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Quite a satisfactory thesis

Nature & Treatment of Cholera

by

H G Williamson.

Devotes consid^e space to the Early History, manner of spreading, & theories of Cause.

Notes, specifies Overcrowding, filth, bad water, intemperance, as favoring occurrence of the disease

Notes the usual treatment

Cholera is commonly stated to have first occurred in 1774; this is however a fallacy; for it had been known in India before that time, indeed there is little reason to doubt that the disease as described by Hippocrates, Aretaeus, Celsus and Galen, and as subsequently recorded by Sydenham is identical with the disease of recent times, varying in some of its characters however as all diseases are found to do under different circumstances.

Aretaeus gives the following description of it. "It is he says one of the severest diseases that exists, consisting of violent vomiting, and purging of a watery fluid; he then describes the burning pain and constriction at the epigastrium, the contractions and twitchings of the tendons, spasm of the muscles, blueness of the nails and coldness of the extremities, that the urinary secretion is suspended and the bladder contracted

and that the patient becomes pulseless, loses the power of articulating, that the spasm and exhaustion prevent him emptying the bowels, and death speedily takes place.

Sydenham describes it as a disease characterized by immoderate vomiting, and discharge of vitiated humours from the intestines, with violent pain and distension of the abdomen, a small irregular pulse, cramps, coldness of the surface etc, and frequently destroying life in less than twenty four hours.

On comparing these descriptions with the disease as seen in recent times there can be little doubt that they apply to a similar disease.

The Cholera is however generally considered to have first appeared in 1774, receiving however very little attention until 1817 when a violent outbreak of it occurred at Jessore on the Ganges, from whence it quickly spread over the whole of the Indian Peninsular reaching the most southern point by 1819, it then commenced to spread both in an easterly and westerly direction, in the east it had overun Southern China and the Indian Archipelago by 1821, and by 1824 had attacked the whole of Northern China. On the west it arrived at Muscat in Arabia in July 1821, breaking out ~~A~~ in the same month at Bagdad and Bussorah and during 1822 and 1823

ravaged most of the populous towns of Mesopotamia Syria and Egypt.

In 1823 it attacked Orenburgh on the Tartar frontier, about four hundred miles north of the Caspian Sea, here it seemed to have stopped, but it was merely a short lull in the storm for in 1828 it reappeared with increased violence, seizing one fourth of the inhabitants, and destroying a fourth of those attacked.

In 1830 it left Orenburg, but broke out on the southern shores of the Caspian, thence spreading along its western shores, and destroying in Astrakan between the ends of July and August upwards of 4000 persons in the city, and 21270 in the provinces. From Astrakan it spread both on the north, and south of the Black Sea, reaching Smyrna by September 1831 and Constantinople by October. On the north it arrived at Wilna by January 1831, Moscow by September, Dantzic in May, and St Petersburgh in June; from St Petersburgh it passed to Berlin and Hamburgh, arriving at the latter place in September. From Hamburgh it passed to England, breaking out at Sunderland in October, at Newcastle a month later, and in December at North Shields, Tynemouth and Gateshead. It first occurred in London in February 1832.

In Scotland it broke out at Haddington on Christmas 1831 and at Leith and Edinburgh in the following

January. From England it passed west to America, arriving at Quebec in June 1832.

During this pestilential march the mortality in the different countries was immense. In Arabia one third of those attacked died. In China where all precautionary measures were neglected the mortality was still greater. In Persia it destroyed one sixth of the inhabitants of the cities and towns. In Russia in 1832, 54,000 were attacked and 31,000 died. In England there were 49,594 cases and 14807 deaths. In London 11,020 cases and 5,270 deaths.

When the Cholera started on its march from India in 1822, it did not abandon that country; in fact since 1817 it has always been present in an epidemic form, in some part or other of that peninsula; causing between the years 1825 and 1844 one eighth of the mortality of the European troops, and one fifth the mortality of the native soldiers.

In 1845 however it broke out with unusual violence in Cabool, and devastated the whole of Northern India.

