

ROBERT L. CLUTE



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MICROBES OF THE AIR

Robert L. Clute 1896.

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MICROBES IN THE AIR.

It has been observed for a considerable time that the air is filled with small floating bodies. In shade or sunshine, these floating bodies are not observed as readily as when a beam of light passes into a somewhat darkened room. On a windy day we have all observed the dust in the air. It is composed of fine particles of sand, remnants of animal substance, or decayed vegetable product. The dust then, may include mineral, animal or vegetable matter. Laying aside the two former divisions let me direct your thought to the vegetable world and investigate the floating bodies found therein.

These micro-organisms or bacteria as the scientist calls them, were discovered in the early part of the seventeenth century. At this time it was supposed that nothing was living that could not be seen. But by the earnest work of Cohn, Koch, Roberts and Pasteur a new science known as Bacteriology has been added to the field of research. These men studied the minute organisms, observed their mode of growth, shape, color and manner of life in general. But not 'till the middle of this century has this science been brought into prominence. The study of pathology has been placed on a scientific basis, showing that most of our diseases are caused by a specific micro-organism. Other germs are known which are non-pathogenic or do not produce disease

The are also divided into liquefying and non-liquefying according to their ability to liquify gelatin. Parasites are thus living on the body of living matter and Saprophytes live on dead matter. There are many other classifications but this will be sufficient for a general description.

In studying microbes found in the air, two methods are used, namely the Petri dish and the Hess apparatus. As the former is the shorter method, it will be considered first, outlining work done and the results obtained.

PETRIE DISH - The bottom of three sterilized petrie dishes were covered with agar, which hardened when cooled. To sterilize the petrie dishes they were previously heated in an oven at 150 degrees C. for over one hour. Care was taken in pouring in the above agar as not to lift the lid higher than was necessary, as the microbes in the air gravitate and might inoculate the medium. This agar is a preparation of meat extract, peptone, common salt, and water and when sterilized and placed in sterilized tubes is ready for use. These tubes are stoppered with cotton as this prevents the germs in the air from entering.

These three petrie dishes were exposed for about two minutes in three different places namely; dairy, horse stable and silo. The following day a slight growth was observed in the dish exposed in the stable. At the second day colonies

had developed in all. A microscopical examination was not made, but if the size, shape and color of the colonies and mould are characteristic of different germs, the dish from the dairy room indicated six kinds of colonies and three kinds of mould; from the stable six colonies and three mould, and from the silo three colonies and two mould. Some of the colonies were colored bright red, others buff and some white. The mould colonies were colored either green, black or white. From this experiment it is shown that there are several kinds of germs and moulds in the air.

But with the Hess apparatus more definite results were obtained. Besides showing that the air contained several different kinds of microbes, it also indicated the number of germs in a given quantity of air.

HESS APPARATUS - It consists of a glass tube two feet long and seven inches in circumference. One end is covered over by a thin sheet of rubber stretched rather tight and tied on with a string. This rubber has a small aperture for the admission of air. This end is again covered by a large and thick rubber. The other end of the tube is closed by a rubber cork and passing through the center of this is a glass tube filled with cotton. This part of the apparatus after being thoroughly cleaned and dried, was placed in a steam sterilizer and kept there for one hour, the tempera-

ture being nearly one hundred centegrade. Then took the tube out, held it nearly horizontal, removed the rubber stopper and poured into the tube sufficient agar to coat the entire inner surface, rotating the tube at the same time. Return the cork and cool the agar by revolving the tube in ice-water. When this is completed return the tube on the tripod and proceed with the aspirator. By the aid of two one liter flasks one of them being filled with water, rubber tubing connecting it with the sterilized tube. The second flask B. is below A. and receives the water when siphoned through. When all is ready the outer rubber covering is removed and the siphon started. By adjusting the height of flask B. the rapidity of the air that enters the tube can be regulated. The air examined was from the laboratory over the entrance, the date being July 12th, 1896. Five liters of air were drawn through the tube at the rate of one liter in two minutes. The following day several colonies could be seen, after the second day they were thick. A micrometer, composed of a sheet of paper with a square inch removed from the center, was placed over several different places on the tube and the colonies counted. As the result it was estimated that (10351) colonies were present. This would place about 2070 in each liter of air. Some of the colonies were minute grey specks and could hardly be seen with the naked eye, others were somewhat larger but of the same shape. Some resembled a celery leaf in form and

