The Plague in India

GOTTFRIED GÜNTHER

THE PLAGUE IN INDIA

AN IMPEACHMENT AND AN APPEAL

BY

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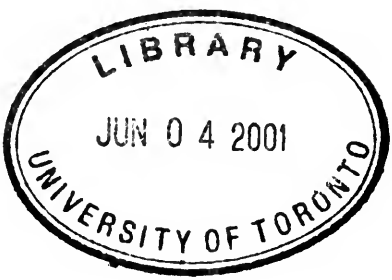

THE PLAGUE IN INDIA.

SINCE September, 1896, has the bubonic-plague now been raging in India, and has defied all efforts of the doctors and the Government. In the Bombay Presidency alone the victims of the scourge can be counted by 100,000; and the means employed, to combat the epidemic, have proved futile—whilst throwing a heavy financial burden upon the Indian Government and upon the various Municipalities, the end of which is at present not discernible.

The object of the following remarks is the endeavour to demonstrate, that the attempts of preventing and curing the malady, have not met with any decided success; and that another prophylactic means, which has a strong scientific basis and many important features for its recommendation—urgently demands a practical trial.

The whole dissertation tends to prove, that the greatest safeguard against an attack of plague is a "Natural Immunity"; and that all efforts should be directed to the discovery of the nature and the cause of this immunity, with the ultimate aim, of imparting the latter to the susceptible portion of the people—thus preventing the individual outbreak and checking the spread of the disorder—in fact: stamping out the epidemic.

Of all epidemic diseases, which periodically attack mankind, none is more dreaded than the "plague." The

celerity in the development of the symptoms and the high percentage of mortality, have stamped it as the most terrible of all morbid afflictions; and history records the despair and hopeless resignation, which an outbreak of this pestilence produced among the inhabitants of various countries or towns during the Middle Ages.

Not only the suddenness, with which an attack overpowers the sufferer; but also the virulence of the symptoms and the almost certainty of a fatal issue, must fill the mind of everyone with awe and alarm—which is augmented by the utter helplessness of the physician, from whom alone relief is expected.

No doubt, the Government is fully aware of the magnitude of the calamity; and not only appoints "plague-doctors" for service in India; but a "Royal Commission" has been sent out . . . "containing" (to repeat Lord Lister's announcement at the anniversary meeting of the Royal Society) "a majority of scientific experts, *to inquire into the subject of the plague* . . . Their chief duty will be, to "sift and report upon the somewhat heterogeneous and "scattered pieces of evidence already published by various "observers as to the nature and mode of transmission of the "complaint, and the best means of dealing with it."

But the plague is not a new disease; and it does not appear that great vigilance has actuated the Government in sending out a Commission to *report* upon the best means of dealing with it, after the disease has raged for two years, and has spread over a considerable part of India. Previous epidemics in various parts of Eastern Europe and Asia must have given ample opportunity for medical men to obtain precise knowledge of the disorder; its distinctive character, and the effective means for preventing and curing it. From the reports of the various Commissions, sent by the Austrian, German, Italian, and Russian Governments in 1897, it must appear, that this belated British Commission will prove

futile in its results. It will probably bring home a mass of evidence, about:—the number of cases and the percentage of mortality;—the probable way in which the infection spread;—how it travelled from house to house, from street to street, from one community to another;—how the poison was conveyed by rats, or by travellers, or by merchandise in ships or along trading routes;—how many experiments were made on monkeys, rats, mice or other animals;—and lastly, about the competitive trials of various forms of plague-serum, invented or prepared by Haffkine, Yersin, Lustig, Galliotti or other serum-injecters; with a formidable array of figures to prove their respective efficacy.

All such investigations and reports (excepting the serum injection, about which more immediately), deal with the extra-corporeal conditions of the infected persons; and however desirable and absolutely necessary—not only for reasons of hygiene, but also for humanity's sake—the suggested municipal and domestic improvements will be, to promote the health and welfare of a community—the whole inquiry leaves out of account the principal factor in the development of the individual case, and thus in the spread of the epidemic, namely: the susceptibility—the predisposition—of some human beings, to succumb to an attack of the pathogenic poison; and on the other hand: *the immunity from the disease, possessed by the majority of people, but for which, epidemic diseases would have exterminated mankind long ago.* To this factor for the prevention of plague—*the natural individual immunity against the disease*—and its neglect by those in authority, the following remarks will direct attention, in the hope, that some action will be taken in the practical application of the prophylactic principles involved.

For the object of this treatise it is not necessary to give a minute detailed account of all the symptoms of the malady; a short description of the principal phenomena will suffice.

Bubonic Plague (pestis orientalis) is a febrile infectious disease, which is distinguished by the appearance of buboes, or swellings, in various parts—especially in the groins and the armpits—of the human body, accompanied by a gangrenous inflammation of the lymphatic glands.

The external appearance of the sufferer would indicate "Typhus"; which has led to the name of "Bubonic Typhus" being given to this disorder. The disease spreads through infection, and breaks out usually from two to five days after the invasion of the contagion. The symptoms assume a manifold character. After the patient has felt very weak and depressed, a violent fever attacks him with severe delirium; and. after this has lasted several days, the boils and glandular swellings are formed. In favourable cases, these latter break, and discharge pus and matter; and after a copious perspiration, convalescence follows. In unfavourable cases the general symptoms assume a more violent character; the central nervous system is seriously affected and symptoms of blood-poisoning supervene until, after two or three days, death ends the suffering. (Brockhaus's *Lexicon*).

Dr. Gavin Milroy (in Reynolds' System of Medicine, I. pp. 322–7), unfolds for us the following picture: "There are "the prodromal" (fore-running) "phenomena of lassitude, "rigor, nausea, head-ache and vertigo; . . . anxiety and "restlessness, with a heavy stupid expression of countenance, "and a muddy and suffused state of the eyes. Then follow "heat of the skin and great thirst, frequent vomiting, a "coated tongue and fetid breath; a rapid weak and irregular "pulse, prostration with perhaps tendency to syncope . . "The matter vomited is sometimes nearly black . . . "Hæmorrhage from the mouth, stomach and bowels, or from "the respiratory passages, is not an unfrequent accom- "paniment. The necroscopic appearances . . . showed ". . that *all the viscera were loaded with fluid dark blood*, "and were generally much more *lax and softened in texture*,

"than they are in health. *The blood, whether drawn from life,* "*or observed after death, has generally been found to be darker* "*and more fluid than in health* . . . etc."

In fact, the disease is a complete dissolution and decomposition (if not really putrefaction) of the living body.

The mortality is correspondingly high; mostly from 60 to 80 per cent. of the attacked; so that on an average one, out of four patients, recovers.

What deserves our special attention—when considering these phenomena—is the fact: that *the disease does not always kill.*

Of those attacked, *some recover*—may be after greatly suffering for a longer or shorter period.

Others again pass through the malady *without the symptoms assuming a mortal character*, and the patients regain their usual health.

And finally: *there are human beings, on whom the poison has no effect;* it may invade their system, but it passes harmlessly through the latter.

It has been incontestably proved to be so in the case of cholera and diphtheria; as also, without doubt in all other infectious diseases. And that the plague makes no exception, is borne out by Sir Arthur Brooks Faulkner in his treatise on that malady. He states (p. 181): "Contagion is (most "fortunately) not governed by a necessity of exerting its "influence upon all individuals alike who come in contact "with the subjects of contamination. This would be contrary "to experience, not only in regard to the plague, but to every "other disease, which is admitted to owe its propagation to "this cause. We do not, in fact, know in any contagious "disease what it is that constitutes the susceptibility of the "human subject, etc."

"The many instances, which occurred during the plague" —at Malta—" of whole families escaping the contamination "after having lived long in the most intimate communication "with the infected, prove, to what a great extent non- "susceptibility may exist."

With regard to the assumption, that dirt and dirty habits are predisposing causes of an attack of plague, Sir Arthur relates in his work (p. 190): "Several cases were known to me "of individuals, labouring under the greatest violence of the "disorder, being taken from the very bosom of their families, "without communicating to them any injury—children from "their parents, and husbands from their wives. Yet these "families had used no kind of precaution whatever; indeed, "in most instances, not so much as an attention to common "cleanliness. . . . My own calesseman and two of his "children died of the plague, but his wife was never infected, "nor his brother-in-law, though constantly attending on the "family in their illness. These people were also very "neglectful of personal cleanliness, and used no kind of "precaution whatever."

Dr. Arnott* relates as an instance of his experience in Bombay: "An old woman returned after having buried her "son, who died from plague, to her home in Hotgi, where she "stayed with her son-in-law, *three* other women and *two* "children. She took ill and died, and *two* of the women and "*one* child died." *The son*, *one* woman and *one* child (three "out of seven) escaped.

It is evident from these accounts that the chief factor for the development of plague is—as in other diseases—an individual susceptibility; and this is tacitly admitted by Lord Lister when he assured the Royal Society, that: ". . . if we "consider how few of the medical men and nurses, who have "for a long time past been engaged in actual attendance on

* Brigade Surgeon Lieutenant-Colonel James Arnott, M.D., Ind. Med. S. —On Plague. See "The Scottish Medical and Surgical Journal," January and February, 1898.

" plague-stricken patients, have fallen victims to the disease, " we may dismiss from our minds the idea of any serious risk " to the commissioners." It is hence an incontestable fact, that *a protection against the disease is found in a natural immunity.*

This once admitted—truly it would be in violence of all evidence and reason not to do so—one cannot escape the further admission, that for stamping out the disease our energies should be directed towards the discovery of the cause of this immunity, and then apply the necessary remedy, to impart that immunity to the susceptible portion of mankind.

There is no absolute law of nature, in virtue of which the human cell should not have as strong—if not a stronger vitality, than the pathogenic intruder—the bacillus; and this is confirmed, not only by those patients, who easily and safely pass through an attack; but also by the frequently observed occurrence, that the disease-germ has been found in the body of healthy persons, without having produced any symptoms of the specific disorder.

That such immunity is not the result of accident is evidenced by the phenomena observed in Cholera-epidemics; and it is not leaving the ground of fair reasoning, by applying the experience in Cholera to the conditions and the phenomena underlying and surrounding the plague.

Dr. Mitra's report of the Cholera-epidemic in Kashmir will serve as an illustration:

" The Kashmirs are notoriously filthy, and 125,000 of " them are crowded into the city of Srinagar—the capital of " Kashmir. The city is built on both sides of the river Yhelum, " and through the city also runs a canal—the Nalla Mar—which " was once used as a water supply, but is now a string of " cesspools. The population is crowded into 25,000 low dirty " houses, built irregularly in narrow lanes and alleys, which " are used as latrines. There is no drainage, and the storm- " water washes the filth and ordure into the Nalla Mar and

" into the river, from which the drinking water is obtained; " the beds and clothes of patients, and the bodies of the dead, " are washed in the river and the canal, from which water " was drawn for drinking and domestic purposes; and the " dejecta of many cases (of cholera) in the boats on the river " were thrown into the water, while drinking water for the " patients was taken from the same spot almost simul- " taneously."

It will be almost impossible either to find naturally, or to produce artificially, more favourable conditions for the development of the disorder than those stated above, and it is a wonder that not all the inhabitants of Srinagar succumbed to the epidemic. Instead of this, 93 per cent. escaped, and the disease died out with, no doubt, plenty of bacilli left in the bodies of the survivors. Of the total population of Srinagar only 7·2 per cent. were attacked and 4·6 per cent. died.

The decline of the epidemic was due not to any absence of filth and of disease-germs, but simply to the fact that the disease had carried off all the persons who were susceptible to it.

But all our accepted ideas of the infectious nature of plague and of the almost certainty, that " dirt," that is: the presence of plague-poison, is the immediate cause of the individual attack and of the epidemic spread of the disorder —are completely upset, when reading the report of the Imperial Austrian Plague Commission.

