The Essentials of Bacteriology.*

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A part of your education as nurses has been neglected unless you possess some little knowledge of the bacteria—on one hand, our deadliest enemies; on the other, our warmest friends. To you the medical profession entrusts the lives of its patients, and it is well that you should know the nature of the cause of the ills which you seek to cure.

It has been said that the bacteria are, on the one hand, our deadliest enemies, and, on the other, our most valued friends. Let me emphasise this; let me illustrate more clearly. The causes of almost all diseases have been proved to be bacteria—for example, diphtheria, scarlatina, pneumonia, tuberculosis, erysipelas, all kinds of pus, and a host of others. These we must fight as long as we live, and the length of our lives, in the majority of instances, depends upon which has the stronger sustaining power, the bacteria or ourselves. It is another phase of the Darwinian axiom of the survival of the fittest. And yet were it not for the bacteria there could be no vegetation, no animal life, no life of any sort—only a dreary earth, a mass of death. For you must know that the nitrifying action of the bacteria of the soil allows the growing plants to assimilate certain elements which otherwise they could never obtain. Again, the beneficent action of certain water bacteria changes nitrites into nitrates, making it far more wholesome. Thus it is that in the rotting of animal and vegetable matter the bacteria remove that which is offensive, and render this same material productive of the highest good.

You should remove another fallacy from your minds. Morphologically and physiologically considered, the bacteria are plants, not animals. All animal and vegetable material is composed of cells, but with this difference: an animal cell has no encircling wall; a vegetable cell has. Judged by this standard, the bacteria are plants. The plant receives carbon-dioxide, nitrogen, oxygen, hydrogen, iron, soda, potash, &c., and builds up more complex bodies, chlorophyll (the green colouring material of the leaves), starches, sugars, oils, and albumins. Animals, on the contrary, receive the completed products from the vegetable world, assimilate to their own bodies that which they wish, and return carbon-dioxide, water, and urea. Thus plants take the elementary substances and build up more complicated ones; animals destroy these products and give off simpler ones. Judged also by this standard the bacteria are plants.

Having now determined that the bacteria are plants, let us try to find their place in the vegetable world.

There are four great divisions of this world: first, the seed plants, or Spermaphytes; second, the ferns, or Pteridophytes; third, the mosses and lichens, or Bryophytes; and, fourth, a group called, for lack of a better name, the Thallophytes. In the first three classes there exists a differentiation of the plant into root, stem, and leaves; in the Thallophytes no such arrangement exists.

The manner of reproduction also differs. In the seed plants there exists in the blossom one, and sometimes two, long stamens, the pistil; this is the female element, and in it grow several ova. The other stamens produce a pollen; these are the male elements. Now the pollen, scattered by the winds and by certain insects, notably by bees, comes in contact with the ova, penetrates them, and thus gives rise to a fertilised oosperm or seed, which in turn develops a new plant. The seed is surrounded by a dense fibrous envelope, where food, as well as life, is enclosed. Often if we will examine a seed a miniature copy of the future plant will be found. Owing to our examination, however, that plant will fail to realise.

But with the fern there is no proper seed. True, certain spores are developed on the under side of the leaves, which fall into the ground, and in due time another fern appears. Yet the new fern is not the offspring of the old, but, so to speak, its grandchild. The spore falling into the ground has developed into a new organism, the gametangium, which in turn has given rise to both germ- and sperm-cells; the sperm-cells have fertilised the ova, and from the oosperm so formed a new fern arises. Thus there is an alternation of generations.

In the mosses and lichens, however, there may be a suppression of either the sporophyte or the gametophyte stage. But in the majority of the mosses there are developed by the plant both male and female elements; the male element fertilises the ovum, and the oosperm is cast away. This finds root and a new organism is formed. The daughter marries and goes to housekeeping with her husband. With the lichens, on the contrary, the fertilised oosperm remains with the parent plant. The son-in-law and his wife thus live upon the father-in-law, who in turn dies, and the younger folk take complete possession until they in turn are superseded.

With the Thallophytes all is changed. Reproduction, for the most part, takes place either by fission or by spore formation, though sometimes a budding occurs. By fission is meant a simple division of a cell, whereby two cells are formed; thus one plant becomes the ancestor of many. By spore formation we describe a process in which the fibrous material formed in the cell, the chromatin, is concentrated into one mass. These may remain in the cell or be expelled. They lie dormant for a while; in due season, however, other plants spring into being.

* Read to the nurses of the Norfolk Protestant Hospital, U.S.A.

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