QUARANTINES AND THEIR SCIENTIFIC VALUE.

THE outbreak of cholera in Europe during the past summer has naturally awakened a lively interest in precautionary measures to prevent its access to this country. The experience of all epidemics shows that among the chief and first obstructions suggested is that of quarantines. From their early application against the progress of plague in Italy, to their latest use during the past summer to prevent the introduction of cholera in Spain and Italy, this institution has met with indifferent success in preventing the spread of an epidemic; so that to-day the practical question of its efficacy remains still unsettled in the minds of many. Indeed, there is a large and influential number who inveigh against all quarantine measures as useless in a sanitary point of view, and as causing needless obstructions to the free intercourse of persons and commerce. It will be the object of this paper briefly to review the position, and establish, if possible, a reliable stand-point from which the work of sanitarians may be rationally carried on.

To approach the subject properly, we must first disabuse our minds of many European prejudices and ideas. So much of our medical literature comes from these sources, that we insensibly adopt conclusions drawn from these writings, without considering the differences of geographical position, and the facility which this gives us of employing measures which may be impracticable in most of the European countries. While this would eminently be the case, even were the conclusions reached by European governments founded on the recognized natural history of epidemics, another element of distrust is presented when we know that other factors enter into and bias their writings.

Governmental jealousies, geographical positions, impeded commercial relations, the difficulty of demonstrating an intangible element, with the consequent contrariety of opinions, have each and all tended to perpetuate the diversity of measures taken by different governments to obstruct the progress of a scourge. The several international sanitary congresses which have from time to time been held since the outbreak of the first cholera epidemic in 1831, have rarely been harmonious in action, adopting their conclusions mostly by a majority vote, or, if harmonious, the governments they represented have often failed through interested motives to give them cordial force and efficiency. Particularly is this notable with the English. Cholera is endemic upon a large area of her richest possessions. Her commercial relations with these countries are constant and immense. Any action taken to repress the spread of cholera must contravene more or less these relations, and is met either by evasion, or distinct refusal to adopt such action.

Her medical men insensibly imbibe the same spirit; and we find her medical literature teeming with articles on 'epidemic influence,' 'non-contagiousness of cholera,' the 'non-efficiency of quarantine,' 'cholera purely a filth disease,' etc.

While there is much in these writings which should command respect and attention, particularly in all that pertains to local sanitation, we should notice that their principal value lies in restricting and jugulating a scourge once admitted, rather than preventing in the first instance its ingress to the country. The geographical position of the different nationalities of Europe with respect to one another precludes the application of the principles of quarantine as understood in this country. Land quarantines have always proved ineffectual: and there is but one spot where quarantine applied to vessels can hope to be effectual against the incursion of cholera; that is the one established within the past few years at the island of Camaran, at the entrance of the Red Sea. In a paper recently published, I have detailed the principles and purposes which actuated the European international sanitary commission in its establishment.[1] If the regulations established at this point are faithfully carried out, the danger from cholera, so far as its transportation by Mohammedan pilgrims is concerned, should be effectually prevented.

Before making our estimate of the efficiency of quarantine measures to prevent the incursion of an epidemic, we must consider for a moment the position of this country with reference to the two great scourges which it is desired to contravene. In no part of this country are cholera or yellow-fever endemic: neither can reach our shores except through the intervention of shipping. The time of transit from Europe is longer than the incubative period of cholera; to all northern ports, from Havana, it is nearly equal to the incubative stage of yellow-fever: disease, therefore, contracted before going on the ship, would be developed before arrival at our ports. We shall see, when we speak of the detail of measures for repression, that a vessel, so far from being unfavorable, is really an efficient spot to jugulate cholera. The same rule does not apply to yellow-fever.

[1] New-York *Medical record*, April 18, 1885.