The late much-lamented Dr. Müller—whose life was sacrificed to his professional ardour in his attendance upon a plague-patient in Vienna—informs us in that report, " that " the medical men in Bombay practically escaped; which " cannot cause surprise, when it is remembered, that constant " care was bestowed on cleanliness and on disinfection."

The assumed cause of this immunity is, however, completely controverted by Dr. Müller's description of the scenes in the Arthur Road Hospital, which, for its real importance, deserves to be reproduced uncurtailed. He says: " It must

" be considered as most remarkable, that the 'ward-boys'
" and the 'sweepers' in the hospital were immune from the
" plague; although the former had to attend the sick, change
" bandages, and during this process touched the open
" buboes; whilst the latter were engaged in the removal of
" fecal and other deposits; cleaning the floor and the utensils;
" transporting of the dead and assisting in the operations on
" the corpses. Only one was subject to an attack, previous
" to our arrival; but he recovered; and during our stay in
" Bombay two 'ward-boys' sickened, but were able after a
" few days to resume work.

"The 'ward-boys' and 'sweepers' went about bare-
" footed, sometimes with bleeding cracks in their feet, and
" often showed rends in their fingers. One sweeper moved
" about the wards with a deep wound in the sole of his foot;
" and the boots, which we bought for him, he only wore half-
" a-day, to save them. It will be more than remarkable to
" learn, that these incredibly dirty sweepers cleaned the
" utensils, which contained the sputum, urine and fæces,
" with their bare, wounded fingers; and walked about with
" naked feet on the floor, which was constantly soiled through
" the sputum and the evacuations, dropped by delirious and
" other patients—and yet they escaped infection.

"Moreover—: with the object of allaying suspicion, the
" relatives and friends were permitted to remain constantly
" at the bedside of the sufferers. For whole days a family of
" adults and children, would squat round the bed, not to lose
" a moment in removing the corpse to a place of cremation.
" I—(Dr. Müller)—have seen numerous cases, in which relatives
" and friends have repeatedly touched the bubo or carbuncle,
" without washing their hands previous to leaving;—how,
" in the cases of pneumonic plague, the friends and visitors
" have wiped away with their finger the bloody sputum
" (which is in truth a pure culture of the plague bacillus)
" from the mouth of the sufferer; or—to save the patient the

" painful exertion of turning over, have received the expec-
" toration in their hand. The hand would then be wiped
" either on the floor or their dress. Never have I seen these
" people wash their hands; and without any attempt at
" cleanliness, they would take their food with the dirty
" fingers. And yet—according to the official report of the
" Arthur Road Hospital, not one of these bare-footed visitors
" to the bedside of these plague-patients, has been attacked
" by the disease."

Dr. Müller adds: "To come to any conclusion from
" the escape of people, who are so intimately and so directly
" exposed to infection, is almost impossible; since we have
" here to deal with a congenital—(?-natural) immunity."

It may well be asked: of what value are sanitation and serum-injection, in face of such experience?

On the other hand it is impossible not to see in these facts the evident proof that the principal factor for the development of the individual case, and for the propagation of an infectious disease, is the individual susceptibility—the predisposition for the disorder; in other words: that *a natural individual immunity is the most effective weapon in the combat with an epidemic.*

Before entering upon the consideration of the nature of this immunity, and of the best means for applying or imparting it to the susceptible portion of the community—it will be appropriate here to refer to the efforts which have been made to treat the developed case of plague and to stem the spread of the epidemic. The result will show that we are as far from a satisfactory solution of this problem as we were two or twenty years ago; that the pestilence still demands our full attention, and that hence further researches are not only justified but demanded.

Referring to the Bombay epidemic, Mr. Birdwood gives us, in his paper before the Society of Arts, the following information under the heading:

"TREATMENT OF PLAGUE-CASES.

"As regarded the medical treatment of plague-cases . . . " I ought to state the opinion of so competent an authority " as Dr. Arnott, that no remedy has been discovered, which can " be relied upon. Dr. Childe says, that many methods have " been tried in Bombay, but 'none with certain success.' " Some of the results of treatment with Monsieur Yersin's " serum at the Parel Hospital; and with Professor Lustig's " serum at the Arthur-road Hospital, are given in Dr. Weir's " and in Dr. Choksy's report on plague-cases treated at the " latter Hospital, where a serum, prepared by Professor " Haffkine was also tried. Speaking from a full experience, " Dr. Choksy says, that all that the means at our command " can do, is simply to tide the patients over the most critical " period and to *assist nature* in recovering her original sway " over the system."

Dr. Arnott (cited above) further adds, that:—

" Antiseptics, and especially carbolic acid and iodine " and liq. hydrarg. perchlor. were diligently tried, but with- " out success. I also tried liq. chlori., which I thought did " well, but in the experience of others it was unreliable. " Local injections of antiseptics, such as iodine and also " perchloride were tried, but unsuccessfully. And in the end " the treatment was symptomatic and stimulating, with the " most careful nursing and feeding."

This is a candid admission of the inability of practical medicine, either—to prevent, or to check, or to cure the developed case of the disorder; and—*whether the attack ends in recovery or in death is simply the result of the recuperative powers of the individual sufferers.* This inability of medical art to influence the zymotic diseases, has been well expressed

long ago by Sir John Forbes (in his: Nature and Art in the Cure of Disease, 2nd ed. p. 109), when he says:— "In the "zymotic or poisonous eruptive fevers . . it is now universally "admitted to be impossible to check their course, and all our "most enlightened practitioners agree, that the terminations, "whether favourable or unfavourable, are only slightly "modifiable by treatment" . . ; and Dr. Milroy honestly confesses under the head of "Curative Treatment of Plague," that "there is little on this head in medical writings at all "satisfactory or encouraging in respect of recovery of the "sick, but much, that is admonitory as to the baneful effects "of an over-active and meddlesome medication."

There is no gleam of light out of all the endeavours to build up an effective therapeutic system against the plague; the susceptible portion of the community is attacked and recovers or dies, according as the individual constitution either overpowers the disease or succumbs; meantime the efforts of the doctors seem to be concentrated on the search for the bacillus—not with the object of curing the malady, but for the purpose of diagnosis only. The patient may have all other symptoms, which formerly were considered as constituting in the aggregate the disease called plague; but now the doctor says:—if the bacillus is not present or cannot be found in or about the body—the attack is not one of true plague. *But whether true plague or not, the treatment is equally helpless; and the patient recovers or dies, whatever the diagnosis.*

These reflections will enable us to judge and appreciate the following (General Gatacre's)

"REPORT ON THE BUBONIC-PLAGUE, CHAPTER III."

which, the "Lancet" (of 22nd Jan., 1898, p. 250) declares, "gives a very excellent summary of the medical aspect of "plague, derived from the views, expressed by the medical "officers working under the committee."

"Reviewing opinions generally, the following is a "rational classification of forms of plague:—

"1st.—With enlarged glands (gravity according to "symptoms and severity of attack), femoral, "inguinal, axillary, cervical, tonsillar.

"2nd.—Without enlarged glands (almost always fatal), "septicaemic, pneumonic, mesenteric, enteric "or gastro-intestinal, nephritic, cerebral."

"The signs and symptoms of these various forms are "then given, followed by a section on a: Ready method of "diagnosing plague."

It would be difficult to assert, that the author of the above report was conscious of the object he had in view, when compiling this "rational" classification of symptoms; for: if even it enabled him to make a true diagnosis, to decide, whether the form of the disease was "inguinal" or "axillary"—whether it assumed a "pneumonic" or "mesenteric" character—was there any specific medicine or any special treatment for each form of the malady, which insured the saving of the life of the patient?—which after all should be the chief object and aim of medical efforts. The report may answer:

"It is difficult to recommend any particular line of "treatment with confidence; for, it is often seen, that a plan "of treatment, which succeeds in one case"—(*when the patient has the strength to overpower the poison*)—"totally fails "in another."

The inutility of such "rational" classification is pointed out by Dr. Milroy (p. 323), when he says: "To describe at "length the different varieties of the plague, which have been "enumerated by authors, would be very unprofitable, and "only serve to obscure a subject, which has often been made "unnecessarily intricate by extreme verbiage in the attempt "at over-subtle distinctions."

It is hence impossible to deny, that all attempts, of influencing the course of the disease by diagnostic investigations and by a super-scientific classification of the symptoms—have proved futile and a waste of energy; not a single patient's life has been saved thereby—all the various assertions to the contrary notwithstanding. The Epidemic continues to stride over the land to mock our endeavours.

Unable to cope with the disease, when once it has attacked its victim, medical men have very naturally directed their attention to the *Prevention*—first: of the individual outbreak; and secondly: of the spread of the infection. This latter has in many cases been partially achieved by "special plague-hospitals" and by "segregation-camps"; but—as with the application of quarantine against the spread of cholera—so has this proved by no means effective, to prevent the propagation of the disorder.

How far these, what may be called: "extra-corporeal" steps, have been successful, is answered by the propagation of the epidemic since its first appearance in 1896.

In an article in the "Nineteenth Century" (June, 1898), entitled: "Fighting the Bubonic-Plague in India"—Miss K. Marion Hunter (late plague-medical officer, Poona), refers to these preventive measures in the following remarks (p. 1010): "With the apparent end of the epidemic in June, "1897, the system of house-to-house visitation was allowed "to lapse and corpse-inspection by medical officers took its "place. That this was insufficient, the rapid strides, made "by the disease in the early autumn-months showed."

Corpse-inspection was not effective; how could it be? But even with house-to-house visitation, the epidemic spread, and became more murderous than before. No wonder, that Miss Hunter complains (p. 1016); and suggests: "The "efforts, to stamp out the disease, having been so compara-"tively unsuccessful, one is inclined to think more radical

"measures should be adopted. The suggestion to burn "down insanitary areas . . . may have to be seriously "considered. . . An adequate and efficient staff of medical "officers, with special qualifications for sanitary work; "notification of infectious diseases and certificates of cause "of death, must in time come to be looked upon as necessary "for the safety of the Indian Empire."

Such suggestions place medical science and art in their worst light; and if such ideas pervaded the minds of the medical staff, working under the Plague-Committee—is it a wonder, that the efforts, to stamp out the disease have been unsuccessful?

It appears, however, that such opinions are shared by the "British Medical Journal," the editor and staff of which may be considered as among the best informed authorities on medical questions. It declares (2nd Oct., 1897), that "the outbreak in India has made it evident, that plague "occurs as a result of insanitation; but that—given money "and power—an epidemic can be checked—nay stamped out "—even in a large city . . . any relaxation in watchful-"ness will be followed by a recurrence, which may last for "years."

Dr. Millingen's remarks (article "Plague" in "Curiosities of Medical Experience," p. 182), in reference to the controversy about the contagiousness of the pestilence, may appropriately be applied in illustration of the absence of sanitation: "If "the stamping out of the disease depended upon sanitary "measures, its ravages would never cease in those countries, "where it is thoroughly neglected; as for instance in Turkey, "where no precautions are resorted to; there would be no "cessation of the disease, until it had swept away the whole "of the population."

If even the burning down of insanitary areas should check the spread of the malady in the city of Bombay—how will this local destruction protect adjacent or distant parts of

the country against the invasion of the pestilence, the germ of which may be carried away by immune and perfectly healthy people?

That epidemic diseases find their victims in crowded and dirty cities or districts, and in badly ventilated tenements (chiefly—but not only)—is owing to the fact, that in such environments are to be found poorly-nourished and ill-tended beings, who have in their improperly-fed body the great susceptibility for the disease. It is this lowered state of their system, which makes them fall a prey to the pathogenic poison; and not their dirty surroundings, as shown by Sir Arthur Brooks Faulkner at Malta, and by Dr. Mitra at Srinagar.