In November it broke out at Ceylon, where it was attributed to endemic influences, occasioned by the irregular occurrence of rain in the late season. In 1846 it overspread the

the Madras Presidency being preceeded by an epidemic of small pox. From Madras it again commenced its northwesterly course towards Europe, attacking Kurrachee at the mouth of the Ganges in June 1846, wherein 10 days it destroyed a tenth of the population; it then rapidly spread over Persia arriving at Teheran in July, where only a population of 60,000 it destroyed 12,000. From Teheran it advanced to Tabreez, seeming to grow more deadly as it progressed, for only 30,000 it destroyed 6,677. In September it reached Bagdad, where the mortality was so great that the town was deserted, and all business suspended; here it seemed to have stopped and even to have commenced a retrograde movement, but soon it returned spreading on the one hand into Asiatic Turkey, and on the other into Syria, reaching Aleppo by December and overrunning the whole of Arabia, while on the north it reached the Russian frontier, where however it made another pause, but only until spring when it again set out on its deadly march, reaching Astrakan in June 1847, Moscow by September where strange to say the first case occured on the eighteenth, being the same day as on the first epidemic. It seems to have been latent in Moscow through the winter, sporadic cases only

occurring reappearing in an epidemic form in May 1848. It now rapidly spread in every direction, reaching Edinburgh by June, from whence it spread to Finland on the north and Russia on the west, reaching Berlin in July, Hamburg in September and in three weeks after reaching Edinburgh.

Another outbreak occurred in 1854 but it was not so widely distributed as the previous epidemics.

On comparing the two epidemics it will be seen that that of 1848–49 was both more rapid and more fatal than the previous one. The first one was eleven years in travelling from India to this country, while that of 1848-49 occupied little more than two years on its march. The mortality in England & Wales from Cholera in 1832 amounted to 16,437 while in 1848-49 it was 72,180. In London the first epidemic carried off 5,273 while in the last one 14125 died.

I now purpose to consider the mode in which Cholera is propagated, mentioning in the first place the principle theories that have been brought forward and then inquiring as to how far they are consistent with the characters & history of the disease

The first theory I shall mention is one that was brought

forward by Sir J Murray, and called by him the Electric Theory.

He supposed that the disease was owing to disturbed electro galvanic currents, and accumulations in the atmosphere sometimes positive sometimes negative, and causing a want of electrical equilibrium in the human body.

He thought that a definite proportion of electricity belongs and is peculiar to everything, and a natural quantity of it being essential to health, so any deficiency, excess, or derangement of it causes corresponding derangement in the human body, and that a certain quantity of it above or below the natural standard is capable of producing certain epidemics, the nature of which depends on and is equivalent to the scale of disturbed electricity.

This theory would seem to be supported by Dr. Andraud of Paris, who in a letter to the President of the French Academy, states that during the outbreak of Cholera in Paris he had been making daily experiments on an electrical machine, which in ordinary weather gave off after two or three turns of the wheel, brilliant sparkles of five or six centimetres, but that since the epidemic occurred, he has not been able to produce anything like

the same results: but that as the severity of the epidemic varied so did the brilliancy of the sparkes.

This electrical condition was not however general, no alteration of the magnets being observed at either London Berlin or Hamburgh.

Another Theory is that of its fungous origin.
The supporters of this theory think, that it depends on certain vegetable spores, which have been found in the evacuations of Cholera patients, as also in the air and water of the infected locality.

These spores are described as occuring in the evacuations of Cholera patients by Dr Swayne as transparent cells with a thick cell wall, which gives them an annulated appearence, they reflect light powerfully, sometimes they present a cellular appearence, and there is usually a transverse fissure or crack at some part of their circumference. They vary very much in size, the larger cells having a dirty yellow colour and an irregular form, with smaller cells and nuclei in their interior.

Dr Swayne admits that in several of the worst and most fatal cases he failed to find these cells.

Dr Beale found similar bodies in the air and water

of the infected locality.

From these observations they thought that these so called Cholera cells have their habitat in the alimentary canal, and that they do not enter the blood at all; they think that they are most likely inhaled or swallowed with the food and saliva, that when received in an healthy stomach they probably undergo partial digestion, and are either dissolved or rendered innocuous, but that if the vital powers of the stomach are depressed, they will undergo a rapid and prolific development, and cause such irritation by their presence, as to lead to the copious discharges of serum and mucus which are so characteristic of the disease.

On the other hand Mr Busk says, that these so called Cholera cells are spores of a species of mucedo, a fungus that produces the smut in wheat, and often found in bread, and that others consist of the membranous portions of grains of wheat, & of starch granules.

Mr Busks explanation seems to be so generally admitted that it were useless to consider further into it.

The other theories may be more shortly stated, leaving their discussion until they have all been mentioned. The first is that it depends on a general atmospheric influence or epidemic constitution, brought into action by localizing agents.