But what, then, is quarantine as understood in this country? Is it mere blind repression, established through the instinct of fear, and calculated to obstruct all intercourse among nations, both personal and commercial? Dealing with intangible agencies, is it equally vague in its principles of repression? The term is an unfortunate one; for it naturally carries us back to the derivation of the word, with all its inconveniences and sufferings of detention, its useless and blind precautions, its superstitions and silly forms as practised for centuries in the south of Europe, and as enforced in Spain and Italy even during the past year. It has no such meaning to-day, but comprises the whole series of measures, hygienic as well as restrictive, employed to contravene the incursion of an epidemic. These are not limited to those taken at the port of arrival of a vessel, but include those which in my judgment are far more important, — the inspection of passengers and *luggage* before embarkation, the systematic inspection of passengers in transit, and, finally, their observation and inspection on arrival at port. The underlying principles upon which its workings are based, are the modes of transmission, and the period of incubation of the disease to be contravened. Intelligent quarantine, while working on these principles, will vary the details according to the locality to be protected, and the particular disease to be excluded. The series of measures necessary to repress cholera would in no way be applicable to the exclusion of yellow-fever, for they are transmitted by wholly different agencies. Cholera, while the most pandemic of all epidemics, is also among the most contagious, or, rather, secondary influences enlarge widely the sphere of the contagious influence; while yellow-fever, limited to certain zones and altitudes, is non-contagious, its transmission depending wholly upon the surroundings of man. Strange as may seem the assertion, a ship should be one of the best places to jugulate cholera; for if due precautions of cleanliness, and disinfection of discharges, are promptly made, we avoid the secondary sources which arise from soil and contaminated water. On the other hand, yellow-fever, appearing on shipboard, can have no ending, so long as there is fresh material upon which to feed, short of seeking a zone where it loses its virulence, or discharging the vessel, and subjecting it to the most minute cleansing and purification.

In an article of this kind, it is unnecessary to recite the details of measures of repression of the two diseases, based on the above principles. I have already done so in the article 'Quarantine,' in Buck's 'Hygiene,' and the paper referred to, lately published in the *Medical record*. There are, however, two or three points to which it is well to refer, and the discussion of which may correct popular misapprehensions. I have stated that the time of transit from European countries to our shores is longer than the incubative period of cholera. If, therefore, by careful inspection of all soiled clothing at the point of departure, this factor for conveying the disease is eliminated, we have only to watch the development on shipboard of such cases as may have acquired the disease before coming on the vessel. The moment a case is recognized, or even suspected from any diarrhoeal discharge, it should be promptly isolated, attendants quarantined, discharges at once disinfected, all soiled clothing promptly destroyed, attendants' hands washed for the slightest stain, and it would be promptly suppressed. There is here but the primary factor with which we have to deal. The secondary ones, of contaminated water, floating germs, and conditions of the soil, are absent. If efficient measures are taken, a ship should be a favorable place to repress the disease. It would remain, then, for the land quarantine to maintain the vessel under observation for the requisite time to determine that no new cases occur. A series of measures which would suggest themselves promptly to any health-officer should be taken; such as the removal of all from the vessel to a spot of absolute isolation, the thorough cleansing and disinfection of all the cabins, linen, etc.

While yellow-fever may be transmitted by any of the surroundings of an individual, its favorite habitat is in the filth which accumulates in the bilge of a vessel. Nothing short of reaching this filth, and removing it with the most scrupulous care, can insure a protective influence. Disinfectants, fumigations, great heat in its various applications, are but secondary adjuvants, to be employed only after most scrupulous cleanliness has been effected. I believe in the efficiency of quarantine, if the measures recited cursorily above are rigidly carried out. They are measures to which the most minute attention must be given in every detail. The neglect to carry out any single provision will cause failure, and throw discredit upon the system.