By all means, give the poor people a better habitation, more fit for human beings, with free access of fresh air and pure water; but let us not think, that our enquiry has had a satisfactory result, when landing it in side issues, which have only an indirect connection with the cause of the calamity.

As distinct from all hygienic—and sanitary—(extra corporeal) measures for combating the plague, medical men directed their efforts to a possible means for protecting the individual-being against an outbreak of the disorder.

Guided by observed facts in the case of other infectious diseases (although not always applicable or pathologically deducible)—it was assumed, that one attack, if safely recovered from, protects against a second; in other words: that one attack confers immunity against the plague. To obtain this immunity, it was suggested, that each human being, exposed to the infection, should have the disorder implanted into the system through the injection into his circulation, of a serum, which contains the plague-bacillus or only its pathogenic poison.

This is not the place, to enter into a disquisition upon the theory of this proceeding—whether it is the formation of

an anti-toxine, or whether it is the adaptation of the system to the poison, which is to protect the human body against the disease; but it may be of assistance in forming an estimate of the serum-treatment, to learn, what results have been achieved by it in its application to other maladies

In the case of tuberculosis it ended in a sad and grievous disappointment to many sufferers, as it did not fulfil the promises of its originator and his disciples.

In its application to cholera it was based upon a misconception of the nature of the disease, and hence could not but end in failure. "One might pale before a science, which "proposes to apply such means to a hundred persons, in order "that three* of them may be saved from an attack of the "disease and half of these from an untimely death; especially "so, since a second inoculation is deemed necessary to deprive "the first of its life-endangering character." (See "Natural "Immunity against Cholera," Williams & Norgate, p. 16; as also: Dr. Haffkine on "Vaccination against Cholera." Fortnightly Review, March, 1893.

In the treatment of Diphtheria not any better record can be offered. The Medical Superintendents of the Metropolitan Asylums Board—in their report for the year 1895—express the opinion, to which all the medical officers of the hospitals subscribed their names, that:—"We are further of "opinion that in antitoxin-serum we possess a remedy of "distinctly greater value in the treatment of diphtheria, than "any other with which we are acquainted" ("Daily Chronicle," 11th April, 1896). But in the year 1897 there occurred in London alone, 2262 deaths from that disease, at a death-rate of 17·7 per cent.; which latter falls well within the natural fluctuation of the mortality, if taken for a number of years.† This low mortality may be owing, as has been pointed out by a continental practitioner—to the fact, that with the

* This number refers to the percentage of people that have a predisposition for cholera.

†"The British Medical Journal," 2nd April, 1898, p. 926, reports for the week preceding its issue a mortality of 25 per cent.

introduction of the serum-injection, there ceased the most destructive treatment with drugs, which to a very great extent paralysed the recuperative powers of the system, and caused as many, if not more deaths, than the disease itself. To this must be added, that the serum-injection is not absolutely without undesirable after-effects. (See "Common Salt,"* pp. 241 to 269.)

So far then: the serum-treatment is not of a nature to encourage and justify its employment for the protection against plague; and when it is now further discovered, that the very fundamental principle, upon which it is based, does not exist—that, namely, *one attack does not protect against a second*—it is impossible to accept serum-injection as an effective prophylactic.

This absence of protection is attested to by several authors on the subject. In the "Cyclopædia of Practical Medicine" it is pointed out, that there is no analogy between plague and eruptive diseases, to cause it to be ranked among diseases, which attack persons but once in the course of their lives. "An English physician (Dr. Whyte) died of the "natural disease, six months after an attack, which he had "inflicted upon himself by inoculation."

"A Chevalier Schabhals . . . was attacked with the "disease, indicated by violent fever, a bubo in the groin and "three carbuncles, from which he had the good fortune to "recover. He . . was however again attacked five weeks "after his complete convalescence with the malady, of which "he died before the sixth day.

"A sufficient number of such cases have been noticed by "judicious observers to warrant our concluding, that plague "does not impart that kind of security from second invasion, "which is afforded by small-pox and other exanthemata."

* "Common-Salt.—Its Use and its Necessity for the Prevention of Disease." Swan Sonnenschein & Co., Ltd., 1898.

Sir Thomas Watson (Principles and Practice of Medicine, vol. ii., p. 913) in his remarks about the plague, describes it as "not furnishing apparently any sure or permanent security "against its future recurrence."

Miss Hunter, in the above cited article on the Bombay epidemic, states that "Convalescence was slow, and *unfor-* "*tunately one attack is not protective against a second.*" This is a plain admission of the *inutility of the serum-treatment for prophylactic purposes.* And having failed in this latter, the serum-injection has been the subject of experiments to establish its curative effect upon the developed case of the disease; the results are, however, very dubious.

That medical men are very anxious to cope with this calamity and discover some effective means for stamping out the disease—for their own credit as well as for the lives of those, entrusted to their care—admits of not the slightest doubt; and if the accounts of the success of the serum-treatment are at times very promising and are reported in most hopeful language—it is but human; (the wish is father to the thought). Nevertheless, the enormous stakes at issue—the lives of another 100,000 of our fellow creatures—enjoin us in all soberness to avoid self-deception, and courageously acknowledge our short-comings. Looking at the reports of the curative application of the serum, issued from time to time, it is evident, that the favourable and the un-favourable reports balance each other.

It is not necessary, to quote largely and extensively, for the purpose of confirming the above. Dr. Robert Koch—a bacteriologist of European fame—was at the head of the German Commission in India, making experiments and observations about the curative effect of plague-serum.

He reports (Reise-Berichte, Berlin, 1898, p. 54), that, "judging from experiments on monkeys, he could undoubtedly "assign some curative properties to the serum. But he would "not say, that similar effect could be obtained with human "beings."

"In the Parel Hospital 24 patients had plague-serum "injected, and of these 13 died; certainly, a low mortality, "which might be accepted in favour of serum-injection. This "favourable result, he states, was, however, only apparent, "since only such cases were selected for the serum-treatment, "which had been admitted during the first or second day of the "attack, and were looked upon as—: with not a bad prognosis. "Besides, according to the opinion of the attending physicians, "these cases might not have shown a greater mortality "without the serum-injection."

And while Dr. Koch admits, "that Haffkine's serum has "a high protective effect—he must also declare, that the "protection is by no means absolute (p. 42); and plenty of "cases occur, which prove the uncertainty of the process." He very significantly remarks, that, "in order to combat the "epidemic successfully by serum-injection, it has to be per- "formed throughout the community; and this can only be "done by compulsion. People only submit to it voluntarily, "when the epidemic has assumed a severe character; and "then it is too late."

The medical commission, sent by the Russian Government, expressed a want of confidence in both—Dr. Haffkine's and Dr. Yersin's plague-serum; and the Austrian commission in its report—(which the "Times" correspondent declares to be "one of the most comprehensive works on the bubonic- "plague, which has yet appeared" and of which the "Times" of November 28th, 1898, contains a condensed account)—gives an elaborate discourse on the plague, but does not touch upon the possible means, by which the disease can be cured and human life can be saved. The object of the commission was: "to study the plague in its etiological, pathological, anatomic "and clinical aspect"; hence we have "tables, giving the "variation of temperature, of the pulse and of the respiration "of a number of patients." It raises questions, whether Griesinger or Müller was correct; makes comparisons between the observations of a number of physicians; and

informs us, that Dr. Müller differed from Dr. Choksy in regard to a symptomatic alteration in the patient's voice; on the time of the appearance of the bubo, etc. but *nothing about the best and most effective means of saving human life.*

In support of the remark made above, about the importance of the individual susceptibility, the Austrian report contains the significant statement, "that, on the whole, the "delegates enjoyed good health. After a short time however, "they all suffered from a slight but painful swelling of the "lymphatic glands in the axillary region. They" (the members of the commission) "were convinced, that this was "due to infection; although, doubtless, of the mildest form of "the plague." Let us add: not because the plague-bacilli acted considerately towards the kind Europeans, and had sufficient compassion upon them not to display their full virulence—but: because the bodies of the delegates possessed a stronger vitality than the plague-poison.

Dr. Müller further showed by his untimely death, that this infection—what may be called a natural inoculation—did not protect him against a second attack, which ended fatally. He expressed himself to the effect, that "the "question, *whether the organism will triumph over the disease,* "*depends upon the degree of its natural power of resistance to the* "*poison of the plague.*"

Metschnikoff (from the Pasteur's Institute, in Paris, in a discourse at the Moscow Medical Congress, August, 1897) states: that he found the protection from Haffkine's serum-injection of short duration; as in three cases of the inoculated an attack occurred on the 12th up to the 42nd day after the injection; and he suggests a repetition of the process after ten to fifteen days. This, he adds, has no detrimental effect on the inoculated.

Against this statement must be cited Dr. Arnott's information, about the effect of Haffkine's "preventive," that: "the action of the remedy is disagreeable, and in

"larger doses may be dangerous. It causes considerable "red and painful swelling; there is fever sometimes rising "as high as 104° or 105°, and in some cases rigor, vomiting, "purging, vertigo or faintness, and in some enlarged glands "—in fact, the person is always ill, and sometimes very ill "with symptoms resembling plague, and it is not likely, that "it will be generally used, except by the educated and "intelligent; or in the presence of great danger."

Dr. Arnott's "wife and as many servants as could be "persuaded, were inoculated with Haffkine's preventive. "The dhobie (washerman), who had not been inoculated, "contracted plague, and died of it in hospital, where he was "treated by Yersin; and later a groom, who had been "inoculated by Haffkine, contracted it and recovered. *Three "other grooms, who had* NOT *been inoculated, did not sicken.*"

Dr. Arnott further informs us, that: Prof. Haffkine, besides his preventive, also prepared a curative serum; but it did not give satisfactory results. Anti-streptococcus serum was tried in the case of nurse E. J., but with no appreciable results.

And nurse Pecha, in Vienna, succumbed to the malady, notwithstanding a daily injection of anti-plague serum.

Nor is the evidence tendered to the Royal Commission in India—as reported by the "Times" correspondent (during November and December, 1898, and January, 1899)—any more encouraging in favour of the serum-injection.

Dr. Haffkine describes the preparation of his prophylactic serum, and claims from 80 to 90 per cent. of recovery (November 30th).

Surgeon-General Bainbridge contends, that sanitary and other measures should be placed before inoculation. Dr. Galliotti describes a process of making curative serum, which cured 75 per cent. of the patients treated (December 1st).

Major Deane declared, that Yersin's serum was useless, Haffkine's serum he said, *conferred a temporary immunity, but*

not to the extent supposed. Colonel McGann stated, that Haffkine's prophylactic had been found valuable. [The same issue of the "Times" reports, that "The plague is again increasing in Bombay." Dec. 12th.]

Colonel Dobson, Capt. Leumann, Dr. Willis, etc., explained the plague-measures, that had been taken, and gave details as to the inoculation. There was no racial immunity. *More Hindus were inoculated than Mahomedans; but there was a greater percentage of deaths among the Hindus.* The explanation was, that *the Hindus were poorer, and that they lived in worse condition.* (Dec. 13th.)

[This is strong evidence of the futility of serum-injection in the presence of a natural susceptibility; the former proved powerless against the latter.]

Col. Benson stated: most (*i.e.* not all) of the cases were among the poor. (Dec. 14th.)

Col. King: Inoculation was not a reasonable substitute for sanitation, but a valuable aid. Major Bannerman—vaccination-inspector—contended: that *Haffkine's serum was cheap* and effective. In Madras City, although there was no plague, inoculation was performed upon 5,366 persons in two months. (Dec. 15th.)

