

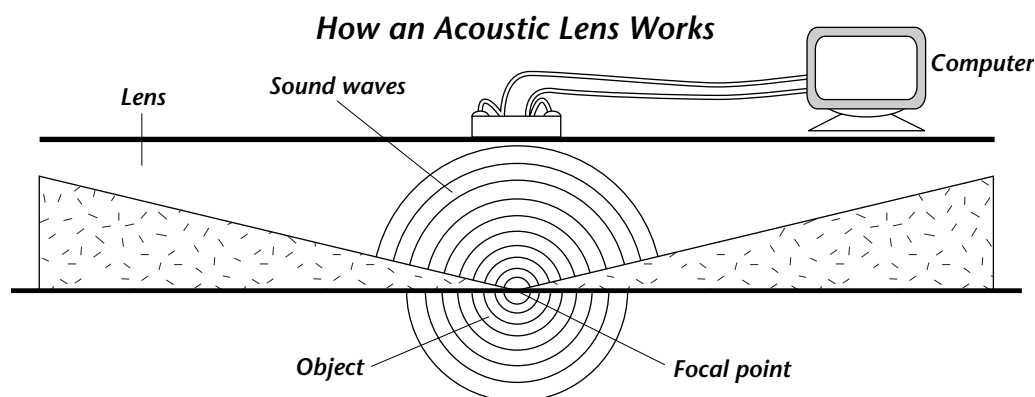
**Cell Structure and Function** ▪ *Enrich*

## Recent Advances in the Microscope

The tremendous power of magnification of the electron microscope has greatly increased scientists' understanding of living things. However, the electron microscope has a major disadvantage. Biological specimens must be dried, frozen, thinly sliced, and coated with metal before they can be viewed with an electron microscope. The beam of electrons used in an electron microscope also damages living things. For these reasons, the electron microscope cannot be used to view biological specimens that are still alive or even in a natural state.

Two new types of microscope address this problem. One type is the transmission positron microscope, or TPM. Like the transmission electron microscope, or TEM, the TPM sends a beam of atomic particles through a specimen. However, instead of using a beam of electrons, the TPM uses a beam of positrons, which are positively charged atomic particles that do not harm living specimens as electrons do.

Another type of microscope that does not harm living specimens is the acoustic microscope. It uses sound waves instead of beams of atomic particles to "see" an object. As shown in the figure, the echoes of sound waves bouncing off the specimen are translated onto a screen as a microscopic image. Even though the sound waves that are used are very high in frequency, they do no damage to living things. Doctors have used the acoustic microscope to view changes in living cells and to examine living cells for cancer without removing the cells from the body.



*Answer the following questions on a separate sheet of paper.*

1. Compare and contrast transmission electron microscopes and transmission positron microscopes.
2. Explain how acoustic microscopes work.
3. Why are transmission positron microscopes and acoustic microscopes important tools for understanding how living cells function?