24th April 1829

Sir,

By desire of Dr. George Hunter, Colonel T.C. Nicholson, at present a prisoner, we have forwarded the accompanying declaration, to be signed, at your order, in the name of the said Colonels, by his son, in payment of the said fee for graduation as a Doctor of Medicine at the Royal University of Edinburgh. I will you please to acknowledge receipt.

Yours, faithfully,

Grindlay

The Dean of the Medical Faculty

University of Edinburgh

I certify that this Thesis has been written by me as the result of my observation, experience and general knowledge of the subject and has been compiled entirely by myself.

[Signature]

Hermes.

Italy

23rd April 1893.
Cholera and its Treatment.
The Etiology of Cholera.

Cholera is generally at the present day considered to be a fifth disease, though in days past very remote it was looked upon as surrounded by much mystery. It is considered to be caused by many and varying agencies.

The Cholera first struck Constantine, and then in its so-called endemic form in Upper Bengal and as the years wore rolled by, it became more and more convinced. The existing conditions are the same agencies through which it is produced and maintained. In the Thana has lived any time in the towns districts of Upper Bengal, one has failed to notice how terrible existing conditions prevail everywhere. It is practically only in the European quarters of Calcutta and in one or other towns in Bengal that one can say that there is any sanitation existing. The disease, though the native parts of Calcutta, which is the most inviting town in Upper Bengal, are garrisoned and surrounded by the British forces supply there is both a family. In all other towns that I have acquainted with, such as Decc, Patna, Moolchakha, Guja, Hooghly, Howrah, Serredpore, Burdwan, Murshidabad, guesthouse.
The native quarters are all terraced. There is nothing in them worthy of note, except the houses and wells. None of them possess any wells supply of water. The water supply is most inadequate. In town the water supply is mainly got from wells. Sinks are occasionally found in houses. The sinks which are in the native parts of towns are usually used both for bathing as well as for drinking purposes. In many towns the natives have wells in their courtyards for drinking purposes. In a few streets there are wells near the houses, into which the dung, all refuse, etc., are thrown. These wells are usually placed at the entrance of the house. In the districts of Bengal unhealthy conditions prevail. It is quite as great as in the towns. The wells and sinks near the villages are all little polluted. The villages, besides this, have absolutely no system of drainage. The people clean their yards and wash their houses.
For purposes of illustration, suppose than the
hills their cattle are usually housed or tied up
close to their dwellings. I do arrangements are
made to carry away this urine +
droppings, etc., where the litter is
collected by the women. I dried into these used as fuel. I planted on the sides
of the houses being. Dirty water is getting
anywhere near the house.

On the any reasons Sole station up to
its think. Water is there always scarce generally in consequence more filling with
hand. The river's current help dry up
the Great amount + water generally in these
is dirty. Then this is the clue, cholera
usually shows itself. The occurrence of
the disease in May & June in some Bengal
is. I believe, always coincident with the
river's polluted state of the valley in
these months. The towns + villages in
some Bengal being in such an insanitary
condition + the climate being so hot,
that it is not the desired at. I think,
that cholera has its home in
this is so called endemic area.

The cholera poison whatever
it is, I believe, can be destroyed for long
in the soil of the endemic area. The
reason it can do so, I think, is made
clear by Bacteriological research. Which
have been verified by the subsequent observations of Gruber, Huguley and Freudenthal. It is maintained by these writers that the Cholera germs lives even renewed its virulence after a residence in the soil. There is no doubt, moreover, but that the soil is the great receptacle of the cholera germs. Here it can live. From this it can be dispersed and dissolved out, or is carried into drinking water or is cured by the birds as duck. In crowded dwellings surrounded by all the inciting conditions met with in an Indian town as Delhi, or in ground around their roughly populated dwellings, there is every chance of this cholera germs finding a breeding ground. I think it does. I am in part these breeding grounds it is, under favorable circumstances, actually being found at in the endemic area. I believe the disease is practically never directly brought from its so-called foci. I think that it is being produced by Trocht's comma bacillus, or perhaps several varieties of vibrios of this kind, living in the germs or germs which produce the disease cholera. Admitting this to the case the life history of these bacillus and its allies shows that they can live 1
In the soil. They can also efficiently live in soil, in damp legs & in air. They are practically always found in the abdomen of the patient, where they can find their way into the soil, water, air, or air. On some occasions, however, that in the endemic area these germs may lie in the soil for long periods unless washed out by rain or blown out of the air. They can remain quiescent for long periods. I have this to an inspection. They choose in the endemic area to lie. It is broken out incidentally 1 to doubt in each case. Can then be found. To connect these outbreaks with the occurrence of cholera in distant parts, as their can be done. Such outbreaks here until they been thought to third from the general beingGames generated diseases. I think the explanation their past since is more likely to the true one.

There is a strong tendency of opinion showing that the cholera being can be traced generally is introduced into the human subject through the medium of drinking water. It is unnecessary for me to quote the numerous instances where it has been proved is demonstration that
an outbreak of cholera has and its origin and virulence{"/n/"}two or three weeks. The recent epidemic in Hamburg is a case in point. The glibly professed belief of the City that flour, milk, and other articles of diet are the means of propagating the epidemic, is, it was not until the use of its water was prohibited, unless they were boiled and filtered, that the epidemic began to show signs of abatement. And I saw again in India an epidemic of cholera has been traced to this cause. In the Cholera season in the endemic area, I am convinced that cold water is, as a rule, the cause of the cholera. In the district of Calcutta, where I was stationed in May 2 June 1892, I particularly noticed this. It was an unusually dry year. The intense heat, followed by intense and unusually dry. The consequence was, the water was therefore unusually early. Besides this, the district there had been scarcity of food, prices soaring. The failure of the crops the previous year. The people, therefore, were living on dry, coarse food. I my little girl, the mango fruit was plentiful. I was forced to eat the fruit as a substitute for proper food. As a result of this deprivation of circumstances was, I, cholera was
Vomiting extensively prevalent in many parts of the district. In all the town; it only ceased then the rainy season set in. The milk supply was thus a consequence improved.

Besides being diluted by water, cholera is also at times spread by bad milk. I believe this to be the reason. I did not understand it until Dr. D. D. Cunningham has informed me that there is a certain amount of safety in milk as it contains such an enormous number of various forms of bacteria that are less digestible than the cholera bacillus, that that bacillus has no chance of life in milk for any time.

When I was resident physician at the Cheltenham General Hospital from 1877 to 1883, on several occasions I noticed cases of cholera in milk supplied at shops by milkmen who admitted delivering their milk from cows situated in a cholera neighbourhood.