Colonel Lawrie, plague commissioner in Hyderabad, declared that: Haffkine's fluid was not a serum, but a putrescent organic liquid, containing micrococci of putrefaction and occasionally pathogenic organisms. It was therefore directly against modern medicine and anti-septic surgery to inject the fluid. Inoculation had not been adopted. [Has Hyderabad, under Col. Lawrie's supervision fared worse, through non-inoculation? Mr. Stevens, deputy-commissioner, said, that . . the classes most affected were low-caste Hindus. Mahomedans were not so liable to infection, nor were the herdsmen, who lived in the open air.

Colonel Johnson described experiments, which had been made to determine, whether living organisms were found in

Haffkine's fluid. Out of six bottles, five showed a distinct growth; the other was doubtful. Col. Lawrie (recalled) expressed his willingness to use Haffkine's fluid, if it were rendered sterile, provided it was proved to retain its prophylactic power under those conditions. He admitted, that the fluid as now used, afforded considerable protection, but denied, that it gave immunity. Sterilization, he thought might render it useless. [Col. Lawrie is evidently well acquainted with the experience of continental anti-serum-injectors. (See: "Common-Salt," pp. 245-8.) As an apparent elucidation of Col. Lawrie's evidence the "Times" reports, that: The plague-returns last week showed a *further rise* for Bombay-city and district, and also for Madras and the Central Provinces. Dec. 20th.]

Dr. Cook, health-officer of the corporation in Calcutta, stated, that: *The plague stopped in Calcutta of its own accord. It was not affected by the measures taken.* Major Green, special health-officer to the corporation, stated: the *de*crease of mortality in Calcutta from May to August (during which time the plague was present) was 3·5 upon the average of the same months in the previous five years; and he considered the low mortality due to the exodus during the scare in April last, and to *the year of plenty following the several years of drought* culminating in the famine of 1897. There was also a *de*crease in Hugli, Howrah and Krishagar. (Dec. 29th.) [It will be expedient, to compare this *decreased mortality* in Calcutta, where, during this year of plenty, when the people were better fed—the plague stopped of its own accord—with the great *increase* previous to the appearance of the plague in other parts of India. We shall have to revert to this later on.]

Col. Harris, officiating principal of the medical college, said, that not any curative agents have proved beneficial. Dr. Clemow, district medical officer, considered plague a filth-disease. . . He had inoculated fifty cases with Yersin's serum. He took alternate cases as checks. The

results were negative; forty died and ten recovered in each group. . . Thirteen patients were inoculated with Lustig's serum . . the symptoms were not affected; ten died. He mentioned two cases of a second attack of plague; both died. (Dec. 30th.)

It will be useless, to add further extracts from the evidence given before the Commission; it cannot alter or modify the impression produced by the above citations—namely: that the whole inquiry into the means for preventing and curing the plague, has not met with any definite solution.

But assuming even, that general sanitary improvements could be carried out, as they are applied in England, it would mean—according to a statement of Surgeon-General Harvey, before the Plague Commission ("Times," Jan. 4)—an annual outlay of £53,000,000.

And if all the inhabitants of India (for: it would be futile to confine the process to localities, without checking personal intercourse and travelling) could be protected by inoculation—were this to prove itself really effective—it would probably involve an expense of about £1,000,000 for one injection, with the prospect of a repetition in about two weeks time.

The result of our inquiry so far shows, that either: as effectual means, or in their practical application for stamping out the Plague in India—neither sanitation nor serum-injection give any hope of success.

It must excite astonishment, that so little regard is generally paid in medical questions to the fact, that different human beings show different susceptibilities to disease-producing agents and influences.

Of, let us say, three people, exposed to a current of cold air, one becomes dangerously ill, contracts perhaps influenza, which brings him to death's door and after serious sufferings

for several weeks, remains with a shattered constitution. Another escapes with a severe cold, but recovers without any further consequences; whilst the third has not felt the least inconvenience from it, but, on the contrary, feels invigorated. It was certainly not the cold air, which determined the effect in each case; but it was the susceptibility of the respective individual.

As with the current of cold air, so it is with all pathogenic influences, including the plague-poison; and in the previous pages there are already recorded a number of opinions expressed by those, who are considered as authorities on the question before us—that there are human beings, who are not susceptible to the disorder. We must naturally conclude, that there is something—either present or absent—in their system, which enables them to overpower the plague-bacillus. This latter passes through their bodies without doing any harm.

That this is not accidental, we have overwhelming evidence. The members of the Austrian commission suffered from lymphatic swellings, without any other morbid symptoms; and Dr. Milroy stated (p. 323) that: "During an "epidemic, many persons have often been affected with "glandular swellings and pains, and occasionally also with "carbuncles, but with so little febrile disturbance, that they "have been able to follow their occupations, and have speedily "got well."

So also Dr. Arnott: "In those persons in whom the *vis* "*medicatrix naturæ—the resistance of the tissues to the microbe* "is sufficient, the bacillus is arrested and destroyed in the "glands."

To what an extent bodily susceptibility entered as a factor in the plague-epidemic in Bombay and other parts of India, can be learnt from . . "The Report of Brigade-Surgeon-Lieutenant-Colonel Dr. Weir—Municipal Health

Officer of Bombay—dated September 1897." (See the "Lancet," Dec. 18th, 1897.) It states:

"At the time of the appearance of plague, the death-rate "of Bombay was abnormally high. This has been ascribed "to un-recorded cases of plague; but—Brigade-Surgeon-"Lieutenant-Colonel Dr. Weir points out: that synchronously "with the increase in the total mortality in Bombay, there "was an increase in the mortality in a number of places "outside the city, which could not be put down to plague. "From the Tana, Surat, Poona, and Kurrachee districts this "increase in mortality was reported, where as yet plague was "unknown. It is interesting, however, to note that all these "places, reported upon, as showing a high rate of mortality, "were subsequently attacked by plague in an epidemic form." It is quite evident from these facts, that the population was subject to temporary conditions, which weakened the human organism against the attack of other pathogenic agents, previous to the outbreak of plague; and that it was this decreased power of resistance, which imparted the high susceptibility for the plague.

All evidence, all experience and all facts seem to force our attention to the inquiry into the state of the human system, which underlies this tendency to susceptibility; and then—as a corollary—into the means by which this predisposition can be avoided or cured. In other words: we must endeavour to discover the cause of the natural Immunity against the plague, possessed by a certain class of human beings.

First we must remember, what has already been stated above, and what may be considered as a biological axiom, that: "*There is no law of nature, by virtue of which the 'human "cell' should not have as great, if not a greater vitality, than the "pathogenic bacillus.*" We can truly speak of the human cell, since our body is not only built-up of cells, but the body's life is the aggregate of the life of the cells. There is no life in

the serum or the lymph; but there is vitality in the blood-cells (Lehmann, II., pp. 274-5) in the white as well as in the red;—in the cells of the nervous system;—of the various glands;—and of all secreting and active organs; and by giving a strong vitality to the various cells, we give it to the human body.

This vitality may be described as an organic stability, which resists abnormal influence to change; and is evidenced by a strong power of assimilation. All cells of which the human body is built up, are formed from material, which has been prepared for it in the process of digestion. A strong digestion produces stable "peptons"; and the strong vitality of these peptons accompanies them into the body, and in the various parts in which they serve the life of the organism—unless other defects, either local or constitutional, counteract or destroy the vitality of the living protoplasm. At all events—the first step towards a strong vitality is a healthy normal digestion.

What now constitutes a healthy normal digestion—in so far as the stability of the product "the peptons" comes in question? Answer: it is the chemical action of a properly constituted gastric juice on the nitrogenous ingredients of our food; and this properly constituted gastric juice *must contain* 0·5 *per cent. of hydrochloric acid*; otherwise the result of the digestion will be an un-stable product, liable to putrefaction, which latter commences already in the intestinal canal. We have every reason to believe that this liability to decomposition or putrefaction—this want of stability and of vitality accompanies the un-stable product throughout its life and activity in the organism. This will make us comprehend how an abnormal digestion, if existing for any considerable time—without showing any immediate dangerous symptoms, can yet gradually undermine the healthiest constitution. The cells of the human body constantly change their substance, take up this unstable protoplasm for their nourishment and thus lower and ultimately destroy their own vitality.

It must be further considered, that the formation of lactic-acid—so frequently met with in the stomach, when this is loaded with amylaceous food—is an abnormal fermentation and thus an unhealthy phenomenon, caused by the want of common-salt in the system; and that this lactic-acid cannot by any means take the place of the mineral—the hydrochloric —acid. This latter is one of the most "powerful means of "preventing and checking putrefaction—the strongest anti- "septic" (Prof. Bunge); and the chief ingredient for the formation of this acid is Common-Salt. It is a well-known fact that: when this salt is not supplied to the system in sufficient quantity, one of the first symptoms is: the absence of hydrochloric acid in the gastric juice, of which direct evidence has been obtained by means of the stomach pump; and it is only an indolent and ignorant mind which cannot comprehend how so simple a fact can have in its train a series of morbid and ultimate mortal effects. [This subject has been fully worked out in a treatise on "Common-Salt," to which the reader is referred for further information, especially to the anti-putrefactive action of hydrochloric acid (pp. 109-114).]

There is another aspect of this part of our discourse, which is: that—as Liebig declares—we can even digest organic poisons, such as the Small-pox poison, in our stomach, as the hydrochloric acid destroys its disease-producing powers. But it is very important to add: *when the acid is present.* A healthy normal gastric juice no doubt destroys pathogenic germs, which may find their way into our digestive organs; and thus the presence of Common-Salt in the system in sufficient quantity, assists indirectly to impart to the human body a resisting power to pathogenic influences. [Roux in "La Sem. Méd.," 1897, p. 27, declares that infection takes place—besides wounds—also through the digestive canal].

Dr. Milroy (cited above) informs us that all the viscera of the plague-corpse were generally much more *lax and softened* than in health; and Dr. Arnott observed (in post-mortem examinations) that the right side of the heart was abnormally

dilated, and its *muscles very soft.* But also the symptoms of hæmorrhage, vomiting of sanguinous fluid and the diffusion of black fluid blood through the various organs—are all indicative of a laxity and a weakness in the connective tissue, which directly influences the heart and the arteries, seriously impairs the blood circulation and thus contributes to the fatal issue of the attack.

Such lax and weakened condition is mostly due to a watery state of the tissues; and Prof. Max von Pettenkofer, and after him Dr. G. Jaeger, have pointed out that this presence of water in the system above the normal proportion imparts to the human body a predisposition for infectious diseases. The counteracting ingredient in the animal economy against such a state of the system is: Common-Salt. It abstracts the water out of the muscles and out of the viscera generally; acts as a diuretic and thus assists in imparting to the organism an immunity against disease. (See: "Common-Salt," p. 125-9.)

The various symptoms of the disorder indicate the primary seat for the growth and multiplication of the plague-bacillus to be the lymphatic glands—those organs which contribute to the change of the white into the red corpuscles; and an enfeebled lymphatic system would thus offer susceptibility for the development of the disease.

Metschnikoff considers the swellings of the lymphatic glands—the pest-buboes—as a defensive process of the affected organism. He found the white corpuscles to act as "defence cells." It is highly probable that these white corpuscles form the pabulum for the growth and multiplication of the bacilli; and if the former are of low vitality they become a prey to the pathogenic microbe. Here comes in the protective effect of the hydrochloric acid in the digestive process, in affording the white corpuscles the vitality to combat the poisonous intruder.

Whether the disease germ, after entering the human body, can grow and multiply—and produce a malignant or a

mild form of the disease—*may* depend upon the difference in the vitality of the intruder; but there can be little doubt that the food which the germ finds in the system—will have a great, if not the greatest, influence upon the issue.

