

From numerous experiments it appears that all putrefaction is directly caused by bacterial life. All the dead organic matter in the world, except what is burned and what is consumed by animals as food, is converted back into inorganic matter by means of putrefaction. Were it not for the bacteria, the dead organic matter would remain in the world unchanged; and, although organic matters sometimes putrefy sooner than is desired, yet, in general, the bacteria perform a very useful and necessary work in removing the dead organic matter from the world and returning it to the inorganic kingdom. They are the great scavengers of nature.

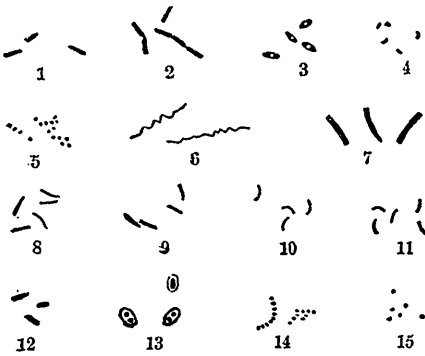


Figure 1 represents one of the useful bacteria. It is called the bacillus subtilis, and sometimes the hay bacillus, because it is found abundantly on the surface of hay. It is found very commonly in putrefying matters, and is about 2 to 6 micromillimeters in length and about 2 micromillimeters broad. Under high magnifying powers (700 diameters) the bacillus subtilis appears as a short rod, but under the very highest powers (4,000 diameters), and with suitable illumination, it exhibits at each end flagella, which are constantly lashing backwards and forwards during the life of the bacillus. Similar flagella exist on all or almost all of the bacilli and spirilla, but not on the micrococci. The bacteria subtilis, as almost all of the bacteria, can be cultivated artificially either in solutions of organic matter or on a slice of potato or in a solid mixture of gelatin and blood serum. They can be best studied when growing in the solid gelatin, and it is seen that the different kinds of

bacteria grow in groups or colonies, which always present the same appearance in the same kind of bacteria, and which differ so greatly in appearance in the different kinds that they can be distinguished from each other by the naked eye.

When their growth and development are carefully observed, it is found that bacteria reproduce themselves in one of two ways—either by fission or by sporification. In the process of fission, the bacterium grows larger, a constriction appears at its middle and becomes so deep that it divides the bacterium into two precisely similar bacteria, which may in turn subdivide. Sometimes before the bacteria separate from each other they each subdivide again, and thus a long chain of bacteria may be formed. The process of fission is shown in figure 2. In the process of sporification, small glistening particles, called spores, appear in the substance of the bacterium, and are set free by the disintegration of the bacterium. They resist injury, such as high temperatures, much more strongly than do the bacteria, and when placed in favorable circumstances they become elongated at one end, grow rapidly, and develop into the adult bacterium. The process of sporification is shown in figure 3. "As far as observation goes, young bacilli invariably grow and multiply by division for some time before they produce spores. Continued vegetation without change of soil is usually terminated by the formation of spores, and these spores, as a rule, will not germinate in the unchanged soil where they are produced" (Gradle).

The bacillus subtilis stands as a representative of the bacteria which are not only harmless, but are extremely useful to the world and to man. Such bacteria surround the body on all sides. They are found in abundance in the mouth, in the intestines and in all parts of the alimentary tract. The tissues of the human body offer such a resistance to them that they cannot penetrate into the human body proper, and they are never found in the blood nor tissues of a healthy person.

There is, however, another class of bacteria, the members of which, under certain conditions, enter into the body