

be to his fellow-man a source of active and serious and continual infection.

We have learned in the past few years one fact about tuberculosis which is of incalculable comfort to many, and that is that the disease is not hereditary. It is very important that we should understand this, because it seems to contradict a long-prevalent tradition, and a belief still widely and sorrowfully entertained.

Bacteria, and especially most disease-producing bacteria, are very sensitive in the matter of growth and proliferation to the conditions under which they are placed and especially to the material on which they feed. So that a germ which can induce serious disease in one species of animal is harmless in the body of a different though closely allied form. More than this, different individuals of the same species, or the same individual at different times, may have the most marked differences in susceptibility in the presence of disease-producing germs. What the conditions favorable to susceptibility are we do not know, but we do know that certain individuals are more likely than others to yield to the incursions of the tubercle bacillus. This vulnerability in the presence of invading germs we call susceptibility, and susceptibility to the action of the tubercle bacillus is hereditary. It is not the disease, tuberculosis, which comes into the world with certain individuals or with successive children of the same family, but the aptitude to contract it should external conditions favor. However much the child of tubercular parents or a member of a tubercular family may be predisposed to disease, he cannot acquire tuberculosis unless by some mischance the fateful germ enters his body from without. What has been through all these years regarded as the strongest proof of the hereditary transmission of tuberculosis—namely, the occurrence of the disease in several members of the same household—is in the new light simply the result of household infection—the breathing of air especially liable to contain the noxious germs, or their entrance in some other way into the bodies of persons especially sensitive to their presence.

It may well be asked why has not the world been long since depopulated when the germs are so widely diffused? but a knowledge of the bodies safeguards, partially at least, answers this question. It has been found that a person breathing in germ and dust laden air through the nose breathes out again air which is both dust and germ free. The air passages of the nose are tortuous, and lined with a moist membrane, against which the air impinges in its passage. On these moist surfaces most of the solid suspended particles, the germs among them, are caught and held fast, and may be thrown off again in the secretion. In breathing through the mouth this safeguard is not utilized. Again, the upper air passages leading to the lungs are lined with a delicate membrane of cells, whose free surfaces are thickly beset with tiny hair like projections. These projections are constantly moving back and forth with a quick sweep, in such a way that they carry away small particles, which may have escaped the barriers above, up into the mouth, from which they may be readily discharged. In this way much of the evil of breathing dust and germ-laden air is averted. But in spite of these natural safeguards a great deal of foreign matter does, under the ordinary conditions of life indoors or in dusty places, find lodgment in the delicate recesses of the lungs. The body tolerates a good deal of deleterious material, but its over-taxed toleration fails at last, when serious disease may ensue.

In the presence of tubercle bacillus the body cells are often able to build a dense enclosing wall around the affected region, shutting it off from the rest of the body. This is one of the modes of natural cure. The body cells are sometimes able, if sustained by nourishing food and abundance of fresh air, to carry on year after year a successful struggle with the invading germs, so that the usefulness and enjoyment of life are but little interfered with. Finally a certain proportion of human beings are endued at birth with some as yet unknown quality in the cells or fluids of the body which naturally unfit them for the life uses of the tubercle bacillus and so renders the individual for longer or shorter period practically immune. Others, on the contrary, are, as we have seen, from birth unusually susceptible.

The degree of success which may attend our crusade against tuberculosis will largely depend upon the wide diffusion of the knowledge of its communicability by means of the sputum dried and powdered

and floating in the air as dust, and the intelligent persistence with which peccant material may be safely cared for at its sources. The resolute avoidance by consumptives of the not only filthy but dangerous practice of spitting up on floors or streets or anywhere else except into proper receptacles; the use of receptacles which may be and are thoroughly cleaned, and, best of all, of water-proof paper cups, which with their contents may be burned; or, when circumstances require the receiving of the dangerous material on cloths or Japanese paper napkins, which may be destroyed by fire, and not on more valuable handkerchiefs, on which the sputum is allowed to dry while in use or before disinfecting and washing; scrupulous care by others of the sputum of those too ill to care for it themselves—these are the comparatively simple means from which we may most confidently expect relief.

To the consumptive himself those measures are not without a vital significance. For his chances of recovery may be in no small degree diminished if he be more or less constantly liable to a fresh infection from material which he has once got rid of, and which should have been destroyed.

In ordinary out-door life little apprehension need be felt from the presence of moving germs, but in crowded cities precautions are necessary. If a street sweeper passes over a dry surface, it must set afloat myriads of germs along with the dust which it arises. Municipal authority should demand that thorough sprinkling precede pavement sweeping. This principle should also be observed in house-sweeping and dusting. By the use of moist tea leaves in the sweeping of carpets, by the use of soft textured fabrics, frequently shaken out-of-doors, or by moist cloths or chamois in dusting, much useless dust-scattering may be avoided. By no matter what the means employed, the final purpose of every household cleaning should be to get the dust, not afloat, but away.

The members of families bearing a hereditary susceptibility to the acquirement of this disease should strive to foster those conditions which favor a healthy, vigorous life, in occupation, food, exercise and amusement, and remember that for them more than for others it is important to avoid such occupations and places as favor the distribution, in the air or otherwise, of the tubercle bacillus.

But when the individual has done what he can in making his surroundings clean, and in thus limiting the spread of tubercle bacilli, there still remains work for municipal and state and national authorities in diffusing the necessary knowledge of the disease, and its modes of prevention; in directly caring for those unable to care for themselves; in securing for all, such freedom from contact with sources of the disease as the dictates of science and humanity may require and the law permit.

To health boards, either national or local, must be largely entrusted the primary protection of the people against the danger from tubercular cattle.

The dreams and aspirations and strenuous labors of the students of this disease have looked steadily towards the discovery of some definite and positive means of cure, but as yet full success lingers beyond their grasp. The methods for the early detection of tuberculosis which science has pointed out make it possible for affected persons to plan such modes of life and early seek such salubrious climate as promises a hope of recovery. What is now understood by science has enabled us to realize that the outlook for those in the earlier stages of this disease is in a considerable proportion of cases extremely encouraging. It is no longer the hopeless malady which it was earlier believed to be. A long and happy and useful life may yet be his, on whom the finger of the disease has fallen, if the conditions which favor his case be early and intelligently fixed upon, and faithfully and patiently persisted in. The wise physician is here the best adviser in climate and regimen, as well as in the proper selection of remedial measures, and the earlier his counsel is sought the brighter will usually be the outlook for recovery.

The great and beneficent work which has been accomplished by Trudeau in the Adirondack woods, in at once widening the bounds of knowledge of tuberculosis and in carrying to a successful issue in so many the varied and delicate processes of cure, is a cheering example of what may be accomplished with persistent devotion, by the light of our new knowledge, in mastering a malady so long considered hopeless.