

to that point you are safe. In giving our directions to the public, we usually say, boil your water for half an hour.

Another very important point about these particular micro-organisms is the fact that they are so quickly destroyed by desiccation. Koch found in his early experiments that a few hours' exposure in dry air when the culture was spread upon a glass cover were sufficient to kill it. Since that Kitasato has taken up the subject, and has found that it may live for a longer time if the stratum has some thickness. If you have a very thin film upon your cover-glass, the spirilla die very quickly when simply dried in the air. If the thicker layer is used, they may live for a longer time. Under certain circumstances, when he had a thick film from an agar culture, Kitasato found that they lived even as long as thirteen days, but ordinarily they only survived desiccation from a few hours to twenty-four hours.

Now, therefore, in regard to articles coming from abroad that have been ten days or more on the steamer—merchandise, mails, etc., I can hardly understand how clean merchandise in original packages or mails could become infected. The mails might easily become infected by scarlet fever or smallpox from convalescents. We know very well that something from the surface of the body of such persons might get into letters written by them, and be transmitted in that way, and yet we very rarely hear of that sort of thing happening. We do not attempt to fumigate our mails on account of smallpox, and in case of cholera, where the germ is in the intestine, even if a sick person sat up and wrote a letter, the chances are that the letter would not convey any infection. I therefore think that all this insistence upon disinfecting the mails and merchandise is going a little too far in that direction, especially as we know the biological characters of this particular micro-organism, and know that it is quickly killed by desiccation.

In regard to the value of various disinfecting agents, innumerable experiments have been made in this country and in Europe by competent observers. In a culture in bouillon, twenty-four hours old, experiments made in Koch's laboratory show that it is killed by hydrochloric acid, 1-1300; sulphuric acid, 1-1000; methyl violet, 1-1000; carbolic acid, 1-400. These experiments were made, however, under different conditions from those which would obtain in practical disinfection. For practical purposes the experiments made by Bolton for the Committee on Disinfectants, under my direction, several years ago, are more reliable. In Bolton's experiments the spirilla were killed in two hours by mercuric chloride, 1-10,000; sulphate of copper, 1-500; and carbolic acid, 1-200; and one per cent. solution of carbolic acid will destroy the spirillum with great certainty in such cultures in two hours.

The methods of obtaining and testing the presence of the cholera spir-