How true is Dr. Gottstein's remark on our assumption of a constancy of the virulence of the pathogenic bacillus, and the disregard shown to the susceptibility of the human organism, when he says: "We estimate the morbid symptoms " in an animal body by the virulence of the bacillus: while " at the same time we measure the virulence of the bacillus " by the morbid symptoms of the diseased organism."

And whether the bacilli increase at the cost of the white corpuscles or of the lymph-plasma—and whether the bacilli (which is doubtful during life), or only their poisonous product can be found in the blood, and thus to act on the nervous system—the ingredient in the organism, which above all others would afford protection against these morbid changes is "*Sodium-chloride.*"

Furthermore: as common-salt is looked upon outside the human body as imparting to organic substances the power of resisting fermentative-and putrefactive changes—so there is every reason to assume that its presence in the plasma of the blood and of the lymph, should confer a similar faculty to those liquids of the human body. It would thus impede the growth and multiplication of the bacteria, and assist and strengthen—in another direction—the natural immunity against the plague.

When considering the symptoms, presented to us in the case of plague, in all their aspects, and inquiring into the immediate cause of the extinction of life, it must appear evident that the bubonic swellings are not directly contributable to the fatal issue—unless blood-poisoning supervenes, and thus brings death to the seat of life—to the nervous system.

It can only be either the heart or the brain (probably more correctly the medulla-oblongata), which in their failure would cause death. The activity of the nervous system and the circulation of the oxygenated blood are the factors, which immediately influence our vital existence. The first: the nervous system, may be morbidly and mortally affected by a poison contained in the blood; and of this the headache, one of the earliest symptoms, gives evidence. Yet this does not appear to lead to a serious issue, and is not of a nature to cause immediate death, as it would show its effect more suddenly. But the maintenance of life in the nervous system, and the latter's continued activity depend, during every moment of the body's existence, upon a supply of oxygen. If this fails, more or less—such symptoms as vertigo, coma, insensibility, convulsions, etc., can be observed; if it fails altogether—syncope, apoplexy, etc., follow and death is the result.

It is, therefore, an incontestable fact, that the life of the patient depends primarily upon the circulation of a sufficiently oxygenated blood; but this circulation itself—*i.e.*, the action of the heart—is only possible, when the blood can supply the oxygen to the nerve-centres of that vital organ.

"*Deficiency of Oxygen is gradual Death to the Heart.*" (See: "Common Salt," pp. 72-76.)

Is, however, the blood of a plague-victim capable of absorbing the oxygen, even if this were offered in an undiluted, pure state?

All evidences distinctly indicate that this is not the case; that the blood is in a dissolved condition—its fluid, black serous state, points to a destruction of the blood-corpuscles, and this makes the absorption of oxygen in the lungs difficult—if not impossible. [This important question is fully worked out in "Common Salt," pp. 67-71.]

As a result: the heart, through the deficient natural stimulus, beats quick, soft, and feeble; the circulation becomes languid and the nervous system shows the symptoms of a waning life.

Says Dr. Arnott: "In connection with the rapid and "weak pulse, is to be noted *great weakness of the heart*," (the former being, no doubt, the result of the latter) "making "it dangerous to sit up in bed, or to go to stool, even when "the other symptoms seem not unfavourable. Several of "our cases died suddenly in that way."

Miss Hunter (cited above) remarks, that "the *most "common cause of death is heart failure*"—which she considers "as a result of the high temperature."

[That high temperature in itself is not the cause of heart-failure is fully reasoned out in "Common Salt," pp. 278-286.]

Dr. Müller (in the report of the Austrian Plague Commission) lays special stress on heart-weakness as the cause of a fatal issue in plague. In fact, he seems to consider weakness of the heart as the principal symptom, which leads to death.

He states (p. 174), "The course and prognosis of an "attack of plague is dependent upon the strength of the "heart; the *power of the heart controls the course of the disease*. "THE PATIENT DIES OF HEART-WEAKNESS." (Dr. Müller emphasises this statement by making it appear in large type).

And repeatedly he refers to this symptom and its primary importance (p. 175). "The period of the attack at "which heart-failure supervened, varied greatly; but it "always determined the length of life, left to the patient." (p. 176.) "When looking through the history of the cases" (contained in the previous pages of the report), "and when "inspecting the diagrams" (which give a record of the duration of the attack, and of the pulse, the temperature and

the respirations)—"there cannot remain any doubt, that "*the condition of the heart, and the earlier or later appearance* "*of heart-failure: determine the course and the prognosis of the* "*disease.*"

Dr. Müller then expresses his surmise of the heart's failure being caused by a poison affecting either the heart-muscles direct, or that part of the nervous system connected with the heart. When it is remembered in how many fatal cases of heart-failure, syncope, apoplexy, or sunstroke, there can be no question of a morbid poison having invaded the system—there will be no need to ascribe these phenomena to any other cause than a deficient oxygenation of the blood. And this would find support in Dr. Müller's statement (p. 176), that: "*The remarkable increase in the frequency of breathing*, " is typical in all cases, even in those which end in recovery. " The increase of the frequency of breathing is generally " dependent upon the weakness of the heart; much less upon " the height of the fever."

Dr. Müller further believes, that even the nervous system has less influence on the course of an attack than the state of the heart. He says: "Yamagiva has given great importance " to the presence or absence of nervous symptoms. But " according to my opinion these nervous symptoms cannot " claim to exercise great influence in the prognosis. I have " seen a number of cases which developed rapidly with " freedom from, or only slight nervous ailments, and ended " in death; whilst others, with severe disturbance of the " nervous system—even with delirium, recovered."

Why then look for any other origin, when so evident a cause as a destroyed blood is forced upon our attention. "The blood," says Dr. Milroy, "whether drawn from life, or "observed after death, has generally been found to be "darker or more fluid, than in health."

It must further be noticed, that even in cases which are considered as of a quickly fatal issue, the body struggles

between life and death not for minutes or even hours—but for two or three days—which might be taken as pointing to a gradual destruction; or if recovery follows, as a revivification of the blood.

Here again, our attention is directed to Common-Salt as the factor for a strong blood, *i.e.*: a blood with healthy blood-corpuscles of *normal shape*, capable of fulfilling their important function of absorbing oxygen from the inhaled atmosphere and distributing it through the organism for the nourishment and the activity (*i.e.* the life) of the nervous system — including the heart. The full exposition of this question the reader will find in "Common-Salt," where it is supported by scientific facts, which to repeat here would be a waste of time and space. On the whole, that work should be read concurrently with this dissertation.

Finally: Dr. Jabolsky (Deutsche Medicische Wochenschrift 1897, No. 27) reports as the result of his investigations, that he found an agglutinating tendency of the blood-serum in cases of plague. This agglutinating or coagulating tendency would point to a deficiency of Common-Salt in the blood, as the salt keeps the albumen in a dissolved condition.

And Giaxa and Gosio (Jahresbericht über Hygiene 1897, p. 369) found, that animals with a natural immunity, when subjected to *hunger*, became susceptible to plague. This may be accepted as an indication, that the digestive process has, even during a few days, so much influence on the organism, as to destroy a natural immunity; and this would again speak for the probability, that the *apparently* slight change, produced by the mere addition of Common-Salt to the system, can have significant beneficial effects on the organism in developing a natural immunity.

Before making an appeal for an acknowledgment of the great probability in favour of Common-Salt as a Prophylactic for the prevention of plague, it will perhaps be expedient to answer one or two objections, that may be raised; and to

point out the circumstance, in which Common-Salt can account for the natural immunity, acknowledged to exist among Europeans and the richer portion of the people in India.

The principal objection or doubt, which may be advanced against the above exposition is, that: Common-Salt is already present in every human being—even when the use of it is neglected; so that, did it possess the beneficial power, claimed for it—it could exercise this power and prevent an attack, without any further addition of it to the system.

Whenever the presence of Sodium-chloride in the human body is the subject of inquiry or controversy—several facts are invariably overlooked or neglected; the first is: that the absolute quantity—not only in the blood, but more especially throughout the tissues of the whole body—fluctuates to a considerable extent. In the blood it reaches a proportion of 0·60 per cent. as a maximum; and it can be reduced to 0·25 (in disease sometimes to 0·20) per cent. as a minimum. It never exceeds the higher density, as the kidneys excrete any amount above the 0.60 per cent.

With regard to the minimum density: if salt be withheld, the amount expelled by the kidneys gradually lessens and soon ceases altogether; but the blood has retained 0·25 per cent., with which it does not part, and which appears to be necessary for the protection and the life of the red corpuscles. At the same time there is every indication, by estimating the quantity of salt eliminated, that the rest of the system has lost its sodium-chloride almost entirely; and it must be quite reasonable to assume, that this absence or diminution must interfere with the function of the various organs, on the action of which common-salt has a direct or indirect influence and must disturb the health of the whole organism.

Says Prof. Beneke: "What a series of physiological "processes, most significant for the maintenance of our life,

"are connected in a more or less high degree, with the "presence of common-salt, which substance is mostly held in "a low estimation."

It is, however, not only a question of the fluctuation in the amount of salt, contained in the organism at any moment of time—but also of the loss and the supply within a certain period. And here enters a factor, which also seems to be neglected; and that is: the quantity of liquid taken within such period. All liquid, which leaves the system by way of the kidneys—and to a less extent by the skin as perspiration—deprives the body of common-salt; and unless a corresponding amount is taken to replace the loss, it must follow: that much imbibing tends to deprive the organism of this mineral food, and thus leads to susceptibility for disease. It endangers the life of the blood [See "Common-Salt,"] and tends to the destruction of the red corpuscles with corresponding heart-weakness and the various more or less mortal symptons in its train. This will explain the fact that in tropical climates or during a continued high temperature in the temperate zone, such diseases as: diarrhœa, cholera, malaria, so-called sunstroke, etc. (in which the destruction of the blood-corpuscles forms one of the symptoms—if not the principal one) are so prevalent.

The high temperature causes evaporation from the skin, resulting in thirst and consequent copious water-drinking. But even, when not any thirst exists—owing to the air being charged with moisture and evaporation being prevented—iced liquid is often imbibed with the object of cooling the body, thus flooding the system; and the great amount of water, in its passage through the blood to the kidneys and the skin for its elimination, will—if the proportion of salt is at a minimum—destroy a part—more or less great—of the blood, unless common-salt in commensurate proportion is furnished to the system.

The import nt and dangerous feature in this insidious process of depriving the body of common-salt is the fact,

that the symptoms are not directly discernible; and the morbid results develop so slowly, that anything else, but not the want of salt in the system is accused of being the cause of what may appear as only a slight temporary indisposition; and often not even this—whilst yet the organism is on the brink of an attack from one or the other of the above diseases.

It is necessary to touch upon another aspect of the relation of common-salt to plague (or any other form of disease); although it applies to the state of mind of the professional, or more perhaps to the un-professional reader of, what may be called a bygone age:—that is the view which assumes, that sodium-chloride is put forward as a "specific" against the plague. A mind which is still in the bondage of the idea, that disease — instead of being a deviation from the healthy state (Galen)—is an entity, which enters our body like a "diabolus minor," which requires a "specific"—an *anti-diabolus*, to drive him out again—may with suspicion and credulity look upon the advice of administering common-salt as a medicine. It would be an unprofitable task to correct such a frame of mind; but it is necessary to point out, that salt can perform its various functions in the human organism only, when it is present in sufficient quantity; in other words: that the salt, which is contained in the blood-serum to protect the red corpuscles, cannot act in the liver, or protect the lymph, or furnish the chlorine for the gastric juice; that it cannot act like a magical specific of which one dose will perform the wonder;—but that it requires to be administered as a daily food, to permeate the system with it.

