

familiar with the convincing evidence which has accumulated to prove that water is a common vehicle for the dissemination of enteric or typhoid fever and cholera, and it may be, as well as milk, a vehicle for communicating scarlet fever and diphtheria, and possibly many other if not all of the infectious febrile diseases.

It seems clear that the spores of some moulds or mildews, which it appears belong to the same class of organisms as the specific infections of disease, will not only sustain themselves when immersed in water containing nitrogenous matter, but owing to the facility with which they accommodate themselves to this medium, they will in it multiply rapidly. Although the pathogenic micro-organisms which are regarded as the germs of infectious diseases are not to be found in ordinary water; the wonderful power of adaptation to a particular medium which all such low forms of life possess, is well known; and they appear to be subject to the same influences as the non-pathogenic organisms. Recent investigations by various medical scientists into the bacteriology of water, have brought out some very interesting and important facts in connection with this subject. It appears from Dr. Percy Frankland's experiments, referred to in late numbers of the *British Medical Journal*, that Kock's "comma bacillus" (of cholera) is capable of adapting itself to the aqueous medium. Dr. Frankland states that, "when introduced into water a large proportion of these bacilli are generally destroyed, but the remaining ones then undergo multiplication; and Dr. Wolffhügel has found that when these adapted organisms are further transplanted into fresh water, they do not undergo this preliminary reduction in their number, but commence multiplication at once." Although the comma bacillus may only survive a few days in good potable water, we are told that in London sewage it appeared to find an excellent culture medium, and was found in largely multiplied numbers after twenty-nine days. Dr. Meade Bolton has shown that the spores of anthrax remained alive in distilled water for upwards of ninety days, and in polluted well-water for nearly a

year; although the bacilli alone when introduced into some kinds of ordinary water perished in the course of a few days. Thus the spores, just as in the case of their resistance to heat and other disinfectants, exhibit a vitality far greater than that possessed by the bacilli. Dr. Wolffhügel found that in polluted river water in Berlin, even when diluted tenfold with distilled water, the anthrax bacilli undergo extensive multiplication. The bacillus pyocyanus, which produces the greenish-blue coloring matter frequently present in abscesses, after having been 53 days in distilled water was found to have increased in numbers many-fold those originally introduced. Dr. Arthur Downes, in a communication to the above named Journal, quoting from a memoir from Professor Duclaux, states that, in sixty-five flasks of M. Pasteur's earlier researches, examined by Duclaux, one hyphomycetes (*Aspergillus niger*), one micrococcus, and four species of bacillus, had retained their vitality for twenty-five years. Dr. Downes has given reasons for thinking that micro-organisms endure injurious influences, such as sunlight, better in water than in nutrient media, for the simple reason that they are in water unable to enter upon the vegetative phases of their existence. This he writes is in accordance with classical observations made by Professor Tyndall on the sterilization of hay infusion.

These results, says the *British Medical Journal*, "clearly show how zymotic diseases may be communicated by potable water of even the best quality, more especially if the microorganisms, which are the cause of the disease, are capable of forming spores, but even in the absence of such spores. This power of adaptation to a particular medium greatly extends the possibilities of vitality for organisms which are not known to produce spores."

With these facts and possibilities before us, and before us too the probability that the bacillus entericus (of typhoid) the bacillus tuberculosis (of consumption), the micrococcus of diphtheria, and possibly the specific organisms of other infectious diseases not yet recognized, have similar characteristics, and the fact that the sewage of any