It is a subject of interest to consider the influence of steam-navigation upon the dissemination of cholera and yellow-fever. As neither disease travels faster than man himself (for I discard the theory of 'epidemic influence'),

it would seem, at first view, that the increased rapidity of travel would also disseminate more rapidly the scourges; and yet it has seemed to me the practical working is the reverse. Those familiar with the history of cholera among the Mohammedan pilgrims are aware that since the abolition of caravans, and the transportation of pilgrims by steamers, very many fewer cases of cholera occur at Mecca, and along the land route from Dejeddah. It is because all are kept, so to speak, in a certain lane, where they are under constant observation; their food and hygienic surroundings are more carefully regulated; and cases occurring can be promptly treated and guarded. The same is true of steamers bringing emigrants to this country. With competent medical officers, isolated hospitals, absolute cleanliness of attendants, and prompt disinfection of discharges, the disease should be limited to those who had contracted it before coming on board, and virtually suppressed by the time of their arrival at any one of our seaports.

This influence of steam-communication is more striking, though in a different way, with reference to yellow-fever. In the great majority of cases, the vessel is the means of transportation; and the particular place of preference for the poison is, as stated above, in the filth which accumulates in the bilge. In sugar and milado carrying vessels, this, in a tropical climate, soon develops fermentative action. Until within a few years, the commercial history of vessels trading with yellow-fever ports has been as follows: A European cargo is taken to Havana, discharged, and the vessel lies an indefinite time empty in an infected port, seeking a charter for some seaport in the United States. No particular precautions of cleanliness are taken, either as regards the vessel or the crew. In most cases the fever appears while lying in port. A cargo is at length obtained, which adds to the filth of the bilge already infected. A better nidus for the propagation of the poison could not be formed; and under a tropical sun, sealed hatches, and stagnant air, it intensifies with great rapidity. An experience of several years showed that the majority of cases brought to the port of New York were on vessels of this character. Within the past ten years a radical change has been going on, and steam-transportation has largely replaced sailing-vessels, and with it there has been a large diminution in the number of the cases of yellow-fever. Steamers belong to regular lines, which make frequent and regular trips, remain but a short time in port, and are therefore rarely infected. Being of iron, their construction enables one to reach the bilge with facility, while the steam-pump flushing it keeps it clean: there is no wood to saturate and become infected. A steamer, too, carries the cargo of several sailing-vessels, and lessens the risk in that proportion. So far, then, from the rapidity of steamers facilitating the spread of cholera and yellow-fever, they have been the means indirectly of retarding both.

It could also be easily shown that the long antagonism between commerce and quarantine has entirely passed away. Instead of vessels riding an indefinite quarantine, our knowledge of the natural history of the two diseases tells us that the sooner a vessel is emptied, the less the danger of transmission of disease. Vessels, therefore, in quarantine, are returned to commerce sooner than if they went to dock, and discharged through the usual routine.

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HOW TO DEAL WITH YELLOW-FEVER.

IN closing a report on the yellow-fever epidemic of 1873, made in response to a resolution of the U. S. senate, the present writer used the following language: —

"It may finally be added, that, in the absence of other adequate cause, the gradual narrowing of the yellow-fever zone in the United States during the past fifty years — say, from the time when leases in New-York City frequently contained a provision for reducing the rate of rents in the event of a depression of business from the advent of cholera or yellow-fever — may be fairly claimed for the sanitarian and his efforts; and that in such efforts lies all there is of promise for the future in dealing with yellow-fever."

This was written before the brilliant results of the investigations of Pasteur and Koch had opened up the tempting field which Ferrán and Domingos Freire already claim to be successfully cultivating. It may be that these gentlemen have actually accomplished — the one for cholera, and the other for yellow-fever — what Jenner, Pasteur, and Koch have done for other diseases; and although this is not yet proven, and, in the nature of the case, will require considerable time to demonstrate, there is scientific ground for believing that immunity against these pestilences will eventually be secured through a process analogous to that by which vaccination has disarmed small-pox of its terrors. Until that desideratum is reached, however, the precautions which should be taken to provide against yellow-fever will