

BIOL1051C Labs

Lab 12— Cells.

The body is a community made up of its innumerable cells or inhabitants. Thomas A. Edison

Introduction:

The purpose of this lab is to introduce the student to animal and plant cells. These cells are prepared with the wet mount technique, which is a microscopy technique that makes temporary microscope slides. This lab requires some previous knowledge of the light microscope, but otherwise uses very simple preparatory techniques.

The cell (from Latin *cella*, meaning “small room”) is the basic structural, functional, and biological unit of all known organisms. Cells are the smallest unit of life and might be considered as the “building blocks of life.” The study of cells is called cell biology, cellular biology, or cytology, and cell physiology studies cell function. Because of their small size, most plant and animal cells are only visible under magnification. Cell dimensions vary between 1 and 100 μm (micrometer: 1×10^{-3} mm).

The basic cell components are: cell membrane, cytoplasm, and nucleus. The cell membrane (also called plasma membrane or plasmalemma) encloses the cytoplasm and the nucleus, which is typically the most conspicuous cell structure. Cytoplasm comprises organelles and cytosol. Organelles are specialized subunits that have specific (and stereotypical) functions. They are called organelle because these structures are components of cells, as organs are components of the body (the suffix *-elle* is a diminutive). Organelles are either membrane-bound (delimited by a membrane similar to the cell membrane) or are non-membrane bound organelles. Although most organelles are within the cell membrane, some functional units that extend outside the cell membrane are also called organelles (e.g., cilia and flagella). Cytosol is the liquid matrix that contains the organelles. The nucleus (itself also an organelle) is the repository of the cell’s **nuclear** DNA (notice that **mitochondrial** DNA is in the mitochondria—another organelle). Together, nuclear and mitochondrial DNA are the cell’s DNA—the blueprints for all of the cell’s proteins.

Organisms can be classified as **unicellular** (consisting of a single cell such as bacteria) or **multicellular** (including plants and animals). Most unicellular organisms are classed as microorganisms.

Lab 12

Cells

A. Human buccal cells (animal cells)

To prepare these cells, gently scrape the inside of your cheek with a toothpick, touch a water droplet centered on a wet mount slide with the toothpick, and cover with a cover slip. You may also use a dye like Methylene Blue to enhance cell structures. Observe with the light microscope and contrast and compare against the reference micrographs (Fig. 1).

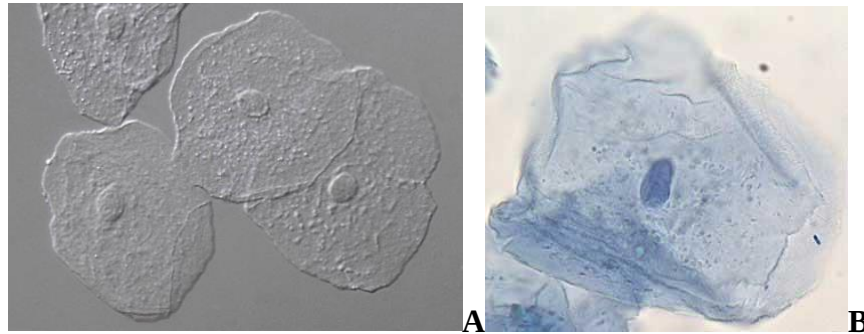


Figure 1— Light micrographs of Human buccal cells. **A** shows unstained cells; **B** shows stained cells (the dye used was Methylene Blue).

B. *Elodea* sp. cells (plant cells)

Elodea is a genus of 6 species of aquatic plants, often called pondweeds, in the frog's-bit family (family Hydrocharitaceae). *Elodea* are native to North America and South America, and are widely used as aquarium vegetation and in biology laboratory demonstrations. They are freshwater plants.

In biology, species are named using the **binomial system**. These are the scientific names of species. In the scientific name, the first word is the genus (always capitalized) and the second word is the specific epithet (always in lower case). Furthermore, species' names must be typed differently than the surrounding text (a common way is to italicize the name when the surrounding text is roman — straight). Underlining also works, and when in doubt, just underline the species name (underlining is the way to properly *write* a scientific name). For example, one could type the name of our species as *Homo sapiens* or Homo sapiens, but never as Homo sapiens or, shudder, Homo Sapiens. Moreover, the abbreviation “sp.” is used when the specific epithet cannot or need not be specified. The abbreviation “spp.” (plural) means “several species.” These abbreviations are not italicized (or underlined).

To prepare these *Elodea* sp. cells, carefully remove a healthy-looking leaf, and place it in a water drop in the center of a wet mount slide, and cover with a cover slip. Observe with the light microscope and contrast and compare against the reference micrograph (Fig. 2).

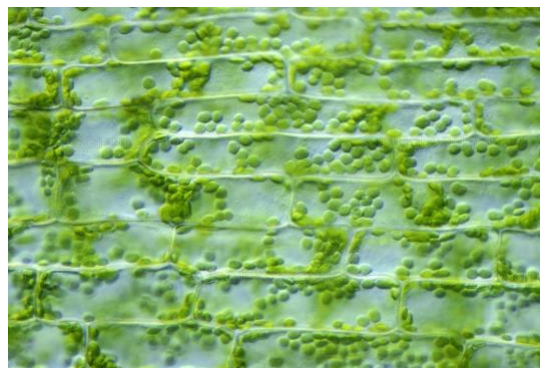


Figure 2— Light micrograph of *Elodea* sp. leaf cells. Chloroplasts are visible as round and green structures; cell walls are the clear, linear structures that define the cells' outlines. (Notice how the genus name is typed in roman because the legend's text is typed in italics)

C. Potato cells (plant cells with the polysaccharide starch)

Some polysaccharides are used for energy storage by animals and plants. In animals the polysaccharide is glycogen, whereas in plants is starch. The potato is a root vegetable native to North and South America. It is the starchy tuber of the plant *Solanum tuberosum*, which is a perennial plant in the nightshade family (family Solanaceae). Starch will stain a deep purple when exposed to iodine dye.

To prepare the starch-rich potato cells, carefully make an extra-thin slice of the fleshy portion of a potato with a razor blade or a scalpel, and place it in an iodine drop in the center of a wet mount slide, and cover with a cover slip. Observe with the light microscope and contrast and compare against the reference micrograph (Fig. 3).

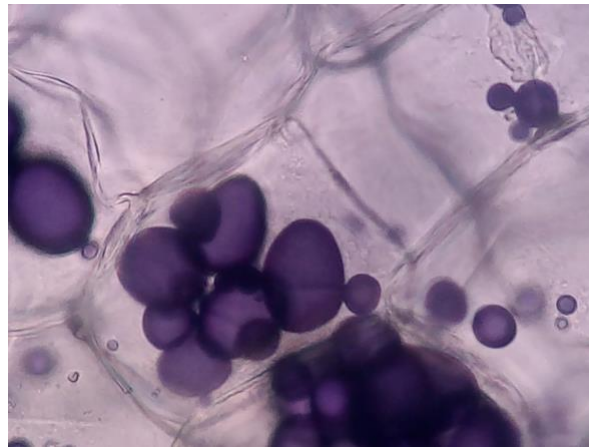


Figure 3— *Light micrograph of Solanum tuberosum potato cells. Starch granules are visible as round and purple structures inside the amyloplasts; cell walls are the clear, somewhat linear structures that define the cells' outlines. (Notice how the species name is typed in roman because the legend's text is typed in italics)*

D. Study questions

1. What are the three basic components of a cell? Are all of them visible in the buccal cells?
2. What is the function of the chloroplasts?
3. What are three (3) differences between animal and plants cells?