of regular out-door exercise on the one hand, and the dangers arising from over-work and excessive exercise on the other. The ambulance movement, which has been evolved from the volunteer system, has led medical men into a new line of experience, which they have voluntarily and freely communicated to laymen and laywomen generally, to the great advantage of all who are subjected to physical injuries and require professional attention quickly. Lastly, the demands of nursing have been studied with scrupulous insight. Women have been trained to duties which once belonged to the male nurse, and which have never been so faithfully carried out as at the present day. This indicates in the most practical manner what a nurse can contribute to the art of healing under the guidance of the Esculapian brotherhood.

CHAPTER XXV.

ZYMOSIS AND THE GERM THEORY.

THE marked change that of late years has agitated us most is that in relation to germs and the development of a science called by its advocates "bacteriology." It is a theory only, or, more correctly speaking, an hypothesis, and, as I have shown from the first, rests mainly on analogy, a dangerous support. The animalcular hypothesis, to which Phillips alludes in his book *A Million of Facts*, was current until 1835, and I have heard Dr. Dwight quoted as its inventor; but the germ theory is of later date and character, and is popular at the present time.

The germ theory assumes that we live in an atmosphere of invisible bodies called germs, as if in an element we could inhale. Germs, it is imagined, sometimes produce in the body bacteria in numerous varieties, traceable by the microscope as causes of disease; that we can shut germs out from the living body; can kill them; but that while they are living in the air, disease due to their presence will never be annihilated. The theory is simple,

and, by the labours of the late M. Pasteur in France, fashionable, and the application of it by the distinguished Sir Joseph Lister in this country, in regard to the treatment of wounds, has attained immense popularity.

On my own part I have never been able to accept the theory propounded, for I have never seen a germ, and could never determine how a germ could grow into a micro-organism. Bacteria I have seen to any extent, but it always appeared to me that it was easier to suppose they were from the animal tissues themselves, undergoing some modifications of disease, than from germs which could never be demonstrated. I knew that the parts of fresh wounds, brought neatly together, would heal, as they do when the injured carpenter surrounds a cut with glue spread over a shaving of wood. I saw that tendons divided under the skin, that is to say, excluded from air, healed without suppuration, and I remembered and published old Belloste's singular argument on the treatment of wounds by exclusion of the air. Further, I could never fail to accept that that which we recognise as antiseptic seems to encourage good healing, or, at all events, prevents suppuration, and very early I employed iodine; I also made styptic colloid, in which preparation benzoin, used by the old friars in their balsam, was mixed with tannin and collodion with good effect, the collodion itself having apparently the property of cutting off the air from a surface over

which it might be spread. This was strong evidence, and gave credit to antiseptics like carbolic acid. I invented another antiseptic, in which benzoic acid was dissolved in chloroform and made to cover wounded surfaces; it was called benzoated chloroform, and acted uncommonly well for disinfecting towels and other linen. It was also efficient when sprayed over the hands during attendance on infectious cases, and I have found it very superior to the weak solution of chloride of zinc, discovered as a disinfectant and deodoriser by the late Sir William Burnett, a solution, the late Mr. Campbell de Morgan, surgeon to the Middlesex Hospital, told me he had successfully used in the dressing of wounded surfaces, but had found it, undoubtedly, rather irritating as an application, the irritation, to some extent, counterbalancing its antiseptic virtues.

On the other side, I was obliged to learn that, in truth, antiseptic agents were not wanted at all, and that absolute cleanliness was alone sufficient as a remedy, and marched side by side with advancing sanitation, which is the mode of cure that stands before all others. In an address at Leamington in 1877, published in *Nature*, I entered into this subject largely, dealing with the nervous origin of animal products and zymosis instead of the bacteriological. I looked on the fact that the force of production of disease is equal to the force of secretion, and that animal poisons are limited by the number of secretions

which the body eliminates. This seemed to me more logical than the idea that we live in a world of living germs, and that we take in from that world varied forms of disease. I thought, in fact, that if we ourselves are not entities derived from germs, probably diseases are not, although some of the ancients thought diseases were entities.

Ophthalmoscope and Laryngoscope.

Up to this point, respecting the revolutions that have occurred in my time, I have omitted to mention two which affect medicine generally, that is to say, both in its medical and surgical character. I refer to the introduction of instruments for research, for investigations on the eye, and on the larynx. The instruments are called the ophthalmoscope and the laryngoscope, both of which it has been my privilege to see brought into practice. The ophthalmoscope was the invention of a considerable number of observers, and it is difficult to name any particular originator. I was struck by the labours of a young surgeon named Avery, a Charing Cross man, and by those of Wordsworth, an ophthalmic surgeon, who was very early in the field, and who used my own eyes for his observations. In regard to the laryngoscope I was more fortunate. Avery showed a tube ten inches long, through which, by reflection, he could see an object. I knew Benjamin Guy Babington, already referred to, who made some

primary efforts to examine the larynx, as did another gentleman, Professor Garcia, whom I also knew. Finally I met with Professor Schermak, who came to England with a practically perfected laryngoscope, and who did me the honour to lay all his improvements before me. By the laryngoscope, as well as by the ophthalmoscope, there has been effected a complete revolution in positive science, for which we cannot be too grateful. They assist to signalise the Victorian era.