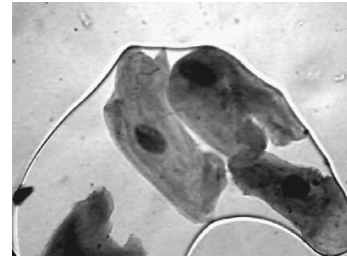


Lab 2. Cell Structure: How Should the Unknown Microscopic Organism Be Classified?

Introduction

Plant and animal cells have many organelles in common, including the nucleus, nucleolus, nuclear envelope, rough and smooth endoplasmic reticulum, Golgi apparatus, ribosomes, cell membrane, and mitochondria. Some organelles found in plant cells, however, are not found in animal cells and vice versa. For example, animal cells have centrioles (which help organize cell division in animal cells), but plant cells do not. These differences can be used to distinguish between cells that come from a plant and cells that come from an animal. The figure to the right shows animal cells from the inside of a human cheek.

Human cheek cells



Your Task

Document the traits of an unknown microscopic organism. Then classify it based on what you know about the characteristics of plant and animal cells.

The guiding question of this investigation is, **How should the unknown microscopic organism be classified?**

Materials

You may use any of the following materials during your investigation:

- Known slide A (plant cells)
- Known slide B (plant cells)
- Known slide C (animal cells)
- Known slide D (animal cells)
- Slide with an unknown organism
- Microscope

Safety Precautions

1. Glass slides can have sharp edges—handle with care to prevent cutting of skin.
2. Use caution when working with electrical equipment. Keep away from water sources in that they can cause shorts, fires, and shock hazards. Use only GFI-protected circuits.
3. Wash hands with soap and water after completing this lab.
4. Follow all normal lab safety rules.

Getting Started

To answer the guiding question, you will need to conduct a systematic observation of the cell samples provided. To accomplish this task, you must first determine what type of data you will need to collect, how you will collect it, and how you will analyze it. To determine *what type of data you will need to collect*, think about the following questions:

- What type of measurements or observations will you need to make during your investigation?
- How will you quantify any differences or similarities you observe in the different cells?

To determine how you will collect your data, think about the following questions:

- How will you make sure that your data are of high quality (i.e., how will you reduce error)?
- How will you keep track of the data you collect and how will you organize the data?

To determine how you will analyze your data, think about the following questions:

- How will you define the different categories of cells (e.g., what makes a plant cell a plant cell, what makes an animal cell an animal cell)?
- What type of calculations will you need to make?
- What type of graph could you create to help make sense of your data?

Investigation Proposal Required? Yes No

Connections to Crosscutting Concepts and to the Nature of Science and the Nature of Scientific Inquiry

As you work through your investigation, be sure to think about

- the importance of looking for patterns during an investigation,

- how structure is related to function in organisms,
- the different type of methods that are used to answer research questions in science, and
- the importance of imagination and creativity in science.

Argumentation Session

Once your group has finished collecting and analyzing your data, prepare a whiteboard that you can use to share your initial argument. Your whiteboard should include all the information shown in the figure to the right.

To share your argument with others, we will be using a round-robin format. This means that one member of your group will stay at your lab station to share your group's argument while the other members of your group go to the other lab stations one at a time to listen to and critique the arguments developed by your classmates.

The goal of the argumentation session is not to convince others that your argument is the best one; rather, the goal is to identify errors or instances of faulty reasoning in the arguments so these mistakes can be fixed. You will therefore need to evaluate the content of the claim, the quality of the evidence used to support the claim, and the strength of the justification of the evidence included in each argument that you see. In order to critique an argument, you will need more information than what is included on the whiteboard. You might, therefore, need to ask the presenter one or more follow-up questions, such as How did you collect your data? Why did you use that method? Why did you collect those data?

- What did you do to make sure the data you collected are reliable? What did you do to decrease measurement error?
- What did you do to analyze your data? Why did you decide to do it that way?
- Is that the only way to interpret the results of your analysis? How do you know that your interpretation of your analysis is appropriate?
- Why did your group decide to present your evidence in that manner?
- What other claims did your group discuss before you decided on that one? Why did your group abandon those alternative ideas?
- How confident are you that your claim is valid? What could you do to increase your confidence?

Once the argumentation session is complete, you will have a chance to meet with your group and revise your original argument. Your group might need to gather more data or design a way to test one or more alternative claims as part of this process. Remember, your goal at this stage of the investigation is to develop the most valid or acceptable answer to the research question!

Report

Once you have completed your research, you will need to prepare an *investigation report* that consists of three sections that provide answers to the following questions:

1. What question were you trying to answer and why?
2. What did you do during your investigation and why did you conduct your investigation in this way?
3. What is your argument?

Your report should answer these questions in two pages or less. This report must be typed, and any diagrams, figures, or tables should be embedded into the document. Be sure to write in a persuasive style; you are trying to convince others that your claim is acceptable or valid!

Argument presentation on a whiteboard

The Guiding Question:	
Our Claim:	
Our Evidence:	Our Justification of the Evidence: