MADISON AVENUE, }  
NEW YORK, Friday, Aug. 10, 1866. }

*E. Harris, M. D., Corresponding Secretary, M. B. H.:*

SIR:—The first case of cholera occurred in the Workhouse on the 28th of July; the last case on the 6th of August. The epidemic continued, therefore, nine days, during which period, of about 800 inmates, 123 died. I do not mention one case reported on the 8th of August, because, as I understand, the person was admitted only the night before; I do not think the disease was contracted in the Workhouse.

You know the building very well. It is admirably constructed for the purposes for which it is designed, and, so far as my observation extends, it is always perfectly clean. Until now, the inmates have been as healthy as this class of people are usually found to be.

The explanation of the rapid propagation and fatality of the disease after it had once gained admission, was believed to be mainly confinement and crowding. It was observed that the cholera was for several days exclusively among the women. The women had the smallest apartments, were most crowded in their cells, and, with few exceptions, were employed within the building in close contact with each other during the day. The men were employed mostly in the quarries, out doors.

On Wednesday, when the epidemic was at its height, the first of August, I gave my pledge to the Board of Commissioners and to Mr. Schultz, President of the Board of Health, in your presence, that I would drive the cholera from the Workhouse in from three to five days. I said this in no spirit of boasting, but in simple reliance on the well-known and established laws of Hygiene. The Commissioners executed literally and promptly every order which was given by the Committee.

The epidemic began to decline from the day they were fully carried out, and on Monday last the pledge was redeemed. The following is a summary of the sanitary means adopted:

The inmates were distributed as far as the vacant places in the

building would permit; the cell doors were left open at night; the night-buckets were supplied with disinfectants and left outside; the women's cooking rooms were converted into hospital wards, and the women were kept out of doors from morning until night; corn meal and molasses were taken from the diet table; coffee, tea, and vegetables were added; at night each inmate was required to take whisky one ounce, water three ounces, tincture of capsicum fifteen drops. [These people are our city vagrants, and probably are habitually intemperate.] A variety of disinfectants were employed freely and constantly in every vessel and closet which received the excreta, even the excreta from the stomach were disinfected immediately after they were received into a vessel or fell upon the floor; stoves were placed in each hospital ward to insure a draft; all windows were kept open night and day; the clothing taken from cholera patients was sent directly to the boilers; a ward was established for patients with the diarrhœa, and the value of this measure is shown by the fact that of the large number received into this ward only one died. It was difficult, however, to persuade these poor creatures to report themselves at this stage of the disease.

From the Workhouse the cholera has spread to every other building on the Island, except, I think, to the "Madhouse," the pavilion attached to the Male Almshouse and the Fever Pavilion. In none, however, has it proved so fatal as in the Workhouse.

The same sanitary measures have been adopted, with slight modifications, in each department, but they cannot be applied with so much vigor to the Lunatic Asylum, the Almshouse, or the General Hospital. These buildings are all crowded, and the inmates cannot be scattered or turned out of doors; consequently, the cholera remains among them, but in a greatly mitigated form. In the Penitentiary it remained but two days.

Connected with the Almshouse are two well-constructed pavilions, lying side by side, separated only by a few feet and a brick wall 10 or 12 feet high. One is occupied by feeble old men, the other by the same class of old women. The only point of difference which I can discover is, that at the time of the outbreak of the cholera, the male pavilion contained only 62 persons, while the female contained 99. In the first there has not been one case of cholera, in the second 31 have died.

Of 14 house-physicians and surgeons employed in these several buildings, some of whom have been in constant attendance upon the sick, not one has suffered from the epidemic.

Very respectfully yours, FRANK H. HAMILTON, M. D.