The Health Officer of Cheltenham, Dr. G. J. Simpson, has recently recorded such a case as having occurred in May 1887 on board the ship "Ardenchetta" at the Spithead Dockyard in Cheltenham. In this instance the outbreak was traced to the milk supplied by a native who it was discovered had placed 25 per cent. of water in the milk from a tank near his house which was
CONTAMINATED WITH CHOLERA MATTTER. If the man
who drank this milk died of cholera 25
had severe diarrhoea. One who drank
very little of the milk escaped. Eight men
who drank preserved milk 3 three who
drank more at all escaped. The complaint
altogether. When the use of the bad milk
was stopped no fresh cases occurred.

The following incident which
occurred during my stay here also goes
To prove that milk can be a source of
cholera. In May 1891, Dr. B. gave a dinner
party in Dehradun. Some 8 or 10 guests sat
down to dinner. The milk ordinarily
supplied Dr. B. came from the Dehradun
Semiotic Appliance Dairy. It was pure. I put
The bottle of the day's supply in milk was
washed up, finally in the office supplied to
the guests after dinner. Dr. B. was in the
habit of drinking a glass of milk in the
early afternoon. His servants, having
washed up all the usual supply, put milk
sent into the bagasse near his mistress's
house, I bought some milk for his use
in the early afternoon. Dr. B. drank
this as did also his servant in the
house. Both Dr. B. and the servant were
attacked with cholera within 12 hours. I
May 1891. I died. So did else in the house
not any of the guests who had been at the
disease were attacked. Shortly after the R.O. came alive in the first house. The one in which M. B. had died. He was a few. Coons, he said. The bazaar for which was supplied by the same millman. He had supplied M. B. a couple of weeks previously. M. C. got cholera. I died in a few hours.

Inquirying it was found that the millmen had buried both samples. Quick, I be admitted being in Delhi from a bell near his house which was at that time being used by some peculiar who were suffering from cholera.

Besides being propagated by the mode of Delhi's sick, it much cholera also sometimes must be spread by the atmosphere. Except in this day it is impossible to account for the occurrence of cholera in some cases. Thus in 1893, when I was in charge of the Agra Costly Immigration. The following occurred:

I sent 300 from Goondub, a bazaar at the junction of the Ganges & Jumna river. A steamer called the "Najmahal" under the Command of Capt. Wallis with some two or three thousand immigrants going to Assine. The emigrants were not exposed to cholera either in Calcutta or Goondub before their embarkation. Not four days after the vessel started there
Having been no Case of Cholera so far as the
Bengalee, the Sleumner encountered a heavy
and hot season. The cold blew from the
direction of the district of Bogra in which
there had been Cholera prevailing pretty
generally. Within 12 from several cases
of Cholera occurred among the Emigrants
Continued to occur during the rest of the
Bogra & Adaur.

Again, I have seen more than once been one
or two cases of Cholera occur in the Public Jail among
prisoners who have never been outside the
Jail Walls where Cholera has been prevalent
in the neighbourhood. The water supply
in the jail at the time was obtained
from inside the Jail, far from the
place where Cholera was prevalent. The
food at the same time and fall been
stored in the Jail for several months
and not been recently brought. At the
time of these occurrences there was a high
wind and much cold blowing from the
direction in which Cholera Cases were
more the occurring. There was no
wind from the direction of the
outbreak at the jail.

In the General Hospital in Calcutta in
1879 I remember 50-60 Cases of Cholera
occurring on the side of the large
water tanks in the Hospital which was
in charge. There was no other way of accounting for this outbreak as far as I could see than by assuming it had been the due of the cholera germs being rafted by the patients in the wind which blew across the place where they were attacked.

Cholera is more attracted by damp buildings. It has repeatedly been known to attack soldiers in certain barracks in Europe among those on their inspecting the barracks. I have seen this in England. In 1859 I remember that certain buildings used as servants' quarters had not been vacated as the person after another inhabiting them was attacked with cholera. The disease ceased among the rest when they all left the quarters. In the colonies where buildings close together are used, cholera is more likely to attack them. In these cases cholera is known to spread through the lungs, coming off the walls, floors, etc.

It is a peculiarity of cholera that all people are not equally susceptible but. It appears true that there are certain states of health predisposing but while others are

impossible to. Thus again, at any rate in the epidemic area, I think acclimatization
in charge. There was no other way I
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In 1879 I remember that certain buildings
used as servants' quarters had to be vacated
as the person after another inhabiting
them was attacked with cholera. The
disease ceased among the rest when they
all left the quarters. In the instances
where buildings ceased to produce cholera,
I believe that the cholera bacillus is
attached to the walls or floors so that it is
more than likely that the bacillus in
those cases enters the human system
through the lungs, coming off the walls
or floors as dust.

It is a peculiarity of cholera that all people
are not equally susceptible to it. It appears
true that those have certain states of health
that predispose it, while others are
immmune to it. Thus, again, it any rule in
the endemic area, think aclimatisation-
is a factor in producing immunity. As a rule in Calcutta, Cholera is more prone to attack new arrivals than old residents. This probably explains why so few people escape attacks when Cholera breaks out in places outside the endemic area where it today is extremely mild. In 1873-1874, when I was stationed in Calcutta, in Eastern Bengal, I especially noted Cholera broke out at the Assam Emigration Depot. At that time the coolies mostly came from Chota Nagpur. Which is outside the endemic area and these coolies were most susceptible to Cholera. At the time, I was speaking to the Eastern Bengal Railway at Calcutta and was amazed Chota Nagpur coolies employed on their docks and living in the Calcutta bazaar were also not the depots for the Emigration. Coolies. When Cholera was raging in the depots among the new arrivals Chota Nagpur Coolies, it was seldom or never spread the Railway Coolies who were the same class of men, but with this difference. That they had been months, i.e., three instances year in Calcutta which is a place in the midst of the endemic Cholera area.
It is this insusceptibility of some persons to the poison of cholera which I think so often makes it difficult to understand its etiology, I propose in particular outbreak of the disease which has in the past so tended to shroud it in mystery.

In the endemic area cholera is always more or less present in the towns and districts. But it tends to become epidemic or at least more prevalent, at certain seasons. One of these seasons as I have mentioned above is in May and June the other is in October and November. The reason of the greater prevalence of cholera at these seasons is, I think, largely connected with the water supply. In May and June as I have before stated water, especially in the smaller towns and villages, is scarce. The winter wells and courses drying up at the greatest extent. The water that remains becomes dirty foul by people bathing in it, washing clothes, diapers in it, if contaminated by cholera discharges. The people who use it are prone to be attacked by the disease. In the cholera season of October and November I think contamination of the water is again the cause of the prevalence of cholera. At this season...
The Country is crying up after the rains & inundations & Numerous Delli holes in & about the small houses & villages are after dry. In the rains these Delli holes are full & the keli is constantly replenished by more rain or by repeated inundations. Being close the houses people use these Delli holes 0.0 & not 0.0 to until they dry up which is usually a few weeks after the rainy season has ended. As the Delli holes dry up the Delli in them get dirty & foul from people walking as well as washing dirty clothes in them. Hence, if by any chance somebody ill with Cholera happens to use this place i.e. the Delli, it becomes contaminated & soon spreads the disease in those people. Thus using this dirty Delli an unacceptable 

The spread of Cholera from one part of India to another is in fact from India to Europe is by means of human agency. The Disease is propagated along the lines of community it is carried by the people as they travel. The poison is carried in their clothes i.e. rags & from those who carry it the poison usually finds its way into
Drinking大量水 which spreads among the people far and near.

