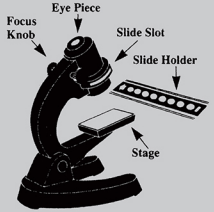
INSERT HERE

MICRO-SLIDE-VIEWER™



Face the Micro-Slide-Viewer so that as much light as possible falls on the white Stage.

Insert the numbered end of the Slide Holder into the Slide Slot of your Viewer, moving it from your right to left.

View with your eye close to the Eye Piece.

With Slide No. 1 in place, focus by turning the Focus Knob.

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On the left is a cross section of a common mushroom composed of a mass of tightly woven fungal strands. Under the cap of the mushroom are the tiny **gills** (H) on which spores form. The photograph on the right shows a magnified section of one of the gills. The spongy hyphal tissue of the gill is modified into finger-like structures (F). *Can you see the spores forming on each "finger"?*

7. THE PLANT KINGDOM / GENERALIZED PLANT CELLS: ONION AND ELODEA
Left (110X) / RIGHT (150X)

Only plants are multicellar, and have chloroplasts, cell walls and alternation of generations. On the left of this slide is a section of onion skin and on the right is the common aquatic plant Elodea. In both cases, the cells are shown in natural colors. Notice that the small green oval **chloroplasts** (C) in the Elodea are not present in the skin of the onion plant. *Can you explain this?*

Plants have chloroplasts containing chlorophyll permitting them to make food through the process of **photosynthesis**. By comparing similarities in the structure of chlorophyll, we know that green algae in the Kingdom Protista (see Slide 5) are the ancestors of the plants.

The **nucleus** (N) is visible in both cells shown here. Surrounding the nucleus is the gel-like **cytoplasm** (CY) containing a wide variety of organelles too small to be seen at this magnification. The **cell wall** (CW) surrounds the cell and provides strength and rigidity while the cell membrane -- lying just inside the wall-- controls what enters and leaves the cell.

Finally, plants also shift between sexual and asexual stages. This process, called *alternation of generations* is seen most easily in primitive plants such as mosses and ferns which produce remarkably different structures at various points in their life cycles.

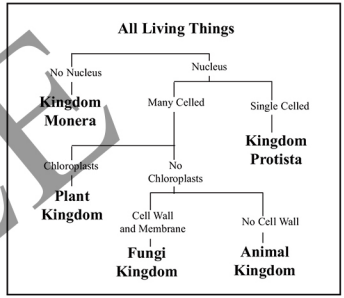
8. THE ANIMAL KINGDOM / GENERALIZED ANIMAL CELL-LIVER CELL (750X)

Animals are related due to their common evolution from the protozoa (see Slide 4). A*nimals cell lack chlorophyll and cell walls, but do have internal membranes and develop from the fertilization of egg and sperm.* In addition, virtually all animals have groups of cells working together as tissues. In turn, these tissues are arranged into organs and organ systems in all animals except sponges.

This slide show a section of the tissue from the liver of an amphibian called the **Amphiuma** (am-FEW-mah). The cells have been stained to show internal detail. Cells may be seen lined up with their **cell membranes** (CM) touching edge-to-edge. The pink regions of these cells are **cytoplasm** (SITE-oh-plazm) (C). Within the cytoplasm are tiny organelles and structures such as mitochondria (MIGHT-oh-con-dre-ah) and ribosome (RIB-oh-sohmz); the site of protein manufacture. Unfortunately, these structures are too small to be seen at this magnification. The purple region near the center of the cell is the **nucleus** (N) surrounded by the **nuclear membrane** (NM). The darkest region of the nucleus is the **nucleolus** (noo-KLEE-uh-luhs) (NU) where ribosomes are made.

THE FIVE KINGDOMS OF LIFE

INTRODUCTION



In the game of twenty questions, someone usually asks if the object is an "animal, vegetable or mineral." This reminds us of a time when the natural world was divided into easily-defined kingdoms. With advances in our understanding, the original two large groups - animals and plants - have now been joined by three new kingdoms called **Monera** (mo-NAIR-uh), **Protista** (pro-TEAS-tah) and **Fungus** (FUN-gus). This new classification scheme makes the job of describing and determining relationships easier than it was when we had only the plant and animal kingdoms.

Modern classification at the kingdoms level is based of factors such as the number of cells in the organism, the presence or absence of internal structures, and the methods of energy processing. For instance, some organisms contain chlorophyll which permits them to make food by using **photosynthesis** (fo-toe-SIN-the-sis). Chlorophyll uses light and components of water and carbon dioxide to make sugar as a method of storing energy. The other major energy-related mechanisms is called **cellular respiration**. In this process food reacts with oxygen to release stored energy with carbon dioxide as a waste product.

No matter how many kingdoms we have presently, it is important to remember that all classification schemes have been invented by humans not nature. Change may be required in the future. Classification plans are helpful in showing relationships and proposing evolutionary trends, but are only tools for making sense of the natural world.

You may find it helpful to refer to the diagram above to see how organisms are classified at the kingdom level. The magnification given, for example Slide 1-(400x) means that the microscope lenses were set at that power when the photograph was taken.

1. EUGLENA- A CLASSIFICATION PUZZLE (400X)

When a new organism is discovered, one of the first jobs for the scientist is to place the creature in its proper kingdom. This slide features an organism that you may not have seen before. Your job is to determine where it belongs in the five kingdom plan. To help, use some of the clues in the

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