Another one is that it depends on a poison partially distributed through the atmosphere, and conveyed from place to place by atmospheric currents, human intercourse etc, and only increasing in certain favourable localities, determined by various localizing agents.

~~2 Third~~ The true contagious theory is the only other important one, it supposes that it depends on a poison emanating from, and increasing in the bodies of the diseased.

Having now stated the different theories of its propagation, it remains to consider with which the general characters of the disease best agree.

1st partial distribution through the countries visited, is one of its most characteristic features, this was generally observed both abroad and in Britain, thus in England, as shown by the Registrar Generals Report four fifths of the deaths occurred in 134 register districts, the total number of districts being 623, and again in the different towns it was always confined to certain localities.

The localities visited possess certain features by which they may be distinguished from the places which escaped, those that suffered were thickly populated districts lying either on the sea coast, on great rivers, or in mining districts

while the districts spared have a high altitude and are inland.

Now it would appear from its choosing these particular situations, that the poison whatever be its nature, finds here the conditions necessary for its increase, this favouring the idea that it depends on a poison partially distributed ~~distributed~~ through the atmosphere, and conveyed from place to place by ~~currents of~~ atmospheric currents, human intercourse etc.

If it depended on a general atmospheric condition, brought into action by localizing agents, it ought to attack all low illventilated crowded districts, but this is not the case; and again if it were truly contagious it would not have been so partially distributed.

It was observed that the wind had no influence on the mortality, this also favouring the theory of its dependence on a partially distributed poison, increasing in certain localities, and probably attaching itself to the surface of bodies; if however it depends on a ~~peculiarity in the atmosphere~~ general atmospheric influence it would certainly be influenced by the winds to some extent.

The intensity of the epidemic varies at different

The reverse in Burt – Company
Infirmary with Cholera Hospital
Alison,

times, the variation with a few striking exceptions agreeing with the increase or decrease of the temperature.

If the contagious theory of Cholera be true the following rules must hold good

1st That it should attack persons in proportion to the freedom of their exposure to the emanations from the sick

2nd That isolation of the healthy should have a marked effect in granting them immunity from the disease.

Now for these rules to hold true the nurses and medical men ought to suffer most, but this does not appear to have been the fact, the medical men hardly ever suffering, and the nurses very seldom.

In the Middlesex and Westminster Hospitals during the epidemic of 1849 no nurse, pupil or medical man was attacked, and the same remark holds good of St Georges and University College Hospitals. In St Bartholomews there were 198 deaths from Cholera and only one nurse attacked, while there was also a nurse attacked at St Guys were they did not receive Cholera patients.

Again isolation of the healthy does not appear to have had any effect in granting them immunity for

the disease was in noways restrained during the epidemic of 1832 by the strict quarantine practised abroad, Russia attempted to stop its march by quarantine, but without effect; Prussia guarded still more cautiously against it by similar means, but with the same unfortunate result, these failures stimulated Austria to still stricter regulations, but in spite of all this the malady continued it course unchecked, compelling the King of Prussia to state in his proclamation; "that the Asiatic Cholera had penetrated into his dominions, in spite of measures the most rigorous, precautions the most active, and vigilence the most sustained, which had all proved useless and unsuccessful in averting or even checking its course.

On the other hand when there has been free exposure to the supposed contagion no Cholera has resulted, thus in September 1848 a vessell arrived at Hull from Hamburgh where the disease was then raging, and although two deaths occured on the passage and the seamen were allowed to go on shore, yet no case occurred in Hull, subsequently other vessells arrived from Hamburgh under similar circumstances and with a like result.

In about twelve months however the disease broke out in Hull, but no vessell had at the time arrived from

Hamburgh or any other infected port.

Again of the first twenty eight cases that occurred in London, there was conclusive evidence that no communication took place between the infected persons.

From the preceeding facts I am inclined to think that the Cholera is propogated by a poison partially distributed through the atmosphere and increasing under particular circumstances, the poison probably being distributed by human intercourse, atmospheric currents &c.

I next propose to consider what the localizing conditions are which favour the increase and spread of the Cholera poison, with the means of prevention to be taken.

There can be no doubt that the poison exists more in one place than another, as is proved by fact that when the Marquess of Hastings army encamped on the banks of the Sind in Bundlecund, five thousand perished from this disease in five days, but when the encampment was shifted the plague was stayed. Now as we cannot avoid the danger in this country in the same manner it remains to find out and remove all the causes which render one place worse than another.

The following will be found to be the most important of these localizing causes.

Overcrowding. This does not refer so much to the number of persons living in a certain space, as to the atmospheric air they have to respire.

