453/h Kingsford (C. D.)

CHOLERA:

A NEW THEORY.

BY

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In reviewing the history of Cholera and the observations of those who have had the widest experience of the disease both in this country and abroad, one thing seems to be agreed upon, that it is excited by some poison whose habitat and mode of entrance into the human body have not hitherto been detected. Whether it gain admission through the respiratory organs and the skin, by atmospheric influence alone; or through the alimentary canal as well, by the poison being swallowed, is not yet determined. A large amount of evidence points to water, impregnated with this unknown poison, as being a very frequent, if not the most frequent, vehicle.

It is unnecessary for me to recapitulate these opinions, as they are open to all who may study the literature of this disease. I would, however, allude to the generally accepted facts that cholera originated at Jessore, in the delta of the Ganges, and that its spread has been, almost invariably, in the course of rivers or of the ocean. For the same reason I will not discuss the numerous theories which have been propounded to account for its origin and spread.

My object is, if possible, to define first from analogy, and then by facts to be subsequently verified, what this poison is, how it is introduced into the body, how it affects the system, and what ought chemically to be the remedy.

There is one poison, and one only, as far as I know—Phosphorus—which kills in about the same space of time as cholera does, giving rise to symptoms of a like train—vomiting, watery stools, extreme prostration, and, it is said, sometimes but not constantly to a petechia-like exanthem; also, in fatal cases, revealing very similar and in some respects identical post-mortem appearances, such "as a bright red colour

of the small intestines, from visible vascular injection; dark, treacly, fluid blood; empty bladder," &c.*

Now, it is not difficult to imagine that phosphorus, probably in the form of phosphuretted hydrogen, may readily be introduced into the body either as a product of animal decomposition, as a vapour, or even dissolved in drinking water.

It seems likewise a reasonable deduction that such waters as the Ganges and Hooghly in India should be peculiarly liable to this poisonous emanation, from the practice, there common, of allowing the dead to float and decompose in these rivers. If also the present epidemic be rightly traced to pilgrims returning from Mecca and Djeddah, we shall find that they had been exposed to the same exciting cause, for in the report made to the Emperor of the French "On the Organization of Sanitary Measures in the East," it is stated—

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* *Vide* Casper's "Forensic Medicine," vol. ii., New Sydenham Society.

"These multitudes live encamped in the open air, exposed to a burning sun, and to the pestilential effluvia generated by accumulations of filth, and the putrid remains of animals who have been slaughtered as a propitiatory sacrifice. . . . . Not less than 200,000 individuals of both sexes and all ages have gathered from divers Mussulman countries to perform the prescribed ceremonies, while the number of sheep and camels slaughtered, and of which the offal was left abandoned on the soil, is calculated at about a million."

Under certain peculiar (electrical?) states of the atmosphere, I conceive, this poisonous gas may be set free and conveyed over large tracts of country either by vapour—for it may be remembered that "Mr. Farr has shown that in the summer season as much probably as 4,000,000 gallons of water rise daily from the surface of the Thames at London, carrying with it into the atmosphere some portion of the putrid contents of the river;"*—or else directly by ad-

* *Vide* "Report of Epidemic Cholera," by Baly and Gull, p. 214.

mixture with water. The same atmospheric influence may determine the evolution of this gas from the ocean; it may also be open to supposition that, under favourable circumstances—bad food, impure water, &c.—the same noxious element may be generated in the human frame.

To explain why cholera should prevail only occasionally, and not constantly—as might be expected if phosphuretted hydrogen be really the exciting poison — I would suggest that the electrical state of the atmosphere, when in a normal condition, causes the formation of a certain quantity of ozone, which neutralizes, or perhaps more correctly, balances the phosphuretted gases, which are ever recurring from natural sources, and from decomposition. In cholera seasons, this balance is interfered with, and a deficiency of ozone is known to exist, and this deficiency may depend either upon an absolutely smaller quantity being formed, or upon the normal quantity being swallowed up by the excess of phosphorus; if this be so I would submit that this noxious gas circulating in the air, and not neutralized by ozone, in-

duces poisonous effects, assuming the form of cholera.

To determine whether this cholera poison acts primarily through the nervous or the circulatory system, would require a large series of experiments; still one point would seem established, that death in these cases, like death from poisoning by phosphorus, "occurs dynamically by destroying the life of the blood."

"Lewin is of opinion that phosphorus being insoluble in every other constituent, is held in solution by the fat of the serum, and that it is by virtue of this fact that it exerts its toxical action."*

Before entering upon the last, and practically most important consideration, what ought chemically to be the remedy, I would instance, as negative evidence in favour of the above views, that as for cholera, so for poisoning by phosphorus, no antidote is yet known.

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* *Vide* New Sydenham Society's "Year Book," 1862, p. 429.

It may be admissible for me to state that, in 1849, between sixty and eighty cases of Asiatic cholera were treated by me at Herne Bay, in conjunction with my late friend Mr. Evans, and that we both became impressed with the great success attending the exhibition of large doses of calomel; that ten, twenty, and even in some severe cases thirty grains, were given every half hour, and not rarely every quarter of an hour; that although many patients must therefore have taken several hundred grains within a few hours, in no case did salivation, or any other deleterious effect, follow, and a large number thus treated recovered. In 1854, I had only a limited experience of cholera in this neighbourhood, but then also saw most benefit from the same treatment. During the present epidemic, by the courtesy of the medical staff of the London Hospital, I have been permitted to see the cholera patients in that institution, and have heard both Dr. Fraser and Dr. Jackson (the house-physician, under whose observation every case admitted passes) express as their individual opinion a belief "that the calomel

treatment will come out well when the statistics are taken."

