

Sketchy Cells

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Introduction:

In introductory biology classes there comes a point in time when students confront the microscope and begin an investigation of cellular structure. Yet, when the laboratory reports return the drawings accompanying them are often a far cry from what those cells actually looked like. This participatory presentation focuses on a classroom tested inquiry-based method to cell investigations in which student drawings of cells improved significantly. By changing the focus of the investigation from a cookbook-type activity where students center their attention on labeling the parts of a cell to an inquiry-based investigation in which students first explore the beauty of the cell, student understanding of cell structures increases and lab drawings more closely exemplify the cell structures they are investigating.

Rationale from the MCF:

Demonstrate evidence that all parts of living things are made of cells. *Key concepts:* Types of living things: plants, animals; parts of organisms: tissues, organs, organ systems; all functions of organisms are carried out by cells. See LC-III.1 m.2 for specific functions. *Tools:* Hand lens, microscope. *Real-world contexts:* Common plant or animal cells: Elodea leaf cells, onion skin cells, human cheek cells. Single-celled organisms: Paramecium.

Compare and contrast ways in which selected cells are specialized to carry out particular life functions. *Key concepts:* Classifications of organisms by cell type—plant, animal, bacteria; selected specialized plant and animal cells—red blood cells, white blood cells, muscle cells, nerve cells, root cells, leaf cells, stem cells; cell parts used for classification — organelle, nucleus, cell wall, cell membrane; specialized functions — reproduction (see LC-III.1 h.1, LH-III.3 h.2), photosynthesis (see LO m.3), transport; cell shape.

Objectives:

1. TSW demonstrate use of the light microscope.
2. TSW use the light microscope to investigate different types of cells.
3. TSW differentiate between animal and plant cells.
4. TSW identify major cell structures identifiable under the light microscope.
5. TSW use their knowledge of cells to determine if cell structures exist in other media.

Materials:

Light microscopes	Iodine Stain for onion cells
Slides	Eosin Stain for cheek/skin cells
Cover slips	Ketchup
Water supply	Pond or Puddle water
Cutting instrument	Other media in which to look for cell structures
Tweezers	Media which contains no cell structures
Fresh Onion	Eye droppers
Toothpicks or scotch tape	

Lesson:

Engage:

Cells can be a very abstract concept for students to understand. We all know that they exist, but because they are at the microscopic level students at times have trouble making the move from what they read about to the actual cell. This is further complicated by the fact that in order to see these structures, the student must make use of the light microscope. While as teachers we are well acquainted with the use and operation of the microscope, students often find using a microscope frustrating and will give up easily. If students are unfamiliar with microscope use, time should be used to create a comfortable use level or failure will result.

To engage students, query them about what they know about cells, where they think cells exist, if all living things have cells, what they think are inside cells and what they think is the function of cells. This will give you a good idea of how your students perceive cells and where you will need to deal with alternative conceptions as the lesson progresses.

Explore:

Hand out the lab sheet which will direct the students on the preparation of slides and what drawings they should be making. It will also provide some questions for them to think about as they work their way through. As students work on their drawings, move around the classroom and pose questions to the students about what they are seeing, the dimensions of some of the cell structures and the general appearance of the cells (for instance, if the student has a cell with nothing but a nucleus in the center, challenge them to look closer at what is really there). It is also helpful to project pictures of the cells they are looking at using an overhead, microscope projector or other visual media. This helps students to understand what they should be seeing and if they are seeing what they should be seeing. It also gives you as a teacher a point of reference when talking with the students as they explain their drawings in the next section.

Note: If students are unfamiliar with the use of the microscope, take time to acquaint students with proper microscope handling and use procedures. Students should have microscopes in front of them during the explanation so they can find parts on the microscope as you talk about them.

Explain:

Have the students share what they discovered about the cells. Were the cheek cells and the onion cells the same? What differences did they notice? What might be the reason for these differences? Using the students' descriptions of their findings bring in the vocabulary of the cell. Introduce the cell structures and describe their function (cell membrane, cell wall, cytoplasm, nucleus, nucleolus). Talk about cell structures which we cannot identify easily with the light microscope (Endoplasmic reticulum, Golgi bodies, mitochondria, vacuoles, microtubules, cytoskeleton). Even more importantly, describe the interactions between these parts and how they function as a whole.

Now that students understand what they have in front of them, have them label the parts of their cells that correlate with the cell terminology used in the explain phase of the lesson. Provide clear directions on how you want the students to label their cells. Have them note cell parts on their lab sheets that they could not see and where those would be located.

Elaborate:

Using the understanding of cells that they have developed in the first exploration, have the students investigate the "unknown" media provided (ketchup, pond/puddle water, etc.). Inform your students that they may have to move the slide around to discover objects hidden in the media. Students should draw any objects which appear to be or have been alive. They should be able to determine this by looking for cell structure.

Evaluation:

Use the lab reports as an evaluative tool to determine if students are able to identify cell structures, are able to show a differentiation between animal and plant cells, are able to identify cell structures in media beyond the onion and cheek, and are able to identify cell structures in these unknown media.