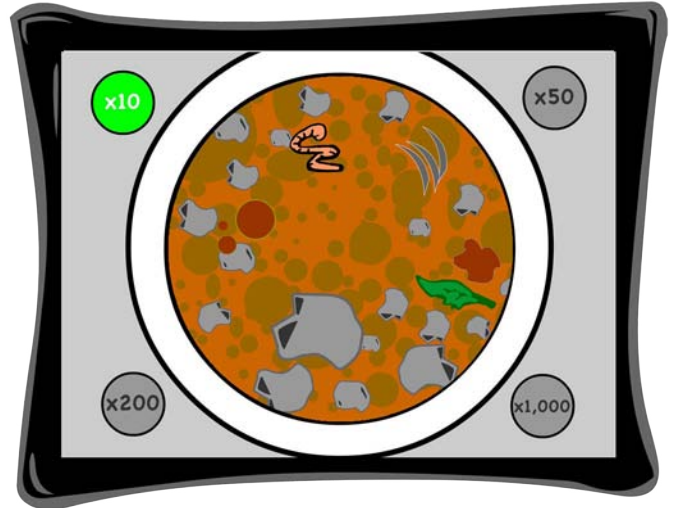




# Topic 5: Soils Under the Microscope

**Introduction** Most soils are derived from some form of rock or sediment and therefore most of what soils are composed of is mineral as opposed to organic because rocks are composed dominantly of mineral matter. The main exception to this is the peat soils which are formed of organic matter in different stages of decomposition. The particles that make up soils come in a wide variety of shapes and sizes. Because most particles that make up the soil are very small, some form of magnification is important for looking at these particles in detail.

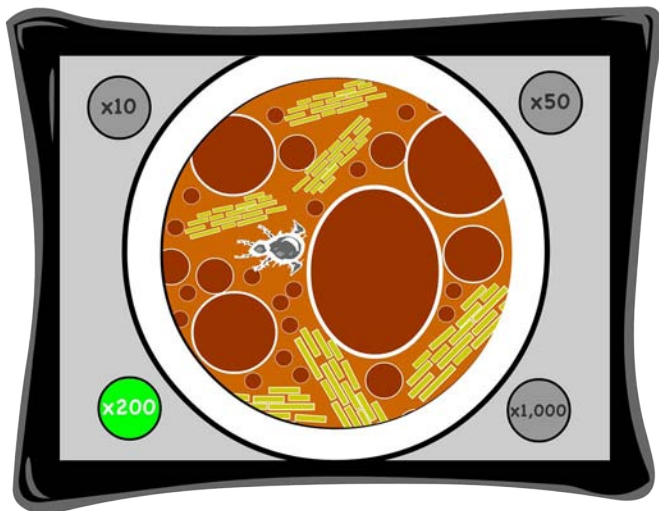
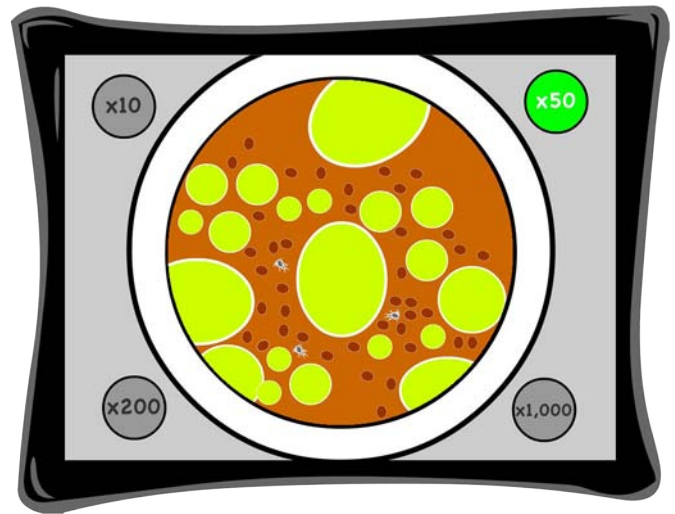


**10x Magnification** At this magnification it is possible to see the small rock fragments and larger mineral particles such as those of sand size. These are an important constituent of sandy soils. Also at this magnification it will be possible to see fragments of organic matter. Some of this will still have the structure of the plant from which it came visible but if it is very decomposed it will just appear as a blackish mass without any structure. The third important component of soils is the pores (holes) formed when these mineral and organic matter parts link together. The pores are very important because they allow water into and through the soil, air into the soil and provide places where the small organisms can live. When you look through a magnifying glass or microscope at a sample of soil look out for the sand grains, the pieces of plant material and, of course, you may well spot some of the amazing creatures that live in the soil.