If now the problem arises of bringing common-salt in connection with the Immunity, possessed by Europeans and the richer portion of the people of India, it is but to mention the salt-tax. Although assurances are given, that the tax does not weigh so heavily upon the poorest Indian, as to

prevent him from providing himself with this life-pre[illegible] food—still, he knows, that it is heavily taxed, and bu[illegible] more of it than he can help. He probably (it would n[illegible] assuming too much to say, absolutely) does not know, how necessary it is for his health, but looks upon it as a luxury, and only uses it as a condiment. The Europeans (ignorant perhaps, as they may still be about the great importance of it for their health), as also the better-placed Indians, never give the salt-tax one moment's consideration—not in relation to the wrong committed upon the poor (See "Common-Salt," pp. 287-293) but to the effect it has on the cost of salt, which affects them only infinitesimally; and they use the mineral in sufficient quantity to prevent their system from becoming a prey to the heat and moisture, which attack the human organism in India, as in many other tropical climates. And as there are Europeans, who live according to strict hygienic rules, but are neglectful in the use of salt, and thus, in ignorance, allow their system to be exposed to the attack of one or the other tropical diseases—so we may conclude, that when these hygienic persons are attacked, it was not dirt or filth or unsanitary habits, which caused the infection and the disease—but a want of that ingredient in their system, which want gave them a susceptibility for the plague.

If it were asked, what inducement and justification there is for an experiment to establish the prophylactic powers of common-salt against the plague—it cannot be difficult to give most weighty reasons in the affirmative.

First: It is a question, in the immediate future, of saving human lives -- in India, at a rough estimate, of another 100,000 in the next year or two; and ultimately in other countries in the tropics—not from plague alone, but also from cholera. In fact the ultimate far-reaching benefit, which is at stake, it would be bold to

define. But not only the saving of lives—it affects also the prevention of all the concomitant evils and calamities, connected with the outbreak and persistence of epidemics of infectious diseases, in our social and commercial life, which involve the loss of national energy, to be estimated by millions of pounds sterling.

Second: The inefficiency, if not absolute failure of the means, hitherto employed to conquer the present epidemic, should instigate an attempt at discovering more effectual agents and remedies for preventing the individual attack and thus the spread of the malady; the more so, since it is evident, that either sanitation or protective serum-injection—even if they proved adequate to the task—are impossible, owing to the enormous expenses involved in their application.

Third: The simplicity, easy application (to which reference will be made immediately), the certainty of absence of opposition on the part of the populace, and above all—the great promise, which is held out by the several physiological and pathological reasons for the development of a natural immunity, as given above—all these more than justify—nay, they demand such an experiment on an extensive scale; especially, when such experiment can be carried out by charitable means, should the Government be advised not to undertake it. This latter might be the result of medical opposition, since, no doubt, the political authorities would refer the decision of such a question to their medical advisers. But it is scarcely conceivable, that, and upon what grounds any opposition can be raised.

It certainly should not be difficult to obtain the support of medical men of authoritative standing in their profession, to lend their name and voice in favour of such an experiment; to have the courage of stepping outside the contempt, which is so universally evinced for so common a substance as common-salt; and to admit, that so insignificant a thing can have most vital and far-reaching influence on the life and well-being of the human body.

It deserves to be repeated, that common-salt by its presence in the human body in sufficient quantity :—

Furnishes the chlorine for a powerful antiseptic gastric juice, which gives organic stability to the products of digestion and thus to the cells, which ultimately are formed from them. And the presence of this acid in the gastric secretion kills the pathogenic poison, which may have entered the stomach.

It gives a disease-resisting power to the tissues by withdrawing water from the system.

It protects the lymph and the white blood-corpuscles by its anti-fermentative and anti-putrefactive qualities.

It protects the red corpuscles from destruction, and keeps them in a condition favourable for the performance of their function, viz. : the supply of oxygen to the nerve-centres of the heart and to the nervous system generally, and thus prevents heart failure—the immediate cause of death in the majority of cases.

Furthermore : it promises, to act as a curative agent, when injected as a simple saline-solution, without an admixture of any organic poison—as it has proved in the case of cholera. In Hamburg, in 1892, during the cholera-epidemic, it was found "that, after all other attempts to beneficially "influence the course of the disease have failed, the remedy

" left is : common-salt in solution, injected subcutaneously or " intraveinously, as the only reliable means for combating the " disease and saving the sufferer's life."

And Dr. A. Gottstein (cited above) advises, respecting the serum-injection in the treatment of diphtheria : " The " result does not justify the enthusiasm, which is shown " everywhere ; but it *should incite to further sober therapeutic* " *experiments*, especially in the direction of *injecting indifferent* " *common-salt solutions*, which have hitherto not been used, " and the action of which would not be interfered with by the " addition of albuminoid substances—the anti-toxins."

It must above all be remembered, that every serum, to be injected into the human body, must of necessity contain at least 0·75 per cent. of sodium-chloride, as otherwise the so-called " serum " (however prepared, and however named) will be harmful to the system. And most significant of all : Prof. H. Buchner (according to Prof. Dr. Emmerich and Dr. Tsuboi, Die Natur der Schutz- und Heil-substance des Blutes, Wiesbaden, 1892, p. 10) has shown, that anti-toxin-serum, without common-salt loses its bacterium-killing effect.

The fact, that the injection of serum is required to be in comparatively considerable quantity, would make it appear that the effective part of the serum is not the organic but rather the inorganic ingredient; in other words: the effect produced—if any—is not so much owing to the anti-toxin, of which the smallest germ would suffice (as for example in the case of vaccinia)—as to the mineral constituent, which requires to be administered in quantity, to alter the blood-serum in its physico-physiological properties.

Dr. Yersin (Sur la peste bubonique.—Ann. de l'Inst. Pasteur, 1897 No. 1) states, that the quantity of serum injected during the early stages of an attack amounted to 20 or 30 c.c.m., and in cases of later application to 60 up to 90 c.c.m.

In relation to the cure of diseases by the administration of common-salt it deserves to be recorded, what Prof. Beneke (Grundlinien einer Pathologie des Stoffwechsels, p. 320) advises: "The generality of practitioners work with the "most powerful agents in the form of medicine; with iodine, "arsenic, mercury, quinine, and a host of others; but the *fate* "*of the organism so far* as it depends upon *its integrating* "*inorganic constituents*, is left to kind nature, without the "least reflection, that with all its benevolence, nature is limited "in its action by one or the other condition; and that the "most rational method of curing disease is employed by "removing these conditions: in our case *by restoring the* "*inorganic ingredients to their normal proportions.*"

The nature and modus operandi of such an experiment as suggested above, is easily stated. A community of perhaps 20,000 inhabitants is selected. To supply these with half an ounce of common-salt per day for one month (the period of the experiment) will require 1 lb. per head, that is altogether 20,000 lbs., or roughly 10 tons of salt. This should be dealt out in proportionate quantities of $3\frac{1}{2}$ oz. per head per week, in the first instance accompanied by printed instructions, stating the benefit and the necessity of salt for their health, and describing the manner of taking it; that is: a part with food (even all farinaceous food should be cooked in slightly salted water), and the greater portion in solution—with a warning: never to drink water unless it has some salt dissolved in it. [This, if so mixed, that the salt is not tasted is very pleasant. See: "Common-Salt."]

The cost of the salt would be under £12 per ton (£3 the salt, and £8 or £9 the tax); hence the total cost of salt £120. The printing of the instruction—say 10,000 hand-bills and perhaps 100 wall-bills, may possibly come to £4 or £5. There remains the cost of distribution and the supervision of the proper use during one month. The number of officials

required for this purpose may be assumed as 30 or 40, at a rough cost of £350; so that the total expense would amount to £500.

Would this be impossible to obtain from a nation which can spend £100,000 on a technical institution at Khartoum?

When a few prominent Medical Men of acknowledged scientific high standing, have given their support to such a trial on the strength of the promising nature of the experiment—surely there would be a long list of benevolent people anxious to assist towards the establishment of a prophylactic means against the scourges, from which mankind is now suffering.

AN APPEAL

TO THE GENERAL PUBLIC.

THIS treatise, as far as presented in the preceding pages, was submitted to several Professors of Physiology and Hygiene at various European Universities, with a request for their support and their recommendation for a practical trial, as suggested. Of the replies received, it is only necessary to reproduce one; viz. that of Professor Dr. Hans Buchner of Munich, who is acknowledged to be one of the highest authorities on bacteriological questions; and whose researches referred to in his letter, entitle him to give an indisputable opinion on the question at issue. His reply is as follows:

"28th January, 1899.

"I duly received your esteemed letter of the 24th inst. and hasten to inform you, that you could not have applied to any one, who is more convinced of the correctness of your views, than I am; as I have ever since 1890, brought forward evidence of the fact, that the natural power of resistance of the organism against bacteria, *depends directly upon the amount of its mineral constituents.*"

"The first proof of this I published in the 'Archiv für 'Hygiene'—vol. x. 1890—in an article, entitled 'In-'vestigation on the bacteria-destroying effects of the 'blood and blood-serum'; and have already at that date shown, that the bacteria-killing faculty of the normal blood serum—upon which the natural protective powers of the organism against bacteria chiefly depend—is lowered and ultimately destroyed in proportion as the mineral constituents, especially Sodium-chloride, are abstracted from the serum."

"Later on, in 1893, I continued these researches on the important office of the neutral Salts in relation to the bacterium-destroying protective substances of

the serum, to which latter I gave (in 1891) the name of 'Alexins'; and added the second proof, that: the bacterium-killing qualities of blood-serum—after having been made in-effective through the abstraction of Common-Salt—*could be restored again by the restitution of the lost minerals, especially Common-Salt.*"

"By same post I send you a copy of the dissertation of 1893, in which I have marked passages on pp. 138, 139, 142, 174-6, to attract your attention."

"These inquiries established the fact, that the presence of mineral salts in the organism is of great importance for the natural resisting powers against infection; and that it would be dangerous to decrease their amount."

"The influence of this diminution appears to become evident in the increased destructive action of water on the cells and on the protective serum (Schützstoffe), which action is in itself always harmful. An organism, deficient of Salt, may be compared to one, which contains an abnormal quantity of water, and possesses, like this latter, a diminished resisting power against infection." (See "Common-Salt," pp. 43 and 125-9.)

"It was naturally suggestive, to apply these scientific results for practical purposes. But when considering these possibilities, I was always induced to think, that the low price of Common-Salt in our countries, gave every one the opportunity of supplying himself with the quantity he needed; and that any amount, beyond the body's necessity is, as you correctly state, excreted by the kidneys."

"You are quite right in stating, that this does not apply to India, where, with the high salt-tax and among a people, who—partly through poverty, partly through habit '(ignorance?)'—do not use it, the human body does not receive sufficient of that mineral substance, which imparts the power of resisting infectious diseases.

And this applies in a special degree to vegetarians, as Prof. Bunge (Lehrbuch der physiologischen Chemie) has shown."

"That such a deficiency of Common-Salt—when it exists—can be very harmful and must essentially increase the pre-disposition for infection, I consider—in accordance with my experiments, as certain. And the possibility of such deficiency of Common-Salt, which I did not think probable for Europeans, I must admit as possible for the inhabitants of India."

"I must however add, that according to my inquiries, Sodium-chloride is by no means the only salt capable of performing the important office assigned to the Alkali-salts in the human body, but that other mineral salts are equally effective. I do not mean to say, that for example, experiments should be made with Sodium-sulphate, since I am convinced, that Sodium-chloride is the most suitable for the human organism. I only wish to point this out, in order to indicate, that *Sodium-chloride must not be looked upon as a 'Specific' against the plague.*" (See ante p. 40; as also "Common-Salt" p. 15.)

"In conclusion, dear Sir, I do not hesitate, to give my full support to the practical experiment, as suggested by you. I consider it to have a strong scientific basis; and that it is for this very reason, urgently demanded—being besides perfectly harmless. I should hence feel highly gratified, were the British or Indian Government to decide, to accede to your request and institute an experiment of distributing Common-Salt among the members of a community, in which Plague has broken out."