That overcrowding has a great effect on Cholera is proved by the fact that wherever the disease has broken out with great violence, there has been with scarcely an exception great overcrowding. The committee of the Academy of Medicine of Paris say in their instructions to the people, that the first and without doubt the most important care is to maintain around each individual a pure atmosphere, experience having shown that they who neglect this precaution are the first to suffer.

The evils of overcrowding are the want of sufficient atmospheric air, that the air they do get is contaminated and as a result the exhalations from the body are checked.

To maintain health, each person should have a breathing space of from 700 to 800 cubic feet, and with less than from 400 to 500 life itself is in danger.

Its pernicious effects may be seen from the following examples.

In June 1849 Cholera broke out at Taunton workhouse there being at the time no cases in the town. On examination

the rooms generally were found to be only eight feet nine inches high. ~~and~~ In a shed fifty feet long, 9 feet 6 inches broad & 7 feet 9 inches high, were crowded sixty seven children, the shed being used as a school room. As a result there were sixty deaths in one week.

At East Farleigh near Maidstone one thousand persons were employed in hop picking, and the accommodation being very limited, each person had only about fifty cubic feet of breathing air during the night. Cholera broke out amongst them and in four days there were 300 cases of diarrhoea, 97 of developed cholera and 47 deaths.

The town of Soree in Hindoostan contains a population of 35,000, but in June or July when an annual festival occurs as many as 150,000 pilgrims visit it, and as a consequence of this overcrowding, Cholera always breaks out, the town having been previously very healthy, and as soon as the pilgrims return the disease subsides.

Dampness is another condition favouring its propagation, a damp atmosphere perhaps holding the poison in solution and thus favouring its ready transmission.

Dampness may depend on water in the neighbourhood, or it may proceed from the subsoil on which the place is

built being abandoned. Cholera has frequently been noticed to attack lofty situations, leaving the lower ground in the vicinity unvisited, but in these cases there has generally been found a reservoir or other bed of water at a still higher level, the pressure of the water keeping the part below in a state of moisture. In the epidemic of 1849 64 percent of the deaths in London occurred close to the Thames; and at Hamburgh it was very similar, the principle mortality being in the immediate vicinity of the water, it must however be remembered that there were other localizing agents at work in these situations.

Filth has very great and evil effects on Cholera in common with other diseases, although until very recently this was not believed, much less avoided; and even now the smell from cowhouses privies etc are often deemed rather healthy than otherwise. The Cholera has given abundant proof of the absurdity of this popular idea, for instance near Christ Church Union London there was a manufactuary of artificial manure, and whenever the works were in operation the mortality in the workhouse was much increased, small pox fevers etc being also of more frequent occurrence.

Dr Baly thought that the diarrhoea and dysentery

so frequent in Millbank Penitentiary proceeded from the effluvia wafted across the Thames from the Lambeth bone works.

At Hull the town refuse and night soil was formerly deposited on a piece of ground of about three acres in extent, and wholly surrounded by houses, all of which were severely visited by Cholera, and in one row extending about 200 yards there were 91 deaths.

Another important localizing cause is bad drainage, for good draining removes all surplus water, as well as decomposing matter suspended in the water.

In Plymouth there was during the epidemic of 1849 only one clean and airy street attacked, and in this the attack was confined to two houses, the drains from which were afterwards found to have been dammed up by some railway works in the neighbourhood.

The use of impure water is another predisposing cause, for whenever the water has been contaminated by the contents of sewers, privies, drainage of graveyards etc, the attacks have been more sudden and violent, and the proportion of deaths greater, even than in circumstances of overcrowding.

As a proof of this assertion I may state that out of 22 persons living in Windmill Square London and supplied with

water from a well into which percolated the contents of a cesspool 11 deed.

In Hope St Salford a violent outbreak of Cholera occurred, and on investigation it was found that the sufferers used water from a pump, the well of which was only nine inches from a sewer, which consequently leaked into it. This water was used by the inhabitants of thirty houses, amongst whom there were nineteen cases of ~~Cholera~~ diarrhoea, and twenty six of cholera, twenty five dying. Amongst the inhabitants of sixty houses in the vicinity, but who used different water there were only eleven cases of diarrhoea and one of cholera.

Age has not any marked effect on the mortality, those in the extremes of life however dying sooner than others, in fact in these cases the disease often proved fatal before it reached the collapsed stage.

Sex also causes very little difference, the proportion of deaths amongst males being 1 in every 331; amongst females 1 in every 333; in many districts however the proportion of deaths was greatest amongst females.

I now propose to consider the general characters and course of the disease, with its exciting causes, pathology and treatment.

The Exciting causes are in fact anything that depresses the Nervous system, the most important being Fatigue Long fasting, intemperance, exposure to heat or cold, the influence of Malaria etc.

The effects of intemperance are very marked, the drunkard suffering more than any class; this refers not only to the habitual drunkard but also to those who indulge in occasional excesses.

In Hamburgh it was observed that every Monday morning brought with it an increase of Cholera cases in the port, and on enquiry it was traced to numbers of the sailors going on shore and getting drunk on the Sunday.

In addition to these causes, there may be enumerated as predisposing causes, all diseases of the intestinal canal, of the heart, lungs, kidneys etc, and in these cases not only is the disease more likely to attack the person, but the attack is more likely to prove fatal.

Symptoms. The Typical form of the disease may be divided into three stages ie The Premonitory, Collapsed and stage of the Consecutive Phenomena.

The Premonitory Stage. Probably the first thing observed will be the peculiar countenance of those about to be attacked, it is pinched and collapsed with a darkening usually round the eyes, but in addition there is a peculiar expression unseen in other diseases. The skin assumes a dusky red hint, soon followed by great depression of the nervous system, manifested by headache, loss of muscular power and general malaise. The circulatory system becomes depressed, causing a small slow and often intermitting pulse, there is slight pain in the abdomen with profuse diarrhoea, the stools being first faecal then becoming watery. A remarkable character of this stage of the disease is the complete indifference manifested by the patients, even though numbers may be dying on every side.

In some cases the diarrhoea is the only premonitory symptom, of 106 cases observed by Briquet and Bodier 83 felt no previous indisposition at all before the diarrhoea, 4 had headache, 9 general malaise, and 10 had slight pain in the abdomen with loss of appetite.

This Premonitory Stage may last only a few hours, in fact sometimes it cannot be said to occur at all, the patient being struck down in collapse from the very commencement, in other cases it may last some days

The duration of the premonitory stage in 134 cases is shown in the following table.

In 3	cases it lasted	1 hour.	In 24	it lasted	1 day
5	" "	2	11	" "	1½ days
3	" "	3	21	" "	2 "
6	" "	4	14	" "	3 "
2	" "	5	3	" "	4 "
10	" "	6	3	" "	5 "
1	" "	8	2	" "	6 "
9	" "	12	13	" "	8 "
2	" "	16	2	" "	10 "

The Stage of collapse is an exaggeration of the premonitory one, it is marked by severe vertigo, a sense of great oppression at the chest, with a burning pain at the epigastrium. Cramps comeon, commencing at the extremities, but rapidly extending to the trunk. The most marked symptoms however are the vomiting and purging, the evacuated matters resembling rice water in appearance, and vomited in immense quantities and without pain. Respiration is quick irregular and laborious, the inspirations being long and difficult, and the expirations very short. The pulse is slow and already frequently extinct at the wrist. The countenance

is pinched and anxious, the eyes sunk, the whole surface assumes a leaden colour with red streaks corresponding to the course of the large veins, the extremities look shrunk and sodden, the nails blue. The temperature is very much decreased, even the breath feels cold to the hand, a cold clammy sweat breaks out which has a peculiar foetid odour. The mind is generally unaffected except that there exists great apathy, and a desire to be left alone. This stage usually lasts from six to twenty four hours and very frequently terminates fatally, should death however not take place reaction comes on ushering in the consecutive stage of the disease.

Commencing reaction is generally evinced by hiccough occurring, and by the return of the pulse to the wrist.

The reaction may be moderate and the patient well in a very short time, or it may be imperfect, fluctuation occurring between collapse and reaction, or it may be excessive constituting the consecutive fever.

In the consecutive fever which is generally if not always symtomatic of renal disease, the symptoms of reaction speedily disappear giving place to

those of ordinary typhoid fever, the pulse becomes small and weak, the temperature falls to very little above the ordinary height, but the skin feels harsh like a piece of thin parchment from the secretions not being restored to it. The urine becomes limpid, the tongue brown, and the teeth covered with sordes, and low muttering delirium comes on; these symptoms go on from bad to worse, the delirium becomes more severe, the tongue almost black, and the patient assumes the typhoid posture which is one requiring the least muscular exertion. The countenance becomes totally void of expression with a peculiar flush over the malar bones. The fever now begins to assume the form nurses call putrid fever, marked by clothes picking, fly catching and other symptoms indicating great nervous exhaustion. The discharges are passed involuntarily, dark purple petechiae appear, diarhoea comes on, and the patient dies comatose.

There is also an eruption comes out, generally appearing on the second day, very marked on the fourth, and disappearing on the sixth.

Besides the typical form of the disease just

mentioned there are some modifications of it ie Cholerine, Cholera Sicca, and Cholera with Renal complications.

Cholera Sicca. The symptoms and course of this variety are similar to those of the typical form except that there is no purging, after death however the intestinal canal is usually found filled with the rice water fluid. The circulation is very early and very much depressed, and the collapse is very severe. It is generally fatal.

Another form is the Cholerine or Cholerac Diarrhoea. In an epidemic this is the most frequent form met with. It is very similar to the premonitory stage of the typical form, there is profuse diarrhoea which may be accompanied by vomiting, and either with or without pain. It is almost invariably followed by the consecutive fever.

Cholera is frequently complicated with Renal disorder, which is especially marked during the consecutive fever. There appears to be some change in the kidneys interfering with the elimination of the urea, which consequently accumulates in the blood, increasing the violence of if not causing the consecutive fever. The urine is of low Sp. Gr. small in quantity, and frequently albuminous, tube casts and blood corpuscles are also

of the present.

In sixty seven cases of Cholera in the Edinburgh Infirmary the urine was examined, and in

16 it was found decidedly coagulable
17 " " highly "
20 " " slightly "
14 " " not "

The Blood in Cholera is found on examination to be more demaceous, darker coloured and less coagulable than in health, the Sp. Gr. is increased being frequently 1081, the water is diminished in nearly corresponding proportion to the amount of the discharge from the bowels, the solids being at the same time increased. The fibrin does not seem to be diminished but its quality appears altered, being less coagulable than in health. The relative amount of the albumen is increased as might be expected from the small amount contained in the evacuations. The relative amount of saline matter is increased, the diminution of the alkalinity which is observed being probably due to organic acids contained in the blood.

The Post Mortem Appearances.

These vary according to whether death occurred during collapse or reaction. When occurring during collapse the following conditions are observed.

The temperature rises after death in most cases, and where it does not do so the bodies are generally observed to be a long time in cooling, this phenomenon has not yet been explained; may it not depend on some chemical changes in the blood, which were previous to death prevented by vital influence?

Muscular movements also frequently occur until the rigor mortis sets in, ~~and then~~ which is very severe and continues for a long time, often from twenty to forty hours.

The stomach is found pale and distended ~~and filled~~ with thence watery fluid which is frequently tinged with blood. The mucous membrane is covered with a layer of tenacious yellow mucus, the membrane itself is sometimes thickened, seldom softened, but sometimes when death occurs very quickly a membrane similar to that ~~see~~ occurring in diphtheria is found.

The portal veins are found distended with thick pitchy blood and the peritoneum is frequently covered with a tenacious yellow fluid.

The small intestines are thickened and hyperæmic

the congestion sometimes extending over large patches, sometimes only over a very small portion. The villi are prominent, often denuded of epithelium, the glands are enlarged and prominent. The mesenteric glands are slightly enlarged.

The large intestines are congested but not to such an extent as the small, the mucous membrane is oedematous sometimes ulcerated, the intestines are generally filled with the rice water fluid.

These rice water evacuations are either alkaline or neutral with a Sp Gr of from 1006 – 1010. The composition, which however varies a little according to the time when observed is shown in the following table.

Period when observed	Sp. Gr.	Albumen in 1000 parts	Extractives in 1000 parts	Sol salts in 1000 parts	Total solids in 1000 parts
Diarrhoeal Period	1012·9	0·466	3·846	9·04	13·9
Early stage of Collapse	1009·	2·4	1·27	10·98	14·65
Full stage of Collapse	1009·5	1·18	·55	9·14	10·87
" "	1008·3	·27	2·33	8·33	10·83
Commencement of Reaction	1008·9	1·48	6·033	9·085	16·62
Relapse	1017·83	·833	17·353		18·21

The following is the microscopic appearance of this fluid. Amorphous granular matter, finely granular cells, blood corpuscles in minute quantity, except the cold stage in many

fevers, when they are more numerous, lastly there is a varying amount of epithelium.