When a large epidemic Virus of Cholera is spread through India, it soon reaches Europe. It is usually started at some large gatherings of the people such as the which takes place every year at Kurta. There the people come in thousands to take in the head waters of the Ganges. In place there they bathe in, at the time of the year when the bathing takes place, a pool in the river, and its waters are very stagnant. The bathing of thousands of persons in this alkaline stagnant pool soon contaminates it. If Cholera poison gets into it the people who bathe, as they usually drink the water to make them feel comfortable. The disease spreads with terrible virulence among them. They take the disease into their homes in all parts of the country, spreading it in the towns and districts through which they pass.

When the disease spreads from India to Europe, it travels from Bengal either westwards by way of Bombay or northward by way of Afghanistan. In the former route it reaches from Bombay the coast of Arabia 1 so along the Red Sea.
of the Red Sea & having reached Jeddah it is conveyed by pilgrims to Mecca & by
them to distributed over Egypt & to
Europe. It the direct route from Bombay & Muscat the various
towns along The Persian Gulf & having
ditched Bastorah it spreads up the
Euphrates & Tigris to Turkey in Asia or
The North of Persia. In this
years the direct route of Persia & Afghanistan, Keral, Irack,
& Turkey to Persia along the shores of
the Caspian or Black Sea or else over the
Caucasus into Russia or Europe.
The epidemic of Cholera which has
raged in Europe in 1892 seems there
started from Hardeci in March &
spread to Luthe in July. From there
by the end of June it has in
Moscow & look afterwards to St.
Petersburg. It spread hence to Hamburg &
Haverbar in York it reached
England in August & in about
3 months from the time of its occurrence
in Luthe, instead of in 3 years as
was the case when Asiatic travel
was slow. When the means of
Communication were more rigid &
Incompleted.

Another means by which
Cholera may be spread is properly by flies. In India, as elsewhere, flies visit in numbers as the ground following bodies of men or the bread. They live to carry about with them germs of every kind. If they accidentally fall into drinking water, they get cooked with their food. There is no doubt that they may carry at times spread a complaint like cholera.

Bacteriology:—Thus said before, let me think the Contagium Divinum of Cholera is probably other than Koch's comma bacillus or some closely allied species. Since the recent epidemic of Cholera in Europe, bacteriologists have had many opportunities of looking at this subject. I have added much to our knowledge, and moreover the accumulated observations of all the workers on this subject since Koch published his results in 1883 have borne fruit. I now go so far to say that a comma-shaped bacillus of this kind is practically always associated with the occurrence of the disease. It seems true that the Contagium Divinum, whatever it is, acts by producing in the body some poison of the nature of a poison, or alkali or, according to the quick or lesser amount of this poison, of its poison or lesser intensity, are the symptoms of the disease more or less severe. This
in my opinion explains in true cholera, in general, the virulence of different cases of different epidemics.

There is no doubt that British cholera, puerperal poisoning, the result of eating bad food, or poisoning from eating muscles, or puerperal are accompanied by symptoms that it is very difficult to distinguish from cholera. I understand that recent researches have shown that a comma bacillus is present in these diseases. Prior and further have shown that the comma bacillus is present in British cholera; Cunningham has also shown this to be the case in puerperal poisoning. I cite his report of the puerperal poisoning which occurred in his study after Hall.

There again a comma bacillus is present in the cholera of young as Gamble has shown, but his case in the history of the fabric I think they not seen it. It is said that a comma bacillus is present in the duodenum of persons suffering from muscle or puerperal poisoning. But I think it is not likely that such will be found in the case.

Again, Cunningham has found roless than ten distinct species of comma bacilli at different times in
The rejection of persons who have died in smallpox has been diagnosed as cholera. Moreover, it has often been observed that there is great variety in appearance and behavior of cholera bacilli in different epidemics of cholera. Cholera occurring in different places. It is possible that, I think Mr. Froelich's particular variety of cholera bacilli may be the most virulent. The one most frequently found in cholera. But it is just possible also, I believe, that varieties in the variety of the bacilli are common and probably account for the peculiarities of variations in the disease. There is no doubt that the variations are very real; so real, in fact, that the physician is often in doubt whether he is really dealing with cholera or only a cholera forerunner.

Several observers in recent years have succeeded in producing in animals a disease which resembles human cholera very closely by means of the cholera bacillus, although all the earlier experimenters of Froelich in this direction were inconclusive. This has been done by artificially increasing the virulence of the bacilli by passing it through a series of guinea pigs. With the bacilli prepared by this means, Gambier has produced in dogs a disease which is said to be absolutely identical in its...
symptoms with human cholera. Gamelcia has moreover produced even in rabbits, by using sterilized cultures, such symptoms of cholera as diarrhea, collapse, thirst, loss of appetite, suppression of urine, the typical changes in the intestines. Very similar results have also been obtained by such workers as Kuppe & Raffilson. In his earlier experiments of Koch, Ermengen, Boger & Dietzsch, working in 1883, cholera symptoms had been induced in guinea pigs, but only after their health had been lowered by the administration of opium, alcohol and other substances.

As a rule apparently the cholera bacillus cannot live in an acid solution. It is, therefore, a question how it manages to escape the action of the gastric juice which is known to be capable of destroying it. It seems, however, that at the commencement of gastric digestion the contents of the stomach usually have an alkaline reaction, and this may gradually lower the acid reaction as it is developed. It seems probable a part of the enzyme poisons the gastric juice before the reaction has become essentially acid and it is, therefore, possible that the members might thus pass through
The stomach ulcerous. This seems likely to be the case, as the clinical evidence is strong that the cholera poison usually enters the system by means of the fluid or liquid food. Therefore, at a time when the stomach contents are in the first instance alkaline or neutral, it is possible also that an explanation similar to that which was found by Gameliea Stephan, the means by which Pasteur and Leblanc found the presence of the cholera bacillus probably affects food, may be found thus as in the case of the cholera bacillus. It may be highly probable that in nature these latter entered the system by the respiratory tract as well as by the stomach. Again, Knepper's aerotic anaerotic theory of the existence of the cholera bacillus may offer another means of explaining away this difficulty.

Pathology: Morbid Anatomy: — When the abdomen of a person who has died of cholera is opened immediately after death, the intestines are found to be in a compact form and in the abdominal cavity in a characteristic manner. The stomach is usually empty and collapsed. In some cases its mucous membrane is reddened and congested, with small spots of ecchymosis on its surface. In other cases the mucous membrane shows little change.
except perhaps in the cloudy swollen condition of its epithelial lining. The peritoneum of the small intestine usually has a peculiar bluish tinge, more especially at the posterior and in the days of colic, and in some cases it may be reddened. The small intestine usually contains more or less fluid which often resembles thin soup if death has occurred within a few hours. When the disease has been acute or longer duration, the contents of the intestines are nearly colourless and contain little flatus of bile pigment mucous. In some cases the fluid in the intestines is stained by the colouring matter of the blood. If the contents of the intestines are examined under the microscope, as a rule a far greater number of comma-shaped bacilli and other micro-organisms are found together with quantities of epithelial cells. More or less reddening of the mucous membrane of the entire length of the small intestine is commonly found with this the epithelial layer is often swollen in patches. In many places the epithelial layer is often detached producing the appearance of superficial ulceration; sometimes even appearing like diphtheritic changes. These appearances are usually found in the
most extensive in the ileum, especially near
the ileo-caecal valve. Pasty patches in the
sticking glands are usually of a distinct grey
colour. While their margins are often
surrounded by a ring of diluted blood
bath here. These hemorogagic spots
among these. These appearances of these
glands are pretty constant and are noticed
even when the epithelial cells are only
partially affected. In cases where the
mucous membrane of the intestines is
very congested, it has become red in colour.
Pasty patches are seen to be distinctly
raised above these. As a rule there is
no fecal matter in the contents of the intestines
there is an absence of gas. It is this
which allows the coils of the intestines to
lie in a flabby congested mass in front of the
spine. The large veins of the abdomen
those supplying the coils of the intestines
are usually and generally butted with thick
viscid dark blood. The preterminal glands
usually are enlarged and often edema is infiltrated
with white granular matter.
Bock states that in the intestines when
the slightest changes are found, he
discovered the comma bacilli had
penetrated into the intestinal glands.
From the ileum intestine coiled here,
irritation as indicated by the opening of the glands
The collection in their interiors of granular circular cells. In many cases he found the bacilli had penetrated behind the epithelium of the glands and multiplied between the epithelium and the glandular membrane. He also found bacilli settled in large numbers on the surface of the villi of the intestines, sometimes they had penetrated into this tissue. In severe cases which terminated in gangrene the mucous membrane of the intestines, the bacilli were found in large numbers: they did not confine themselves to that invasion of the intestinal glands but passed into the surrounding tissue into the lower layers of the mucous membrane. In some instances right through the muscular coat of the intestines. The intestinal villi were also in such cases penetrated by bacilli. The chief seat of these changes in the lower part of the small intestines.

The liver in cases of cholera has generally a threatened look. Its portal vein is full of dark purgy blood. The liver cells are often disintegrated, broken down. The spleen is small, bloodless. It has a tough, lethargic feeling. Located changes usually occur in the kidneys. Their cortical substance is generally abnormally pale.
be examined. Skinned sections the tortuous larynx are not Ushaped. The nuclei here disappeared or contaminate old pieces of the gland. The thyroid gland is usually degenerated is slightly cloudy, if death occurs at this height of the ovulation process, the epithelium will be found to fill the lumen of the lobules. The uriniferous tubule is generally empty. The lungs are 2 quitting, through appearance which is probably due. The alveoli, some of the branches, which allow the elasticity of the organs, behave in an air more completely out of them than usual as soon as the chest is opened. On section the lungs appear the dry containing dry little blood which is confined. The pulmonary arteries and branches. The capillaries of the lungs are empty. Nearly more blood is found in the minute veins. The lungs I then their color appears darker. The right side of the heart is usually found distended. Red blood in the left cavity.

The larger veins such as the Vena cava, the jugulars, the coronary veins are full of blood. On the other hand, the arteries such as the aorta are all the other larger ones are empty, except the pulmonary arteries. The blood found in the vessels is dark and undigested. It still has the power of taking up oxygen; giving off Carbonic acid.

At present we study through the pulmonary
decls that only about a third of the usual quantity of carbonic acid is given off by the lungs and little oxygen is absorbed.

Artificial blood vessels and blood vessels are constantly found in the pericardium inferius in the heart of the body of persons who die from cholera. These are caused by alterations in the cells lining the walls of the vessels in the serous and mucous membranes of the body.

There is very little alteration in the brain except that the veins are full and there is very little fluid in the arachnoid and denticles.

Another peculiarity in cholera is that very few effusions or dropsy that existed prior to the attack are generally dispersed.

Pregnant women usually abort in the early stages; in the latter the woman often dies undelivered. The relation of milk in women who are lactating is continued and collapse is sometimes unavoidable. The menstrual flow also goes on unchecked in persons suffering from cholera.

Cholera, if dependent upon the commixture as seems the probable, is apparently due to a poison or toxin produced by this microbe. This poison acts powerfully on the nervous system through the pneumogastric and sympathetic
To the Dean of the Medical Faculty of the University of Edinburgh,

May I express my profound gratitude for your kind letter of recommendation? I graduated in Edinburgh in 1869 with a Bachelor of Medicine and have since then practiced medicine and surgery as a surgeon to the Indian Medical Service of the Majesty of India. In this service, I am now a Surgeon LT. Colonel.

I am now deserving of further service.

Yours sincerely,

Panzaire

10 Via Panzani

Florence

Italy

Date: April 1873
degree of M.A. of the University of Edinburgh, I understand under the rules connected which it is necessary for me to write a thesis. This I am ready to do. I forward to you an enclosed note in which I have written I should be obliged if you would inform me you may formalize a regulation I must comply with and write it is possible for me to clear my degree in question. In abeyance.
Frank + begin or Mr. Phil. thers on defined size paper (give definition)

Yes.

L. R. Col
Indian Medical Service
To The Dean of the Medical Faculty
Edinburgh University

Sirs,

I am in receipt of yours of the 13th inst. and enclosing a bill to inform you that I passed an examination in Greekology at the University of Edinburgh in Oct 1866. I had no time to take the examination at the time, but I am willing to take it at some future time. By a reference to the record of my statement, it can be seen that I passed the part of the examination, which included the subject of medical studies for the degree of Bachelor in Oct 1866.
and taking good note of you passed
with the subject in 1866 and I have
seen it since then. Since I graduated
in 1867 I have been constantly
in practice as a member of the
Indian Medical Service as a reviser to any any list with
shortage. I will send my letter in 2 or
your 29½ hand. Through time is,
unfortunately, short. I have written to my Banker and have
instructed them to remit to you
$17.50 which you shall add to
her necessary fees for the degree of
Ph.D. This is I can not send before
his 29½ and I shall be to read.
before that date.
I have filled up the memorandum from your instructions, it will be
sent to you by my Bankers, before
Grinding No. 20. You'll also receive any
trinitarian fee.

Yours faithfully,

Frederick Brown Surgeon of H. M.

[Handwritten notes and scribbles below]
The result of this is the pouring out of the intestinal fluids in vast quantities. This is followed by purging and vomiting. This goes on with great or lesser intensity according to the virulence of the toxin. The tissues of the body gradually the blood become drained of their fluids. This leads to the inspiration of the blood as a consequence of difficulty of respiration. The failure of the heart. It is also the reason why secretion by the various organs is absorbed by the stomach are practically at a standstill.

Symptoms: After exposure the victim suffers from nausea. The disease then in a period of incubation which usually lasts 1 to 3 days, but may be shortened to from 12 to 36 hours. The earliest cases of an outbreak of cholera are generally the most severe and fatal. New arrivals in an infected area are those more frequently attacked than persons who have been living for some time in the midst of the disease. The invasion of cholera may be either gradual or sudden. When the disease sets in suddenly there is no preliminary diarrhoea. The patient purge violently, 2 or 3 times, passes into collapse and dies within 36 hours. The more usual day, however, for the outbreak of cholera is gradual. The earliest symptom
is generally diarhoea attended with griping pain & an unusual feeling of exhaustion after each motion. Sometimes, either preceding or with the diarrhoea, there is called premonitory. There is a feeling of lassitude such as an unwell depression of spirits, vertigo, dizziness in the ears & oppression at the epigastrium. In such cases the face is often anxious & pale. The duration of the premonitory stage lasts from a few hours to 2 or 3 days.

Cholera very often begins in the early morning hours or at the usual waking hours of the patient. After the premonitory diarrhoea has gone on for some time, violent purging begins. In this the contents of the bowel are rapidly forced out in fluid form. The material discharged soon becomes colourless & like bile in which rice has been boiled. This fluid, if allowed to stand, deposits a Brazil gum material consisting of mucous globules containing numerous large coxcoles & large quantities of granules & various bacteria. Soon after, sometimes coincident with the onset of the purging, vomiting sets in. After the original contents of the stomach have been evacuated, the vomited matter is pale & whitish & is apparently identical with the rice which has just passed by the bowel. If the purging & vomiting is not soon
null
The essential sign of this stage is failure of the circulation beginning at the periphery and gradually affecting parts ever distant from the heart. The pulse at the wrist becomes more and more feeble until it is imperceptible. Even the brachial pulse may no longer be felt beating. On listening to the heart the second sound will be found absent. While the first sound may still be heard faintly, in this stage the lividity of the surface becomes much increased while the skin has a rough, inelastic feeling. The patient is very restless, constantly rolling about, crying out for water, his attendant and his brothers and legs to relieve his painful cramps. The temperature of the surface in this skin is seldom below 93° or 94°, while in the rectum it varies from 100° to 104°.

All during the stage of collapse there is intense thirst. The stomach is intensely irritable so that anything drunk is quickly vomited up again. Besides the intense thirst another very distressing symptom is the sense of burning heat at the epigastrium which is often accompanied by great tenderness and distressing lancinations. Finally, throughout this stage the urine is suppressed. This is probably due to defective flow of blood through the kidneys. Towards the end of this collapse stage, the
purging & vomiting sometimes almost cease. The patient lies in a semi-comatose condition with half closed eyes & constricted conjunctiva. The pulse at the same time cannot be felt. The respiration is slow &laboured. While the skin is covered with cold clammy perspiration. This state of things may be called the torpid stage. It often it lasts in a person seldom recovers. Cholera collapse. This leads directly to a fatal termination. When this is the case, death takes place generally between 12 & 24 hours after the commencement of the attack.

Reaction may come on at any stage of cholera; not infrequently even extreme collapse is recovered from. When this is the case, reaction usually begins to develop at the end of 24 or 48 hours. This generally begins by the patient becoming less restless; the cramps diminish; the purging & vomiting lessen. The pulse begins to appear again. The respiration become quieter & more regular. The patient begins to close his eyelids. As the pulse & respiration improve. The veins on the back of the hands begin to fill. The surface becomes less cold. The features less sunken. The colour begins to return. The surface.
The period of reaction is not free from danger. A relapse may occur accompanied by purging, vomiting, rapid respiration. In other instances the reaction may be imperfect. In such cases the pulse after improving remains weak. The surface of the body continues colder than natural; the face keeps a bluish tinge; waking the patient may cause a bloody vomitus; even the patient's breath may be detected. In some instances patients are attacked with a rose red rash which is accompanied by some or less fever.

The most usual bars to convalescence are suppression of urine, gastritis, enteritis, pulmonary congestion, a clot in the right side of the heart or pulmonary arteries, meningitis, coughing of the throat, abscesses over the surface of the body and hemorrhages from the bowels.

In the reaction of cholera, the most important condition is the state of the kidneys. Usually if a patient is doing well in the stage of reaction some 36 hours after the onset of the attack of cholera he passes a small quantity of urine. Sometimes the urine is not established for some 3 or 4 days. When this is the case it is as well to use a catheter as urine may be in the bladder. If the urine is not restored before the 6th day the case is generally hopeless. A rolling of your uracemia.
The most common complication which ends fatally after the setting in of hectic in the so-called "Choledochal afflatus" is uraemia. This sets in from 3 to 6 days after the onset of the attack of cholera. It is accompanied by suppressed urine, great prostration, headache, stiffness of limbs. The face is at first flushed, but is subsequently pale. The eyes are usually injected. The patient is drowsy, apathetic. The mucus is often rigid. The tongue becomes dry. Drowsy and death usually takes place from coma in about 48 hours after the onset of the uraemic symptoms.

**Diagnosis** - There is seldom any difficulty in recognizing well-advanced forms of cholera, but in countries where the disease is endemic or at times when the disease is epidemic it is sometimes a matter of great difficulty to diagnose it in its earliest forms. A method of no certain efficacy by which it can be recognized is the presence of indigo in the urine is diagnostic, but I do not think this can be relied upon. It is only from a consideration of the circumstances connected with a doubtful case or its symptoms I recollect that an opinion can be arrived at. This must often be a doubtful one. This certainly has often been my experience in India. The finding of comma braille in the evacuations may prove
Evidently the most reliable diagnostic sign of cholera.

Prognosis: Cholera is more fatal in children than in old or young adults. The mortality among adults may be taken at about 50 per cent. While that of children is 50 per cent, the young age 50 to 80 per cent. Young adults have the best chance, and the mortality among them is probably not much more than 40 to 45 per cent. The disease is more than usually fatal when it attacks those who are already sick or discouraged. It is also very fatal to children.

The earlier cases in an epidemic are more fatal than those attacked later. The odds of the chances of a patient's recovery. The amount of the collapse produced by the disease is more important than the extent of the purging and vomiting. One attack does not lessen their much effect in wasting off another, or of causing subjective attacks less violent.

Preventive: This should be preventative as well as suitable for the disease. When it actually has attacked a patient, the prophylactic measures are adopted against cholera may be considered under three heads: first those intended to prevent the spread of the infectious area and, so far as
European countries are concerned this rests chiefly in preventing the transport of Cholera from India. Accordingly, the measures to adopt to prevent the spread of the disease after it has been imported into a locality entirely by inoculation of the residents in susceptible individuals immune or susceptible to the disease should it break out in the surrounding population.

Regarding the first head above mentioned, there is little that can be done in India to prevent the spread of the disease from place to place once it has started in epidemic form, as it spreads along the lines of communication with the people as they go from place to place. It may be possible to prevent large collections of people at fairs and bathing ceremonies in cholera years and it may be possible to improve the bathing places as I believe is now being done at Hardwar. But to introduce a regular discipline of quarantine all over India in the cholera season. I think, would be impossible to enforce, if possible being rigidly carried out, doomed in effect to fail a hardship on the people to allow of its being submitted to.

The best way to keep down is to prevent the spread of Cholera would be to introduce all over India a proper system
If sanitation, but this is no call for the government of India with its impoverished finances of the Country to undertake. I do not believe that the Country will ever be healthy enough below of such an expenditure. If anything is done in this direction England must help or I am afraid nothing can be done. There is no doubt but that if cholera could be stamped out in India, as I believe it might be if sufficient money were spent, Europe would be relieved of the course that every few years breaks out in series of thousands of victims.

Tailing this radical means of preventing the spread of cholera from India to Europe the rules laid down by the Sanitary Congress in 1883 are the best that can be followed. These rules lay down the following principles: viz. that general sanitation, isolation and complete of everything which might introduce the disease here. The best means for preventing the importation and subsequent propagation of cholera. This means that there must be complete supervision over the intercourse between persons or articles from an infected area in order that the passage of cholera germs into unaffected places may be prevented. The more attention
The principles involved in this rule are to be well understood, and the spread of cholera from India to Europe to be controlled. When cholera breaks out in a locality in order to prevent its spreading among the community, the first case should be isolated at the premises where the patient resided previously. Should the patient reside previously, the premises should be thoroughly disinfected. The hospital should be set aside for the treatment of the sick. Cases of cholera travelling over a line of rail, or by river steamer or by road should be watched for isolation if found. All railways and railway stations should be kept clean; the cattle should be regularly disinfected. After a cholera patient has been isolated, which should be done in a special building if possible, his clothes and his evacuations should be disinfected. The letter should be destroyed. This is perhaps best done by burning them. The great object is to prevent 'infecting dirt' from passing into the drinking water or its sources or the soil. Besides these precautions it is highly desirable that those who are exposed to the possibilities of cholera infection should have some holy, air, and scenery. Cleaning surrounding.
are practically unattainable at present even in the large towns.

It is, therefore, very desirable that some protective against cholera should be found if it seems highly probable that this has been done. Dr. Jenner's inoculation in Spain in 1855 seems to show that the attenuated he obtained from pure cultivations of cholera bacilli has the power of rendering persons immune against cholera. But little experiments, especially those of Baffin, seem to make it more certain that a protective virus has been discovered. This virus is made from cultivations of cholera bacilli. The virus decays the capacity of producing cholera in rabbits, guinea pigs, & piglets. It is made by passing a culture of ordinary Cooma bacillus in agar agar through a series of guinea pigs by which its virulence becomes attenuated. Between the 20th & 30th passage the maximum virulence is obtained. This is called the virulent active and is about 30 times as virulent as cultivations of the ordinary microbe. This virus is rapidly fatal to guinea pigs when injected into the peritoneum. It also kills human still certainty when introduced into the intestines or three gills by the mouth.
The gastric juice is neutralized with soda. The peristaltic action of the bowel is quieted. If injected under the skin, however, the virus does not kill; it produces merely a local reaction. After a few hours an extensive sebula develops. This leads to necrosis of the tissues involved. In a few days the necrotic mass of tissue drops off, leaving a granulating wound which usually heals completely. After this the animal is found to be immune against inoculation with cholera in any dose. Whether it is tested with a weakened or a strengthened virus, or whether it is injected into the peritoneum or the muscular tissue. At this method of inoculation gave rise to much extensive necrosis of tissue it was found impracticable. It was necessary, therefore, to devise some method of first protecting the juvenile pig against the necrosis produced by the virus itself. This it has found could be done by a previous treatment with attenuated virus.

The attenuated virus is prepared by Haffkine by growing the disease in a sheep in the current of air. If this process the attenuated virus is formed, it is so completely altered that it loses the power of causing necrosis in juvenile pigs even when injected under the skin in exaggerated doses.
It will, however, appear the power of killing these animals when injected into the peritoneum in quantities only slightly larger than is necessary to obtain this result, both the ordinary virus.

If a dose of the attenuated virus is injected under the skin of a guinea pig an extensive edema develops within 24 hours. During the next few days it diminishes in size, leaving, however, a hard nodule which persists for a considerable time. If a week later the animal is inoculated with a smaller quantity of the virus twice an edema develops, but it is less than in the first case, it does not lead to recovery. When tested a few days later the animal is found that he has acquired an immunity against the cholera microbe in whatever form it may be inoculated. This immunity has been found to be unimpaired a couple of months after treatment.

When the attenuated virus is injected into the human individual it produces the same immunity in the individual. The virus works. It is very difficult to prove that a person who has been inoculated by Kupffer's method is proof against cholera, but arguing by analogy it seems that such inoculation should be protective. The inoculation does not apparently harm the individual inoculated.
Though it seems that it is possible that during the inoculation process there is a temporary diminution in the power of the individual to resist the entry of cholera organisms. But if this is so, it only shows, I think, that these inoculations should not be practiced in a given place at the time an epidemic is raging, except under great precautions. Since I wrote the above. I have learned that Dr. Daffahine has gone to India and is trying his inoculation in that country. There has been no regular report yet of his work in India, but from a report I saw in the ordinary newspapers it seems to appear that his inoculations have been successful.

Dr. Daffahine has lately read a paper before the Pathological Society of London in which he states that in experiments he has made by him he has found that two organisms such as Staphylococcus spiralis, Staphylococcus coli, he protopus vulgaris, the bacillus prodigiosus when grown on agar agar and then injected into the peritoneal cavity of guinea pigs, under the same conditions as Daffahine employed in his Cholera Cultures, produce the same effect, that is, peritonitis and death. The intracellular poisons contained in all these organisms were not apparent, he says.
Than the same physiological action as he
explained when injected in considerable
quantities into the peritoneum. Moreover,
by previous treatment with small doses of the
cultures, whether by means of subcutaneous
inoculation or intra-peritoneal injection.
The animal is protected against subsequent
intra-peritoneal inoculation.

Again, in this is a very notable
point, the organism was found to protect
against others, that is as long as intra-
peritoneal poison Arg is used. In this way D. Palier
succeeded by means of intra-peritoneal injection
of the ordinary Bacillus prodigiosus in protecting
an animal against Diphtheria's virus with
he concludes from his experiments that
protection against one intra-cellular poison
protects also against all the others.

He thinks, however, that this may not
protect against their specific poison;
because he found that an animal
immunised against Diphtheria's virus
injection (which he maintains is Arg alone
intra-cellular poison) will succumb to
injury subcutaneous cultures of Amoeba which
injected peritoneally. It seems, according to
Palier, to have no certainty that in using
Diphtheria's method we are protecting ourselves
against the specific poison of Cholera however
carefully we may be protected against the
effects of intra cellular poison. Moreover, we have no certainty that an immunity in the peritoneum implies an equal resistance of the intestinal tract.

The whole subject of Cholera requires more careful investigation. While it is probably at the present moment receiving in India at the hands of Raffles, but meantime, the position which Klein's work points, so long as it remains undisputed, is that Raffles produces a temporary immunity, not necessarily against Cholera, but against one of the effects of the intestinal inoculation with comma bacilli - an effect which Klein believes the latter three slots among others, which therefore cannot not be considered in any way specific. The prophylactic means to him to prevent the occurrence of Cholera, once it has begun in a locality, are the attending the stopping of all slight forms of diarrhea as soon as possible. The supply of an acid drink to those who are likely to be infected. An ordinary diarrhea medicine containing opium is sufficient at first. It is better perhaps that the diarrhoea medicine a pill shown contain an acid, such as acetate of lead or aromatic sulphuric acid. The best acid drink is made of dilute sulphuric acid.
About 15 drops of the ordinary dilute acid. dextrose with water should be taken 20. 3 p.m., in the 24 hours. This is useful as I have found by experience when large numbers of persons are crowded together as among soldiers in barracks or prisoners in jail. If the comma bacillus is the cause of the disease, as I think it is, the good effect of the acid dextrose is explained by the fact that that organism is destroyed by acids. Whether this is the explanation or not, I have no doubt from repeated experience that this acid dextrose is a good prophylactic drink where cholera is prevailing.

As soon as a person is attacked with the presymptomatic symptoms of cholera, the best thing to do is to give him under the influence of opium. All physicians who have had much to do with the treatment of cholera are agreed as to this, I all so called Cholera Medicines which have been popular for many years. Dr. Murray's Cholera pills which are largely used in India consist of opium, black pepper, and cantharides. There is no doubt but that they are very useful. The objection their injurious medicines or pills in this stage of cholera is that they are very pain

They caused up at once and to never have a chance of doing any good. To obviate this difficulty for years their been in the habit of
administering opium or morphia by patients hypodermically, and with the best results. Opium or morphia in this day and in former days good effect up to much later period of the first stage than when given by the mouth, even if it is retained, for the vomit very soon ceases to act and hence the opium does no good. In my practice I give morphia hypodermically to a patient if he has not had it before as long as I can feel the pulse. To give it later than that in cholera does no good as a rule it may do harm.

According the age, strength as soon as I suspect cholera to be the complaint their is no delay I give from 1/2 to 1 grain of morphia hypodermically. It is as well always to give as large a dose as you think is safe at first, for the quicker a patient is brought under the influence of the opiate the better. I usually repeat the dose in 4 hours if I find it has quieted the patient I made him sleep for a time. Often I often patients been at the commencement of the first stage hear the diurete continued by this treatment. This has been my experience at any rate I think that also of many others who have tried it. Occasionally at the same time I give morphia I have had best
some astringent mixture, usually Sulfuric acid with Buywood or Cechew. With the morphia I usually give 10° of a grain of atropine. This is especially useful if the patient has been purging and vomiting for sometime before being seen. I have a very bad pulse. Besides these remedies a medicated poultice of the abdomen is often a comfort. The lodging of ice relieves the feeling of thirst. An arrowroot balle is the best food required.

During the last 3 years I have been in the habit of giving celot in 10 grain doses every 2 or 4 hours instead of an astringent bicholine after the hypodermic injection of morphia. I think with advantage.

When a patient is seen at the onset of an attack of Cholera, I think the rule is that he is cured by the line of treatment. I suggest 2 it is comparatively rare for him to pass into the stage of collapse.

It more often happens, however, that a patient is not seen by a medical man in the early stage of Cholera or, if seen, he has had insufficient treatment so he is really first brought under proper treatment while he is in the stage of collapse.

Unfortunately it is these suffering from varying degrees of collapse. The most cholera patients, particularly infants, are
Dought for medical treatment in India is this, which lends itself to the recall; treatment appears so bad. Another cause for this is that mild cases of cholera are very often not returned as cholera. Thus an undue percentage of deaths rather often shown in the returns of cases treated in an epidemic.

For the treatment of cholera, once the patient has passed into the stage of collapse, none can be said there is no specific remedy yet known. Modern bacteriology may, perhaps, in time lead to the discovery of some remedy which will annihilate the virus in the body without damaging its functions. But to this, no remedy has not been found. In the meantime, therefore, we must treat patients in the collapsed or active stages as the body experience has shown the best.

If it is admitted that cholera is dependent upon a specific poison, the product of a microbe, I think we are fairly justified in assuming this at the early stages. The indications for treatment, could seem the following: 1st. to check the multiplication of the bacillus in the intestinal canal; 2nd. to neutralize the chemical poison formed by the bacillus; 3rd. to cause the elimination of the poison from the body.
4th to diminish the more or less excited irritation of the blood which occurs as a result of the loss of diuresis from it. The times these indications are affected by the administration of remedies that have the power of destroying the bacillus such as the administration of acid remedies by the mouth or rectum. Sulphuric acid mixture is the medicine of this kind most commonly used by the mouth. By the rectum warm injections of boric acid after each stool are advocated. Contini of Naples has been found useful. He also uses boric acid by the mouth. Personally, I have used, besides acid mixtures, Salol. I think with good results. Salol, I think, was first suggested by Schieb, but it has just recently recommended by a great authority in Prague as a treatment for cholera in 1889. It was suggested as a remedy for cholera as it passes through the stomach unaffected by the gastric juice. It is split up into its component parts, carbonic and salicylic acids, in the small intestines by the action of the pancreatic juice. I believe the earlier Salol is administered after the onset of cholera symptoms the better. I use it in the premonitory
They at the same time that I give morphine subcutaneously its exhibition can, therefore, be continued all through the collapse stage until reaction begins when it is better to discontinue it. I give it in 10 grain doses every 2 or 4 hours combined with spirits of chloroform. I first began this remedy in July 1889. I later then there treated 12 black treated by my friends & assistants who have reported some 120 cases. 14 of 6 cases with a mortality of 22.6 per cent. Thus these were treated between July 1889 & April 1891. Since then I have had no opportunity of treating cases.

Sometimes it seems to be a specific as many cases recover after its administration while in other instances it seems there little or no good effect. Among the first 15 cases treated by me in July 1889, an account of which I published in the September number of the Indian Medical Gazette of that year, not a single death occurred. The next 16 cases I treated here in the Bhopal Hospital, Dacca & these cases 12 died or a mortality of 66.6 per cent. Three 14 cases were treated at the Bhopal Hospital by Dr. Parves & these 8 died
giving a mortality of 57.1 per cent.
83 cases were treated at Narayangunga.
Hospital by Dr. Das under my supervision.
With 9 deaths or a mortality of 10.8 per cent.
12 cases were treated by my Friends B. S.
Dutt & Parchem with 5 deaths or a
mortality of 41.6 per cent. 11 cases were
treated in private practice in Dacca
by my assistant who 1 death or 9 per cent.

It will be seen from this
that the results from the use of salt
are very variable. Friends writing me
have repeatedly informed me that they
have met with great success in
Treating a series of cases of cholera.
Another series had found no good effect.
Whatever. Dr. Heber of Hyderabad has had
a similar experience. His first paper on the
Treatment of Cholera with salt published if
I remember rightly in 1890 spoke in high
terms of it while in his paper in the
Proceedings of November 1892 he has altered
his favorable opinion entirely.
The cases of Cholera I have included
in the 146 I have mentioned above were
all practically treated in the endemic
area of Cholera and were second in not
epidemic in character. The 83 cases
Treated at Narayangunga were spread over
15 months. This time is in the district
of Dacca i Cholera is more or less prevalent in it at all seasons. The death rate of cholera treated at the Dacca General Hospital from 1886 to 1889 inclusive I find was as low as 33 per cent., but during the 15 months in which Salol was used this death rate fell to 10.8 per cent. Why Salol should seem so useful in some cases of cholera, I practically useless in others, I am not able to say. It is not the explanation I think, however, by the assumption that the success is due to the remedy being exhibited when the disease is in the decline, for my experience has not been with epidemic cholera, but with that kind that is called seasonal or sporadic in Bengal. Each of Naples speaks highly of the plan of treating patients with wine mixed with 20 per cent. acid alcohol. In reading accounts of the recent epidemic of cholera in Europe I find many speak in high terms of this treatment, but just as many say it has been useless in their hands.

In India at the time Colonel was largely used in the treatment of the epidemic type of cholera. Many physicians had good results from its use, but intended experience somehow rendered it less popular. In 1880, however, it is seldom used.
It is usual to attribute the success of so-called cholera specific to the fact of their being used at the close of an epidemic when the tendency is for most patients to recover. This easily explains the success of some remedies, but I am convinced it is not the explanation of the success of many remedies that have been successfully used in the treatment of cholera. What is the explanation of the great success in the use of different so-called specifics at different times or their uselessness at others is a difficult question. However, I think it will be found true in the direction that the disease cholera is not always absolutely the same entity. It is different from the researches of Cunningham that there are many different varieties of not species. Commonly bacillus to be found in the intestines of patients who die of cholera. If the disease is dependent on a bacillus formed by the bacillus as seems likely, then the case is it not possible that different varieties of bacillus, decree a form bacillus of varying degrees of intensity. If this can be admitted, is it not possible that it may happen most naturally why so many things have from time to time been found useful? Then at others have been discarded.
as useless. This seems a possible explanation of the difficulty. It also explains perhaps the difference in intensity of the disease. Why in some instances it is so mild as to be scarcely distinguishable from ordinary diarrhoea, while in others it is so virulent that it strikes down strong and apparently healthy persons suddenly so that after one or two motions they pass into a state of collapse and are dead in an hour or two from the onset of the first symptoms.

During the collapse stage I recommend one of the plans of treatment mentioned above to be used. At this time it is being exhibited the patient should be allowed sweet ice in small quantities ad libitum. It is better to prevent the thirst in this way than to allow large quantities of water which only produce vomiting. Where ice is not procurable cold beet in small quantities must be allowed. Food is not required. But if this stage is prolonged then thin arrow-root meal with beet may be given in small quantities. In addition pumpernickel Holt of the stomach. The lower part of the abdomen may be applied if they have not already been applied. During the remittent stage granges are best induced by ginger and...
or by massage. If the patient becomes very cold, a pulseless hypodermic injection of ether may arouse him. It is always advisable also to give under these circumstances aigitin or strychnine. These drugs strengthen the heart's action; sometimes intratracheal doses also does good also, but not often.

The stage of Collapse lasts for a variable period of from 10 to 12 hours to 2 days or more. In this pulseless stage, sometimes intravenous or intra-cellular injections of sterile saline, sterilized fluid does good. Formerly the intravenous injections were tried, but did little permanent good as though they restored the patient to a state of rest, the pulse, the good effect did not last.

In Europe during the recent epidemic saline intra-cellular injections have been tried with more success. I think from what I have read of these they are worthy of more extended trial. But while using them other remedies for strengthening the heart, for establishing the circulation should not be neglected.

If the patient does not die in the stage of Collapse, reaction begins slowly. This is ushered in usually by the patient becoming less restless, his getting more asleep, his longer and longer duration. Thus the body becomes gradually
Duncan, the pulse as appears at the beginning becomes less laboured. When all goes well the case has not been very severe reaction sets in gradually. I do not think complications. But even then it is necessary to be careful not to overfeed the patient. If this is done, enteritis is very likely to set up. Small quantities of milk are to be administered frequently. Seltzer or beef tea for a change, is generally sufficient for the patient for the first day or two. This may be increased in quantity as signs of improvement take place. By this treatment the kidneys and other organs of the body will gradually recover their functions. Should the kidneys not act a few hours after reaction sets in, it is as well to ascertain whether the bladder contains any urine. A catheter should be passed. If no urine is found, some injections of poultries' blood should be applied to a diuretic mixture containing digitoxis should be given long 4 hours. Sometimes dry cupping is needed but cupping must be practiced only to establish the urinary secretion. It is advantageous also, I think, to combine Bicarbonate of soda with the diuretic mixture for it has some effect in neutralizing uraemic poisoning.
The urine is rarely required. Pilocarpine, given hypodermically also is useful in cases of suppression of the urine. It helps to clear the system by causing profuse perspiration. It should be given in doses of from 1/20 to 1/20 of a grain twice in the 24 hours. The patient all the while that the urine is suppressed should have fluid food as above till fluid quantities once the urine is established as a rule the patient may be considered to be safe & the risk to recover. It must be remembered however that he is very sick & that any injudicious movement or increase in food may bring on a fatal termination. Sudden syncope may follow injudicious movement such as sitting up too soon or taking any
milk or injudicious food. Great care during therefore during the convalescence from cholera are very necessary & much of the success in the treatment of cholera depends upon this.

F. Siciliani

Florence
Italy
23rd April 1893.