(Signed:) "Dr. HANS BUCHNER,
Professor at,
and President of the Hygienic Institute of,
the University of Munich."

Accompanied by a transcript of this letter, a copy of the pamphlet was sent (Feb. 6th) to the Right Honorable Lord George Hamilton, Principal Secretary of State for India, with an Appeal: that his Lordship would take cognizance of the contents of the letter and of the pamphlet, with the view of instructing either the present Royal Commission in India, or any other special delegates, to institute an experiment, as suggested in the pamphlet. The receipt of the letter and pamphlet has been duly acknowledged (Feb. 8th).

Will the request be granted?—Will the Government order such an experiment to be made?

The decision of this question will rest, no doubt, with the Medical Staff; but it may not be out of place here, to inquire into the objections that can possibly be raised against the proposed experiment—to ascertain, whether—and how far—they justify a refusal of the appeal.

The opposition to the trial may be based upon either politico-economical—or upon scientific grounds. The former resolves itself into a question of expense, and of ultimate influence upon the Indian finances—*i.e.* the Income derived from the Salt-tax.

As to the cost—were this even to amount to, say, £1000, or more—to establish the prophylactic efficacy of Common-Salt, it would be an insignificant sum, as compared with the expense incurred in fighting the plague, as done at the present time; and it would be infinitesimal, when the ultimate great boon is considered, which would be achieved by so trifling an outlay. Should however the appeal be refused upon the mere consideration of expense—in that case there cannot exist the least doubt, that private means would be forthcoming, to bear the cost; and only the mere sanction of the Government would be required. Such a sanction would, in the eyes of the natives, give a moral support to the experiment; and the withholding of it would be dictated by motives, which could not bear public exposure.

The objection based upon the disturbing influence on the Salt-tax, may be looked upon as of a more valid nature; but this is apparent only. Let the bulk of the inhabitants of India once learn the great benefit, which can be derived from a liberal use of Common-Salt, the Indian finances would not suffer, were the Government to reduce for example the Salt-tax to one half of its present rate (if incapable of rescinding it altogether)—since the reduction in the tax would be fully balanced by the increased consumption.

This question presents however an additional aspect. The probable reduction in the Salt-tax would be compensated for by an improved state of public health and a consequent increase in the industrial energies of the community, and thus indirectly in the general finances of the country. In fact, this side of the question alone will well deserve the full attention of the Indian Government.

So far the question at issue refers to the decision of the statesman; what now can be the objection of the physician and scientist? To declare, that the present means are fully adequate to meet the exigencies of the epidemic, would be in direct contradiction of all attested facts. The epidemic is dying out in some—and taking root in other districts; and it does this admittedly without being influenced by the prophylactic and curative agencies employed. What apparently has been achieved by the serum-injection among the numerically few, as compared with the thousand times greater number of the non-inoculated, can be accounted for by a natural immunity and by the application of other means; and this is after all most insignificant, as compared with the mass of the population untouched by it. The abatement is unquestionably due to a natural decline of the epidemic, either on the whole or in definite localities. The question remains as much an un-solved problem, as it has been hitherto; and still awaits a satisfactory solution.

Besides this assertion of non-expediency, there is the objection, that the suggested prophylactic remedy is far too

simple, to produce so complicated a state of the system as an immunity against infectious diseases. This is not only expressed in half-veiled language or by inference, but also plainly asserted. Surely, such a pretext should not come from a highly-educated scientist; it would be more in character with an ignorant layman, who is dominated by the idea, that great, far-reaching effects can only be achieved by causes and agencies of an uncommon nature—whereas the man of science should readily admit, that trifling causes can have important consequences. And it is not becoming of gentlemen in the position as teachers of the laity, to treat such questions with silence. They should remember, that the simple substance—Common-Salt, lies at the basis of human existence; that by abstracting and absolutely withholding it from the system—illness and ultimately death is the result.

That simple physiological means can prove effective against a malady usually considered fatal, which has its origin in pathogenic microbes, is illustrated by the acknowledged cure of tuberculosis. Here is a dangerous affliction—the result of an organic poison, for which bacteriological therapeutics considers anti-toxins or internal anti-septics absolutely necessary; yet—it is found, that: instead of being cured by bacterium-killing medicines of any kind—this dire disease will yield to fresh air, ample food and judicious exercise. And not any medical man, however high his position in the profession, is entitled—either through ignorance of its effect (see Prof. Buchner's letter), or of its importance for the existence or the health of the human organism—to oppose the employment of Sodium-chloride as a prophylactic before an outbreak; or even as a curative agent, when injected intraveinously or subcutaneously during an attack. (See: Results of Salt-injections during the Hamburg epidemic in 1892, in "Natural Immunity against Cholera," pp. 78-9.) Such opposition deserves the severest opprobrium and should be met by charges of unworthy motives.

Surely, it cannot be derogatory to the nimbus of their science to admit, that Sodium-chloride can be instrumental in imparting to the human body the power of preservation and of protection against pathogenic influences. Certainly: to err is human; and no doubt, it might appear to damage professional prestige, were so common a substance as Common-Salt to achieve, what the whole therapeutic armory has not been able to effect. Everyone will understand this wounded pride; but every sensible person must admit, that such a sentiment should not stand in the way, when human lives, to be counted by thousands, are in question.

Besides the above pretext, which may have its origin in the "amour-propre" of a highly-strung scientific mind, there is no valid and truly logical reason, that can be advanced in opposition to the suggested trial, which—besides a scientific basis, has everything in its favour: simplicity in its application; comparative inexpensiveness; and—what deserves weighty consideration—ready acceptance and active assistance on the part of the inhabitants of India. But above all: the promising prospect of conquering one of the scourges—with most probably other ailments—which afflict mankind.

Should the Government nevertheless not accede to the request and either refuse to institute the experiment, or simply shelve the matter,—in that case it will be expedient and necessary, to make an appeal to the general public for an agitation in favour of the suggested experiment, and awaken an interest in a subject, which is of universal and far-reaching importance.

That this appeal will meet with a ready and extensive response, cannot be doubted, since the publication of the treatise on "Common-Salt" has called forth, unsolicited (among many others), several communications on the subject of the prevention of disease in tropical climates by the liberal use of this mineral food.

Among these, the following extract from a letter of a gentleman, resident in the Riviéra, deserves a place here, as its contents have a direct bearing on the subject of this treatise and on the question of the health of Europeans in the tropics. He writes:

"27th Dec. 1898.

"I have read your work 'Common-Salt' with great pleasure and interest, having, for the most part of my career in India, been a great advocate for its use; and I attribute my immunity from all serious illness, whilst in that country (some 35 years) to being a regular salt-eater. My duties at times took me into parts of the country, where malarial fevers and cholera were very rife; and it is alone to this preventive, that I consider, I enjoyed good health and suffered no ill consequences . . . . and, as I mentioned before, I have had no serious illness during my life—not even tooth-ache—thanks to Salt."

Another gentleman, for many years resident in India and Egypt, gives his experience in these countries, among other statements, as follows:

"In 1873 I was in charge of a Government stud in Bengal, where cholera prevailed in the villages all round. I read in 'Braithwaite's Retrospect of Medicine' about a doctor in the West-Indies, treating the last 17 cases of cholera there, with iced sea-water, and they all recovered. So I wrote to an English Chemist in Benares to prepare for me a large jar-full of sea-salt, giving him the proportions of the various ingredients. (I think, he sent me about 10 or 12 lbs.) There was no English doctor within 20 miles; so I gave a quantity of the salt to a native doctor, who had obtained a diploma in the Government Medical College at Calcutta. I distributed the remainder among some villagers, who were suffering badly,—telling them, to dissolve it in water and let the

patients drink frequently, at the same time rolling them in blankets, to cause perpiration. The native doctor told me, that he gave the salt in 13 cases of cholera, and that 11 recovered. Some weeks afterwards several villagers came to my bungalow, and thanked me for giving them the medicine. They said, that 25 people were attacked and all recovered after taking it."

"I always took a fair amount of salt, and have been in eight places, where there were outbreaks of cholera—some of them very virulent—and I never had a sign of the disease. I am strongly in favour of an ample supply of salt as advantageous to the health of all, except carnivorous animals—especially in hot climates. When in Egypt in 1882, I persuaded the officials to allow a daily ration of salt for all the Government horses and mules, although the military authorities were opposed to the expense, on the ground, that it was not given in England."

"The natives of India are full believers in its being good for health; but the heavy tax laid upon it by the Government, prevents the poorer classes from buying enough. If this were abolished or even reduced to one quarter of what it is now, I believe that the lives of thousands of cattle, as well as of natives, would be saved annually. The cattle cannot receive much now on account of the expense being too great. If the tax were one-fourth of what it is, I believe that the Government-revenue would not decrease, because the natives would buy the Salt in far greater quantities."

"For the Government stallions under my charge in the Punjab I made a practice of greatly increasing the ration of salt, whenever anthrax or Loodiana fever was in the neighbourhood, giving two chittacks, or about

four ounces daily to each. I did this in hopes that it might render them less liable than they would otherwise have been to the attacks of the disease; and certainly, I was fortunate enough, never to have had a case amongst them, even when the fever was very prevalent and fatal in the artillery and cavalry at the same station."

There can be scarcely any room for doubt, that—upon the publication of this treatise—a considerable number of reports of a similar nature in relation to India alone, will be forthcoming, to give support to the contention for a practical trial, which should lead to active steps towards its consummation, should the Government fail to undertake the same.

At the moment of completing this treatise comes the news of a wonderful—"a romantic"—success of Haffkine's serum-injection as applied in a small community of 600 people "*after*" 381 attacks, of which 378 proved fatal. *Within four days* of the appearance of Dr. Lieven (so it is reported), at the Central-Asian village of Anzop with "Bombay serum," the epidemic is stamped out. What a mockery upon the investigations, the researches, the trials and the efforts of the medical staff, engaged in combating the disease in India, and upon the various commissions, delegated to gather knowledge about the nature and efficacy of the serum-treatment. The story, as given by the "Times of India." was brought to Bombay by a Russian nobleman. But it naturally raises the question: Why was this treatment not equally effective in India? The answer will probably be found in the record itself, which says: Inoculation took place "*after*" 378 deaths had occurred. Not any epidemic has ever completely annihilated a whole community; there are always human beings, who escaped the attack, and most outbreaks have ceased without any prophylactic or curative

means being employed—entirely of their own accord. And the survivors, who escaped after the epidemic had raged out, were probably protected through a natural immunity; for, they had ample time to be infected and to develop the disease during the illness of the 381 sufferers, before Dr. Lieven appeared on the scene.

Why agitate the public mind with such a sensational story, which on the face of it bears the stamp of improbability and of being dictated by a kind of "jingoistic" bias. It can only lead to disappointment and to a mistrust in all scientific efforts, even when these have the best foundation for success. Editors of the public papers should fulfil their trust towards their readers with better knowledge and greater conscientiousness. That such stories are offered for our acceptance is an indication of the low estimate, in which the public intellect is held.

Nothing is so detrimental to a healthy corporate life in our social fabric as that easy-going indifference, which can only be moved, when fate and our personal misfortunes shake us out of our selfishness or out of our ignorance. How many national calamities could have been prevented, had but the educated public taken more interest in special questions relating to our general welfare; and shown less satisfaction —by a passive acquiescence—with the dicta of those, who by appointment or by general consent have been delegated to decide such matters. This does not apply only to our political, social and municipal organisations, but also to the employment of scientific principles, when these bear upon our mental and social wellbeing. The general indifference, shown in such cases, is the more reprehensible, when the educated public is declared to be incapable of understanding and of judging these questions, and is thus—one might say—persuaded into respectful submission and silence.