**50x Magnification** At this magnification you are likely to be able to see some of the small soil creatures that spend their whole life moving about the soil and see some of the small pores in which they live. In addition to the sand-sized grains (greater than 0.05 mm in size) that you can see at smaller magnification, silt-sized mineral grains (0.002 to 0.05 mm in size) will also be more visible.

There will be many of these in the silty soils. At this magnification also you can have a closer look at the structure of some of the plant material that has yet to decompose. See if you can pick out the cells (small compartments) in some of the plant remains and other parts of the decaying plant. As you increase the magnification at which you look at the soil so you will be able to pick out many more details about the things that make up the soil, like the structure of the plants, the movement of the organisms, the different types of mineral grain.

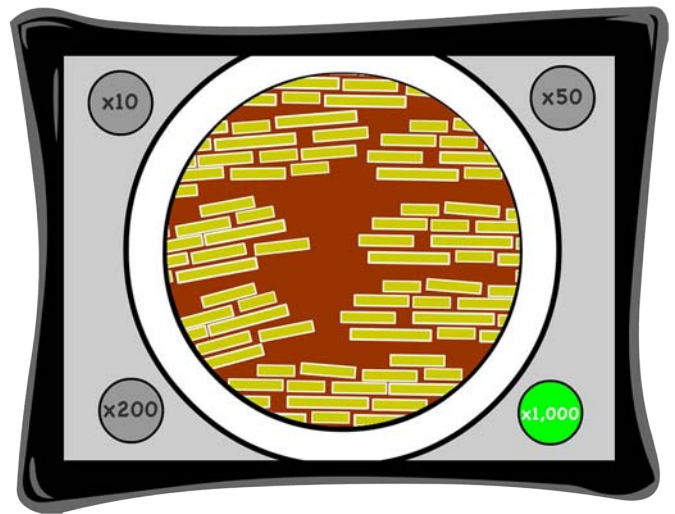


**200x Magnification** At this magnification you will be able to pick out virtually all the things that make up the soil and how they work together to create such an important material to support life. At this magnification you will begin to pick up bundles of clay particles. These are the smallest of the mineral particles but they do an important job, together with organic matter, in binding soil particles together.

You should also be able to see some of the smaller pores which are so important in storing the water that is held in the soils ready for uptake by the growing plants. The higher the magnification at which you look at the soil, the more unusual looking things you will see, such as some of the very tiny creatures and the roots of plants that are looking for nutrients and water.



**1000x Magnification** Now you will be able to see all of the mineral particles and how they are held together to form soil. You can even see some of the tiny clay particles. At this magnification you may see some mycorrhizae. This is a type of fungus which attaches itself to plant roots and helps to pass nutrients from the soil to the plant root. You may also see other types of fungi and also bacteria. The bacteria tend to be very tiny and may be difficult to spot but they play such an important part in helping to maintain good healthy soils. At high magnifications it takes more experience to unravel and identify the many parts of the soil but you should be able to identify some of the mineral grains, roots and plant fragments. Do try to see the soil at this magnification.



The microscope is an important tool in studying the make up of soils. It is particularly useful in the study of soil organisms and in unravelling the role these play in the soil.

It is also important in understanding the interaction between the various parts of soil that make the soil what it is. These include mineral grains, plant fragments, organic matter, pores, water and the numerous living organisms.

The microscope is a vital instrument in identifying the different minerals in a soil and thus helping to identify the rocks and sediments from which the soil is derived.

Similarly, it is an essential tool for studying the breakdown of plant fragments in the soil and their transfer into organic matter from which nutrients can be extracted and recycled.

