adding gelatine to clear beef broth, which supplies in every way the requirements of these plants, and in which the majority of them grow readily. This jelly is poured into a large number of little tubes, a couple of teaspoonfuls in each, and the entrance of bacteria from the air is prevented by plugging the mouths of the tubes with cotton wool, through which they cannot penetrate. As, however, in the process of filling the tubes, bacteria may have entered, it is necessary to render them sterile, and this is done by placing them in a steamer and heating them up to the temperature of boiling water for a short time. When the whole process is complete, we have our tubes filled with a beautifully clear jelly, which will keep indefinitely and which is always ready for use.

Suppose we wish to find out the number and kinds of bacteria in a sample of water. The jelly in such a tube is liquified by heating it gently, a drop of water is thoroughly mixed with the liquid jelly, and the mixture poured out in a thin layer in a little flat glass dish with a cover, which has also been sterilized by heat. This is placed in a warm room, and in the course of forty-eight hours small spots will begin to appear in the jelly. These spots are formed in this way. Let us suppose there were ten bacteria in the drop of water. These ten become widely separated from each other by mixing the water with the jelly and spreading it out in a thin film. Each individual, finding itself surrounded by plenty of food, begins to grow and multiply, so that at the end of forty-eight hours, in place of ten single imdividuals, we have ten colonies made up of millions of individuals and visible to the naked eye. This is what is called the method of plate culture, and each colony so formed is found to be made up entirely of one specific micrococcus, bacillus or spirillum, as the case may be. By picking up a small quantity of such a culture on the end of a sterilized needle, we may either study the organism of which it is composed under the microscope, or transfer it to a fresh tube of jelly for further study.

The form of each colony differs widely according to the particular microbe which produces it. Some are clear-cut and circular. Others have ragged edges or push fine projections out into the jelly. Some liquefy the jelly, others do not. Some have brilliant colors, such as orange, red or blue, whilst others are quite colorless. Each microbe produces a colony peculiar to itself, and by the form of this colony we recognize it.

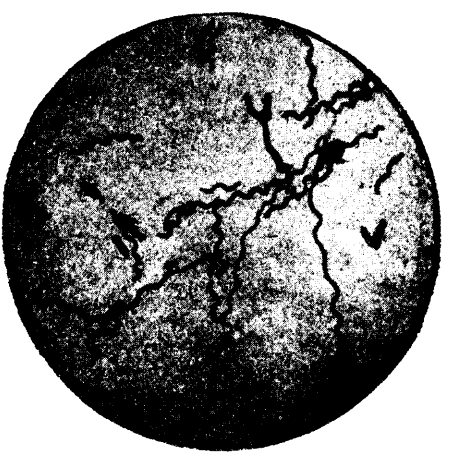

FIG. 3. A SPIRILLUM FROM WATER.

Examples of these colonies are shown in Fig. 4. Should we wish to carry our study farther, we pick up a portion of the colony on our sterilized needle and stab it into the solid jelly in a new tube. This gives rise to a new series of characteristic growths—the growth in stab culture; or we may smear it on the surface of the jelly and so form a smear culture. In Fig. 5 we have a stab culture of the cholera bacillus which has grown for three days, and, it will be seen, is beginning to liquefy the jelly, forming a little pocket at the top of the stab. In Fig. 6 is a smear culture of the bacillus of tuberculosis, the bacteria growing over the whole surface of the jelly.