How, then, it may be asked, does calomel act?

First—by exciting the action of the liver, for so soon as a bilious stool occurs, as a rule, the patient is safe, and this bilious action has frequently been effected in those who, when first put under treatment, were in profound collapse; and moreover that there is a notably larger amount of bile in the liver and intestines of those who die after being subjected to calomel treatment, has been lately demonstrated by Dr. Sutton, on the post-mortem table at the London Hospital; now, if the bile and pancreatic fluid be regarded as the natural solvents of fat, it is a reasonable inference that, in a disease where so large an amount of serum is poured from the blood into the intestinal canal, an increased flow of these secretions is required, the natural supply being wholly inadequate for the absorption of so large a quantity of abnormal fat—serum. Secondly—(assuming the presence of phosphuretted hydrogen) by itself undergoing decompo-

sition, the chlorine of the calomel uniting with the hydrogen of the poisonous gas, while the metal hydrargyrum is reduced and rendered inert by the phosphorus.

If, then, this theory be true, it follows that the curative indication is to administer a preparation containing a metallic base, and it is more than probable that some combination other than calomel may, by setting up a like chemical action, be found equally efficacious.

A question may arise why, if calomel act thus, and be the rational remedy for cholera, is there so great discrepancy among medical authorities as to its usefulness? My reply is—first, the existence of phosphorus has not hitherto been suspected, and therefore the chemical change the calomel undergoes has not been taken into consideration; next, that from the well-known baneful effects of calomel under ordinary circumstances, it has not been given in doses sufficiently large and frequently repeated for this particular chemical result to be produced.

My chief object has been to prove that cholera is caused by a specific poison, and that a corre-

sponding antidote may go far towards promoting a cure. I would not, however, be understood to advocate the use of calomel to the exclusion of all other treatment, for I consider it most important that diarrhœa should be checked as speedily as possible, by astringents and even by opium, in the early stage; if this plan fail, then calomel should be given at first in doses of two or three grains, repeated according to the urgency of the symptoms, and immediately the evacuations assume a rice-water character, followed by the more decided symptoms of cholera, then, according to my experience, our chief reliance is to be placed upon larger and more frequently repeated doses. Nor do I think it militates against my views, that patients brought into hospital in extreme collapse, and, as too often is the case, moribund, should not respond to the treatment, for the same failure is witnessed in every case of poisoning where either the dose has been excessive, or there has been too long delay in seeking medical aid.

In a conversation with Dr. Herbert Davies,

Physician to the London Hospital, he remarked: "Of the various modes of treatment which I have adopted for cholera, I find none so valuable and efficacious as calomel in full doses, a scruple at commencement, and ten grains every two hours, until some colour is observed in the motions, warmth restored to the surface, and salivation induced." This is strong testimony in favour of treatment by calomel; but that salivation should occur—and Dr. Davies has kindly shown me several patients in the wards suffering more or less from ptyalism—is not only contrary to my experience in 1849, but, at the first blush, would seem to be opposed to the chemical decomposition the calomel is assumed by me to undergo. Upon reflexion, however, I think it will bear the following interpretation—that so soon as the chemical action has neutralized all the phosphorus present, then, the usual effect only of the extra doses of calomel becomes apparent; and it must be next to impossible to know exactly when this action can have ceased, and so at what period, in order

to prevent salivation, the treatment should be stayed.

My task, for the present, is finished, and if the solution be correct, then not only is a rational principle of treatment established for cholera, but likewise an antidote is discovered for poisoning by phosphorus. It must be left for the analytical chemist to determine whether some of the yellow matter, apparently bile, observed at the autopsies of those who have died when under treatment by calomel, may not prove to be the yellow phosphide of mercury; and to ascertain how far the rice-water evacuations, and peculiar vomit, so characteristic of cholera, owe their appearance to the presence, in some form, of phosphorus.

To account for the recent sudden outbreak of cholera at the east-end of London, I will mention one very significant circumstance, which was told me by a highly respectable inhabitant of Whitechapel — that on the Saturday previous to this outbreak a very large importation of mackerel, packed in ice, arrived in the market,

and was greedily bought up by the poor; the fish were sold for a penny a piece, and within a short time after they were exposed to the air, and consequently thawed, they were totally unfit for consumption; and that on the same evening, to his knowledge, a large quantity of meat was sold, which became putrid by the following Sunday morning. Now, in Miller's "Elements of Chemistry," vol. i., is found:—"Sea fish in general, whiting, herring, and mackerel, in particular, soon after death exhibit a luminous appearance . . . . . if the fish be exposed to a cold sufficient to freeze it, the luminosity disappears, but it returns when it is thawed." I would ask, then, if phosphorus be the *fons et origo mali*, how can the increase of the disease in this instance be better explained?

From the foregoing it appears that cholera probably owes its origin, under certain conditions of the atmosphere, to poisonous emanations from decomposing animal matter; and if the theory herein advanced be correct, it is evident that this most direful scourge would, to a great extent, be

eliminated by proper State regulations, enforcing the cremation or burial of the dead in India, and preventing the pollution of our rivers at home.

UPPER CLAPTON, N.E.,

August 15*th*, 1866.

THE END.