The spleen is slightly diminished in size causing its capsule to be wrinkled. The liver is also generally shrunk, but the hepatic and portal veins are both filled with dark blood. The gall bladder is distended with dark coloured bile. The kidneys generally contain a little serous fluid, the cortical portion and papillae are congested. The bladder is contracted and empty. The lower portions of the lungs are generally oedematous, and sometimes there is slight pleuritic effusion, sometimes there is also a little fluid in the pericardium, the amount varying from a drachm to an ounce. The sinuses of the brain are loaded with dark blood, sometimes there is slight effusion.

When death occurs during the stage of reaction the morbid appearances are very much the same as in the collapsed stage, the intestines however are not so much congested, & the shrunken appearance of the liver and spleen has disappeared. The kidneys are very much congested and enlarged, with the secreting structure pale oedematous and easily lacerated, the tubuli uniniferi are filled with epithelium and nuclei. The lungs are often very much congested and generally there is cerebral effusion.

If we take it for granted that Cholera is due to the action of a poison, we have yet to consider how this poison acts on the body. Does it act directly on the organic nervous system or does it act primarily on the blood? These are questions which cannot be positively answered still it seems probable that the poison is inhaled into the lungs where by depressing the vital energy of the nerves of this organ it interferes with its proper function, diminishing its expansile action and so interfering with the proper aeration of the blood, that this is the case seems probable from the laborious inspirations and rapid expirations, the coldness of the expired air, the feeble retraction of the epigastrium and hypochondria, all which symptoms indicate that the vital action of the lungs is almost suspended. The nervous power actuating the heart is also depressed, the pulse becoming small weak and nearly abolished.

This imperfect action leads naturally to congestion of the lungs and to changes in the blood, this again acting on the abdominal viscera which become congested and at the same time their vital activity being ~~being~~ diminished (for a depressing agent acting on any portion of the sympathetic system rapidly influences the whole)

leads to suppression of the secretions, and to exudation of serum from the over distended vessels, this exudation causing still further changes in the blood, leading to the state it is found in during the stage of collapse.

These changes are accompanied by great diminution of the temperature, this may be readily accounted for, ~~for~~ it has been found by Liebig that the heat evolved during the combination of the free oxygen contained in the arterial blood with the carbon it meets with in the capillaries is sufficient to keep up the temperature of the body, now as the blood is imperfectly arterialized, it necessarily follows that there can be little chemical action in the capillaries. It is however remarkable that the ~~capillaries~~ temperature rises after death, this increase is generally observed commencing in the extremities, and is most marked when the purging had not continued for a long time, sometimes the warmth begins to return to the surface a few minutes before death takes place.

During the stage of collapse the secretions and changes in the tissues seem to be suspended, but when reaction commences secretion and wasting of tissues begins too, as a consequence of this wasting

urea is formed in large quantities, and if the kidneys do not quickly regain their function and excrete it, it will accumulate in the blood and lead in all probability to the consecutive fever.

Having now considered the symptoms and pathology of the disease, it only remains to enquire as to the best method of treating it. Being a disease of comparatively recent introduction into this country, its treatment has been necessarily a very much disputed point, and the disputes appear generally to have been whether this or that drug was the remedy, as if every case was to be treated by the same remedy, and general principles of practice to be ignored!

The rational treatment may be conveniently divided into the prophylactic and the treatment of the attack.

The prophylactic is decidedly the most important. Fortunately an attack of cholera generally gives distinct warning of its approach, so that there is generally ample time to carry out the necessary precautions; if these are neglected our medicinal treatment will be of little avail, therefore we must consider it rather

as a pestilence to be checked by measures of prevention than as a disease to be cured by medicine.

The prophylactic treatment will consist in rectifying all the conditions which were previously mentioned as localizing agents of the disease and also in avoiding all depression of the nervous system which we have seen to act as an exciting cause. In Malarious districts quinine will be found useful, and under all circumstances the moderate use of ripe fruits or vegetable acids is advisable. The cold bath and open air exercise should be taken if possible, and in fact all the rules of hygiene should be strictly observed.

Having failed in our prophylaxis, we must endeavour to cut short the preliminary stage of the disease, and if properly managed this may generally be done, there is a great difficulty however in seeing the disease during this stage, for the apathy which we saw to be peculiar to it prevents those attacked from applying for relief, in fact they hardly seem to observe that they have got diarrhoea. To remedy this evil it was found necessary during the epidemics which have visited this country to appoint properly qualified persons to make house to house visitations and so to discover the disease in its incipient stage

When we meet with the disease in this stage it will not do to let the diarrhoea run on in the hopes of its removing the poisonous matter from the system, for experience has shown that it will do no such thing, but that it still further depresses the already weakened system.