In conclusion: The object is, to prevent illness and save human lives by the employment of a simple physiological agent, which either on scientific—or on financial grounds, offers no reason for objections—on the contrary is most favourably supported.

And should the efficacy of this prophylactic means be ultimately established—for which there is every reason to hope—what a remorse, what a feeling of guilt, bordering on that of manslaughter, must take possession of those, who in their conceit and pseudo-wisdom have vetoed its employment!

But there is no legal court, before which they can be arraigned, except popular opinion and their own conscience.

Received in time, to be offered as evidence in favour of the contention of this treatise is a letter from:

Professor Dr. Max von Pettenkofer,
Past President of the Hygienic Institute
of the University of Munich.

"Munich, 24th February, 1899.

". . . . . .

"Your 'Plague in India' I have read with interest, and I support your suggestion, that the experiment with Salt should be made there. Your work on 'Common-Salt' I obtained from London, and I am lending it to my friends to read. It contains many original ideas."

A copy of this letter has been forwarded to the Secretary of State for India, as Prof. von Pettenkofer's name stands

foremost in the medical world. It is difficult to conceive, upon what grounds the Government can possibly disregard the opinions of such high authorities as Prof. von Pettenkofer and Prof. Buchner—in the face of the bewildering evidence offered to the Royal Commission, and the absence of all valid reasons for refusing the suggested experiment.

LATEST NEWS FROM INDIA.

The "*Times*" correspondent under date February 21st, reports the evidence before the Royal Commission as follows:

> "The monotony of the evidence was varied by the production of a native inspector in the Bombay Customs Department, who had been twice attacked by the plague and had recovered, and also of one Narayan Muljee, a patient of Dr. Godinho, who had been attacked three times and had recovered."

Nature's "inoculation"— as which the first attack must be considered—failed to protect against a second, and two even against a third attack; what a mockery on all artificial attempts of protecting the system by serum-injection! *IF* serum-injection is effective as a prophylactic, surely: the above examples prove, that the protection cannot be due to the organic constituents of the serum, but must be ascribed to the action of the mineral ingredients—Common-Salt—which every serum, whatever its origin and composition, must contain, and without which it would be injurious to the organism. These two sufferers showed exceptional susceptibility for the disease; but they recovered in virtue of a strong vitality of their blood and of their nervous system.

And on the 23rd. ("Times"—25th.) he states:

> "According to this report (of the Poona and Kirki cantonments), *inoculation is but a makeshift.* It is useful *perhaps*, in time of trouble; but it cannot take its place among the great sanitary laws, which secure health to, and govern the health-legislation of the civilized world."

This may be taken as a just estimate of "Serum-therapeutics."

The whole subject of the Plague, its prevention and cure illustrates, what a medical writer said a hundred years ago:

> "There is a tendency of observing too much and of thinking too little."

"TROUTBECK,"
ELM ROAD, BECKENHAM,
KENT.

JUST PUBLISHED. PRICE FIVE SHILLINGS.

COMMON SALT.

ITS USE AND NECESSITY FOR THE MAINTENANCE OF HEALTH AND THE PREVENTION OF DISEASE.

BY

C. GODFREY GÜMPEL.

FELLOW OF THE PHYSICAL SOCIETY; ASSOCIATE OF THE INSTITUTION OF CIVIL ENGINEERS; ASSOCIATE OF THE INSTITUTION OF ELECTRICAL ENGINEERS; MEMBER OF THE BRITISH ASTRONOMICAL ASSOCIATION; ETC.

Criminal is the ignorance which causes Disease and Death.

London: SWAN SONNENSCHEIN & Co., Ltd., Paternoster Square.
1898.

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nervous system—Other objections against the use of salt—How much salt?—How to take the salt?—Sea-water and mineral waters—Sea- and salt-water bathing—Disease—Salt and disease—Merely a cold—Rheumatism and gout—Dropsy—Anæmia and chlorosis—Individual immunity—Cholera—Typhoid and other fevers—The Plague—Serum treatment—Diphtheria—Influenza—Small-pox—Salt and life in the tropics—The salt tax in India—Salt and infants—Salt and vegetarians—Practical experience—Salt no panacea—What should be done?—Salt and the doctors—Concluding remarks.

APPENDIX: Illness of H.R.H. the Prince of Wales—List of some cases of sudden death—Glossary of terms—Index.

OPINIONS OF THE PRESS.

Many medical men will be inclined to look with suspicion on a book dealing with the functions of salt in the human economy, written by one who is not himself a member of the profession; but the *greater number will read from cover to cover with interest, and agree in the main with the author's conclusions*. Apart from the medical profession, *a careful study of the book* by laymen *will well repay the time spent in doing so*, on account of the nature and variety of the information it contains.—(*Glasgow Herald.*)

Mr. Gümpel has produced *a most fascinating volume.* It is as interesting as a novel, and *it is so brightly written*, that we should prefer it to many a novel it has been our sad lot to peruse . . . What that treatment is we must leave our readers to find out for themselves from *this most entertaining and instructive volume.*—(*London Review*).

The book has much to say for itself, and that is of an interesting and suggestive kind. It deserves to be read and weighed-up by the medical profession; and a lay-reader could scarcely study it without *deriving from it much good instruction in the principles of health.*—(*Scotsman.*)

It is a full inquiry into a whole set of questions, and it furnishes answers with respect to all. They deserve reading.—(*Echo.*)

We cannot too strongly recommend a perusal of *this common-sense work* as a valuable guide to the maintenance of health.—(*Chester Courant.*)

The book deserves something more, than the curt dismissal which the professional man is too apt to give to works of the kind, which emanate from anybody but a medical man.—(*Publishers' Circular.*)

The physiological reasons, upon which Mr. Gümpel's theories are based are clearly stated.—(*Nottingham Guardian.*)

These and many kindred facts, Mr. Gümpel sets out with knowledge, clearness and vivacity.—(*Saturday Review.*)

The book is one of great general interest to the educated reader and *is not without pregnant suggestion to the statesmen of India.*—(*Times of India.*)

It certainly puts the case for Salt very forcibly and very fully . . . It *covers a much wider field* than the use or non-use of Common-Salt . . . Those, who wish to know, why we take Salt with our food or why we should get it into our bodies, should *read his very interesting book.*—(*English Mechanic.*)

He has given the thoughtful reader a really fascinating treatise, full of startling asseverations, and striking at the very root of many of the supposed fundamentals of medical and other sciences. There is something in the book for the mother, for, in the chapter "Salt and Infants," the author becomes delightfully satirical as he deals with the notions and ways of the modern nursery. Its "Sugar" for everything, but of "Salt" there is never a word. The *book is worth reading, and if it succeeds in a small degree in its aim and object, it will not have been written in vain.*—(*Food and Health.* Supplement to the *Sanitary Record.*)

Of so-called "high-class" criticism the following will serve as examples.

The "*Saturday Review*" states, among other questionable assertions, that: "The author implores every one in health or out of health, to put a pinch of salt into every cup of tea, and to put a pinch of salt into every cup of coffee." And the "*Christian World*" follows suit in an un-Christian like spirit, when declaring: "If you have a cup of tea in bed, Mr. Gümpel entreats you to pop a little salt into it, and you will live long."

Now, what does the book actually say ?

The reader will find on page 323 the advice given : to *avoid the early cup of tea on an empty stomach*, as destructive to the powers of digestion; and *should the sudden denial of this bad habit prove too great a task*, then *to gradually reduce the strength of the tea and increase the pinch of salt*—in order to arrive by easy stages at the desired morning dose of salt-solution ; and on page 147 the assertion : that salt-eaters cannot enjoy anything, unless it has a decided salty taste—is answered by calling attention to the old habit (older than the author or the "critic") of bringing out the flavour of the coffee by putting some salt—of *the size of a hempseed* into the cup, which it would be absurd to declare was done in order to produce a taste of salt.

The above barefaced mis-representations can have evidently no other object, than to hide the critic's inability of finding the author at fault, by exposing him to ridicule. Such tricks must bring the blush of shame into the face of the "honest" critic ; and a reviewer, who has the effrontery to offer to his readers such a distorted account, can certainly not claim public confidence.

Of a similar character are other statements, which are put forward as scientific refutations of the contentions of the book—sweeping assertions, unsupported by either proofs or by citations from the book ;—demands for a great body of empirical, evidence for his "drug" as a "specific" (a "drug" and a "specific"—why, the man has never read the book);—"a bemuddled criticism of serum-therapeutics" (a mere empty assertion, which must be accepted in evidence, either of the critic's confused understanding, or of his professional chagrin at the public exposition of the plain truth) ; —they all evince an animus, an obliquity of acumen, which is not very complimentary to the respective writers of the "Saturday Review," the "Westminster Review" and the "Sanitary Record." The scathing answer, which they deserve, cannot find a place here and must be left for a future occasion.

On the whole, the critics have never given a *specific* case of doubtful physiological facts, or of incorrect inferences from them ; they have failed to show, that false conclusions have been deduced from wrong principles ; they have ignored such diseases as Diphtheria and Cholera, in which practical proof has been given of the action of Common-Salt as a curative agent, which is even more than the treatise desires to prove. And such evasion places either the understanding or the honesty of the reviewer in a questionable light.

Such "critics" deserve the answer, which Mephistopheles gave to Faust:

Du bist am Ende—was du bist.
Setz' dir Perrücken auf von Millionen Locken,
Setz' deinen Fusz auf ellenhohe Socken,
Du bleibst doch immer was du bist . . viz. . ?

AN INDICTMENT FOR A SIN OF OMISSION.

The editor of a public paper or journal is charged with a trust. This trust may be self-imposed; but it nevertheless constitutes a charge, viz.: of rendering a true and undistorted account of whatever tends to promote human health and public welfare.

Nor is he justified to withhold such information for the same reason, which may induce him to do so in matters and questions, appertaining to works of pure literature or art, without laying himself open to public censure.

The information, contained in the treatise on "Common-Salt," will tend to the prevention of sudden deaths from internal causes, usually assigned to Heart-failure, Syncope or Apoplexy; and in face of the scientific reasons in support of that contention, it would be bold and risky, to deny "a priori" the correctness of such reasons—unless from bias, prejudice or wilfulness. And as the dissemination of such knowledge may save human lives; in the same degree will the withholding of the information deserve a serious reproach for neglect—if not worse.

How far have the London daily and some of the weekly papers and journals acted-up to the demand for making the public acquainted with the cause and the means of preventing such untimely loss of life, witnessed in such striking cases, as the sudden deaths of the late Dr. Berry, Lord Justice Chitty and President Faure? A copy of the work was sent for review to most of the journals; but after nearly five months no notice has been taken of the book—although room could be spared for every other—sometimes trivial subject. When these papers indict the "peculiar people" for manslaughter on account of neglecting to call-in medical aid without any certainty, that such aid would have saved the life of the sufferer—with the same right, and on the same grounds can such an

indictment be laid against these same papers—for neglecting to disseminate the knowledge, which may serve in the prevention of these sudden deaths; and the simple unfounded assertion, that Common-Salt can have no such power—cannot be accepted against the scientific reasons advanced in its favour.

The above remarks apply in a still higher degree to the prevention of Diphtheria, considering the practical proofs of the successful application of Sodium-chloride in the cure of that disorder.

The public "Press" prevents a free expression of opinions on such questions for apparently no other reason, than prejudice in favour of the infallible (?) tenets of Medical Science.

The same spirit, which in a petty way denies publicity to new ideas as not in harmony with the generally-accepted doctrines—burnt John Huss and Giordano Bruno; opposed Harvey's discovery of the blood-circulation; ordered witches to the stake, etc., etc.

Truly, we are living in a free and enlightened age!


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