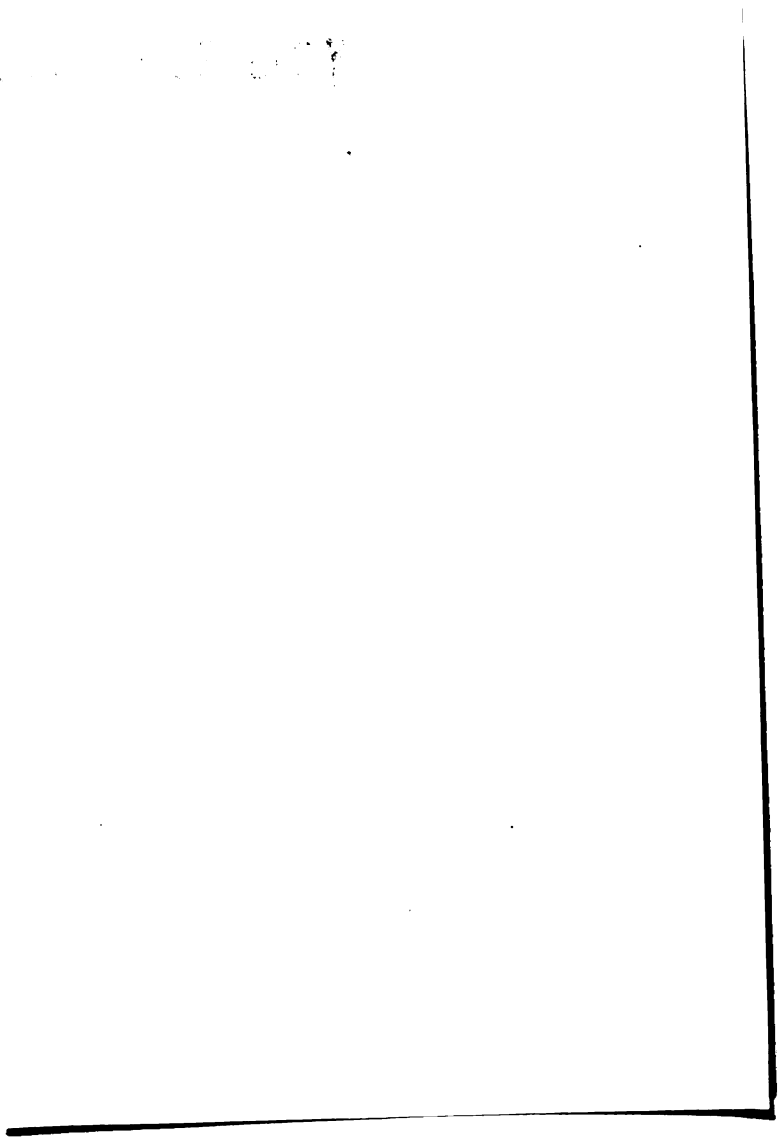
one in particular was similar to a large branching bush, at least two inches across.

A microscopical examination showed that there were at least four different kinds of germs, three bacilli and one Micrococcus.

By repeatedly examining the air in different localities, an average of the number of microbes could be obtained, and by examining the petrie dishes in the hospitals, alleys of large cities and other places, a thorough examination of the germs there found, and continued work of classifying them would be of great interest.

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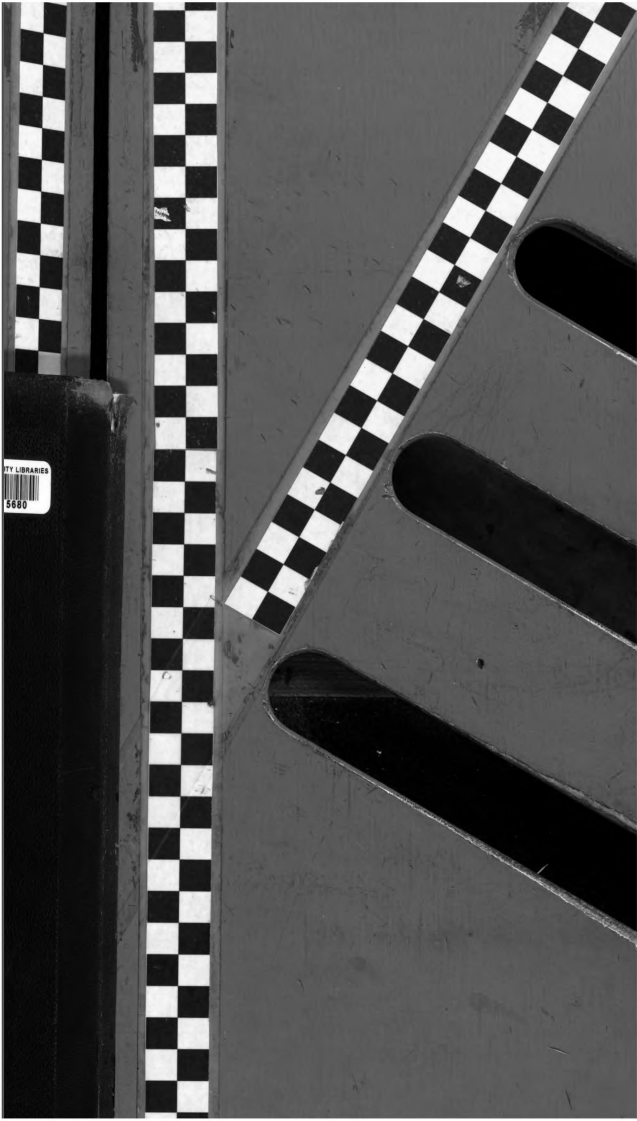


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