

“Some Little Things to See”
Chapter XV
Through A Microscope

There is no end to the beautiful and wonderful things one can see with the simple microscope...Seeds are highly interesting. One meets with many curious **appendages** by which the seeds are carried off and sown at a distance from the plant. Some, like the dandelion, have a parachute attachment; others have wings to catch the wind, and others still are covered with hooked spines whereby they become attached to the fur of animals...

Leaves and stems sometimes have on them beautiful hairs and oil-glands...These show best when a piece of the leaf broken off is looked at edgewise.

If you examine the fruit-dots on the backs of the different kinds of ferns you will be surprised to find how pretty they are and of how many different shapes...

By observing closely while out in the fields or woods, one sees hovering about in swarms, **myriad** tiny insects. Under the lens some of them are very odd, others very beautiful. The easiest way to catch these little midgets, is to wet the palm of the hand and then sweep it among them, or in the same way use a piece of sticky paper.

The study of the different parts of insects is one of the most fascinating of the many uses of the simple microscope. Although all insects are made up on the same general plan and corresponding organs occur in most of them, there is an endless variety in the forms under which we see the different organs and the uses to which they are put.

Take for example the antennae. In the grasshopper it is long and threadlike; in the butterflies always ending in a knob; in moths always tapering to a point, although sometimes threadlike and sometimes much branched, forming a beautiful plume; in the beetles, sometimes fan-like, sometimes like a comb; and in other insects assuming still other forms. Insects' eyes are often colored beautifully. A horse-fly's eyes are striped. Butterflies' eyes have usually a soft liquid coloring, and moths' eyes in the dark shine like little fiery beads...

In working with the simple microscope there is a fine chance to display **ingenuity**, not only in making the instruments and mounting the objects but in discovering new things to look at and in seeing how much can be found out about those things which are the most common.

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Close-Up on the Microscope: Finding and Curing Disease

(1) In the 1590s, Dutch makers of eyeglasses began experimenting with lenses and created the first microscope. Early microscopes allowed scientists to make important discoveries. For example, the life inside a single drop of water could be studied for the first time. But 400 years ago, microscopes weren't powerful enough to reveal viruses. It took advanced microscopes to identify these mysterious **microorganisms**.

(2) In the 20th century, one of the most challenging and deadly puzzles in medicine was polio. This highly **infectious** virus terrified families for 40 years beginning in 1916. Polio spreads through personal contact, and every summer it would break out again. One of the worst **epidemics** was 1949, when more than 40,000 cases were reported in the United States. That year, 2,720 people died from polio.



Fluorescence Microscope

(3) Even if it didn't kill, polio could **paralyze**. Sometimes it was temporary. Sometimes it was permanent. Some victims needed a wheelchair or a machine to help them breathe for the rest of their lives. Many victims were young, but not all. President Franklin D. Roosevelt was diagnosed with polio at age 39. He survived it, but could never again walk or stand without leg braces or crutches.

(4) Jonas Salk had helped develop a flu vaccine used by the Army during World War II. A **microbiologist**, he used a microscope to study microorganisms, including viruses. He had studied the body's immune system. He used samples of the polio virus developed by another medical team. From these he was able to make large quantities of the virus. He developed the first successful polio **vaccine** that used an inactive ("dead") form of the virus. It was given by injection.

(5) Another polio vaccine, developed by Albert Sabin, is taken by mouth. Together the Salk and Sabin vaccines have eliminated polio from most of the world. In 2017, there were cases in only a handful of countries: Afghanistan, Democratic Republic of the Congo, Nigeria, Pakistan, and Syria.

(6) Today's microscopes can magnify images that are thousands of times smaller than a wavelength of light. Thirty-two years before his death in 1995, Jonas Salk founded the Salk Institute for Biological Sciences in California. Using modern microscopes, the Salk Institute continues to make breakthroughs in immunology and other areas. Recently, the Institute published research about new discoveries made with microscopes the size of a

penny. These tiny new microscopes could lead to pain treatments for spinal cord injuries, ALS (Lou Gehrig's Disease), and more.