Opium will be found the best means of checking it, given in combination with carminatives and astringents, when thus combined the usual effects of the opium are not produced but the astringent effect is very much increased. We must also give diffusible stimulants. Should these remedies fail the mineral astringents must be used such as the acetate of lead or the sulphate of zinc. External warmth and friction applied to the surface will be found also of the greatest use.

In spite of all preventive measures however, the disease frequently runs on to the collapsed stage and in these cases we must still ply our remedies though with less hope of success for the gastro intestinal mucous membrane is in such a condition that absorption is almost suspended, medicines being consequently more likely to prove inert masses than active remedies.

Various methods of treatment have been in vogue, many of them as previously stated depending on some particular

drug, and of this class no treatment has been so much followed as Dr Ayres treatment by large doses of calomel, why it should have been so much employed is a mystery, for it can only be administered on empirical grounds, its good effects are however supposed to be proved by several statistical returns that have been published on the other hand it must be remembered that those whose mortality was ~~below~~ above the average would not care to publish the fact, besides from the cases that have been published we can only learn that in general no appreciable effects followed the administration of the drug, even after large amounts in frequently repeated doses had been administered, in fact it was generally either vomited or ~~by~~ passed by stool unchanged in the majority of cases.

I do not intend to enter into an enumeration of all the other remedies proposed, for in short almost every drug in the Materia medica has been recommended, but shall proceed to state what appears to me to be the rational treatment.

As the principle difficulty to be overcome is the depression of the nervous system, so the remedies must be chiefly directed to its stimulation, for until

that be accomplished little good can be expected. Stimulants then will be found to be the remedies to be most relied on, and they should be combined with small quantities of opium, some object to opium, they say it depresses the system still more, but if properly given this is not the case, for when given in small doses it causes excitement, the subsequent depression being slight and a long time before it comes on, so that by frequently repeating the dose the stage of excitement may be kept up continuously. The best stimulants are [redacted] Ether, camphor, musk or castor. In addition external warmth and friction must not be desisted from. It has been proposed to excite reaction by giving emetics, the effect however is only temporary and the subsequent depression is worse than ever. Salines have also been tried with the intention of restoring to the blood a fluid similar to that it had lost through the diarhoea, but if given at all they it must be when the alimentary canal has recovered its power of absorption. For the same reasons saline injections into the veins have been tried the results however

not being very favourable, still there has not been a sufficient trial of it, as the cases selected for its employment were generally in the extreme stage of the disease, and even in these the effects for a time were even magical, relapse however coming on in no long time. The fluid injected should be as near the composition of the rice water evacuations as possible and the quantity should not be too large.

Although the fatal tendency of the disease may be avoided during the collapse, still in many of these cases the reaction is imperfect and the patient slips through our fingers just when he is considered recovering. Sometimes recovery seems to be taking place rapidly, when a relapse occurs and the phenomena of the cold stage once more occur. This stage therefore requires careful watching with the means ready to repress reaction if excessive to stimulate it if deficient.

Reaction when excessive generally terminates in the consecutive fever which so commonly terminates the disease. In treating this fever the great thing is to avoid depressing the system during the cold

period of reaction which occurs, if we do, the patient in all probability sinks during the subsequent course of the attack. Draughts of Citrate of Ammonia with slight excess of Ammonia may be given, or equal parts of Liquor Ammoniæ Acetatis and Camphor Mixture. The nervous system must be gently supported because we know that great depression will very soon occur; the perspiration may be excited by a grain of calomel and three of Dovers powder every three hours.

As soon however as the symptoms of exhaustion come on we must be ready with Ammonia Wine Beef Tea etc. The use of opium requires great caution, we must be sure the symptoms are those of irritation from nervous exhaustion, and that there exists no tendency to cerebral congestion, in favourable circumstances however it is of great advantage.

When there is renal complications we must get the Kidneys to act as speedily as possible by fomentations, dry cupping over the loins etc, keeping up at the same time diaphoresis until the kidneys are able to take their own part of the work. Saline diuretics must however be avoided as

they are likely to tell further aggravate the morbid state of the kidneys.

The books I have consulted, are included in the following list

Dr Copelands Dictionary of Medicine
Reports on Epidemic Cholera. Dr. Baly & Gull.
Reports of Registrar General
" of General Board of Health
Braithwaits Retrospect of Medicine 1848. 1849.
Lancets 1848. 1849
Medical Gazette 1832.