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THE BACTERIA OF DISEASE.

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YOU all know that in the air we breathe, in the water we drink, and in the earth under us, there are a great number of globular, cylindrical or filiform bodies, which are so minute that they can be seen only under the higher powers of the microscope, and which, when placed in a suitable medium, absorb food, move about, grow larger, reproduce themselves, and give other manifestations of life. These little bodies are, therefore, living organisms, and upon close examination they are found to consist of a central mass of protoplasm enclosed in a membrane or cell wall. They are really small cells, which, however, differ very much in appearance from the cells with which we are familiar as occuring in the human body. Many of the little cellular bodies have the shape of little rods, and in consequence the whole class have received the name bacteria, from a Greek word signifying "a little rod." The class of bacteria stands very near the border line of the animal and vegetable kingdoms; and although at the present time there is a general unanimity of opinion that they belong to the vegetable kingdom, yet there is still some dispute whether they should be classed among the algæ or fungi.

It has not as yet been possible to classify all the different kinds of bacteria, but there are three great groups into which they can be divided according to their form. They are, micrococci, bacilli, and spirilla.

Micrococci are spherical or elliptical bodies which very rarely exceed 2 micromillimeters in diameter. They occur either in separate granules, or in rows like a chain of beads, or in quite large groups imbedded in a gelatinous mass, such a group being called a zoöglœa, from the Greek for "animal," and "glue."

Bacilli are rods, varying in length from about 1 to 6 micromillimeters and in diameter from 2 micromillimeters down to a diameter too small to be measured. They occur either as separate rods or in the form of dense groups, called swarms, or arranged end to end in long chains, which are called leptothrix, from the Greek for "fine," and "hair."

Spirilla are undulating or spiral filaments varying in length from 4 to 40 micromillimeters. They occur either singly or matted together in clusters.

The conditions requisite for the life and development of bacteria are (1) warmth; (2) water; (3) oxygen, either free or in combination; and (4) a sufficient quantity of organic matter to serve as food. When all these conditions are fulfilled, the bacteria develop with great rapidity until they have exhausted their supply of food; that is, until they have converted the complex organic molecules either into inorganic molecules or into simpler organic molecules, according as there is an abundant or an insufficient supply of oxygen present. When the organic matter is in solution, and when air or oxygen is artificially supplied to this solution in such abundance that there is always free oxygen present, then the bacteria convert the organic matter into carbonic acid, water and ammonia directly, without the production of any evil-smelling compounds. When, however, the supply of oxygen is limited, as is always the case in nature, then in the decomposition of the organic matter through the agency of bacterial life certain bad-smelling compounds, such as sulphuretted hydrogen, etc., are formed, and the process is called putrefaction.