

Variation in Cells

Major Topic and SOL **Microorganisms**
 Science SOL 5.5a, b, c

Length of Activity **90 minutes**

Major Understanding

- Students will investigate and understand organisms are made of one or more cells and have distinguishing characteristics that play a vital role in the organism’s ability to survive and thrive in its environment. Key concepts include basic cell structures and functions; classification of organisms using physical characteristics, body structures, and behavior of the organism; and traits of organisms that allow them to survive in their environment.
- Living things are made of cells.
- Cells carry out all life processes. New cells come from existing cells.
- Cells are too small to be seen with the eye alone. By using a microscope, many parts of a cell can be seen. Though plant and animal cells are similar, they are also different in shape and in some of their parts.
- Plant cells tend to be rectangular, while animal cells tend to be spherical or at times irregular.
- Organisms that share similar characteristics can be organized into groups in order to help understand similarities and differences.

Essential Questions

- How are plant and animal cells alike and how are they different?

Student Objectives

- Students will identify the major differences and similarities in plant and animal cells.
- Students will investigate how certain microscopic cells and microorganisms are alike and how they are different.

| Bloom’s Taxonomy Skills | 21st Century Learning Skills |
|--|---|
| <ul style="list-style-type: none"> • Evaluating • Analyzing • Applying • Understanding | <ul style="list-style-type: none"> • Critical Thinking • Problem Solving • Communication • Collaboration • Contextual Learning • Research |

Assessment Evidence

Performance Tasks

Students will

- name a career in STEM that might work with cells and microbiology.
- describe how they think the specimen on a slide will look under the microscope.
- examine the entire organism or cell on the slide by moving it around under the microscope.
- identify and describe what is seen under the digital microscope by using the drawing tools and writing descriptions.
- identify and list cell parts seen, and justify how it is known to be that cell organelle.
- compare and contrast three slides.
- explain how the different organisms examined are alike and how are they different.
- examine the parts of an insect that can be seen on the slides provided, using a digital microscope.

Other Evidence

- Written/Typed analysis questions:
 - How many cell parts were you able to locate and identify? Which ones were you able to locate and identify?
 - Why do you think these cell organelles are the easiest to locate on a slide under a digital microscope?
 - What features of these microorganisms surprised you the most, after viewing them under the digital microscope?
 - What cell or microorganism that was not provided to you would you be interested in seeing? Explain why (be specific in your explanation!).
 - What differences did you discover between the three different cells/organisms you examined? Were these differences surprising? How do you think these differences explain how these organisms are different on a larger scale? (For example, if you noticed differences between a mold cell and a muscle cell, how does that explain the differences between bread mold and the animal the muscle tissue came from?)
 - How are plant and animal cells alike and how are they different?
 - In your own words, in a few complete sentences, explain how these different organisms you examined are alike and how are they different.

Technology digital microscopes, computers

Internet Resources

- Online activity: <http://itsisu.portal.concord.org/activities/3093>

Supplies/Materials

- digital microscope
- variety of slides

Lesson: Variation in Cells

Engage:

- Have the students login and launch the activity from the website: <http://itsisu.portal.concord.org/activities/3093> (Note: The teacher and student will need free accounts if the teacher would like to assess typed work/answers and digital snapshots of what the students collected within the ITSI-SU platform)
- Ask students about STEM careers that related to microscopes, cells, and microbiology.

Explore:

- Give the students a variety of slides to choose from to view under the digital microscope.
- They will choose three to examine closely for parts they can identify, draw, or describe thoroughly.
- Put the students in groups with the selected slides to compare and contrast (Note: Each student will need a computer to record their data, but they may need to share a digital microscope).

Explain:

- Have the students list at least three similarities and at least three differences that their chosen slides exhibited when viewed under the digital microscope (Note: This is done through the website platform).
- The students will fill in the answers to the prompting questions within the website.

Elaborate:

- The students will respond to the *Analysis Questions* in this activity to elaborate their conception knowledge. The questions promote deeper reflection of the skills and standards taught in this lesson.

Evaluate:

- The students will respond to the *Conclusion* section.
- The students will complete the *Further Investigation* activity and questions to allow both students and teachers to move beyond general cell study, into more specific microbiology activities, developing skills even more.
- The teacher can/should also run an ITSI-SU report to read and assess student responses to all predictions and questions, to use in conjunction with the formal rubric observations of students' behaviors during the actual activity.

5th Grade Core Lab Rubric

| | Criteria | Strong Evidence 4 | Some Evidence 3 | Little Evidence 2 | No Evidence 1 |
|---|---|--|--|--|---|
| 1 | Ability to work collaboratively in a team | <i>Always</i> listens to, shares with, and supports the efforts of others; tries to keep team members working well together. | <i>Usually</i> listens to, shares with, and supports the efforts of others.; does not cause "waves" in the team. | <i>Often</i> listens to, shares with, and supports the efforts of others, but sometimes is not a good team member. | <i>Rarely</i> listens to, shares with, and supports the efforts of others; often is not a good team player. |
| 2 | Ability to write a hypothesis statement while determining independent and dependent variables. (Must be as an "if/then" statement.) | The hypothesis specifically describes how the dependent variable should change if the independent variable is changed. Scientific reasoning is used to <i>clearly</i> justify the hypothesis and the hypothesis is <i>complete</i> . | The hypothesis describes how the dependent variable should change if the independent variable is changed. Scientific reasoning is used to <i>adequately</i> justify the hypothesis and the hypothesis is <i>mostly</i> complete. | The hypothesis is <i>incomplete</i> , is not clear, or is not supported by scientific reasoning. | The hypothesis does <i>not</i> relate to the problem being investigated or is missing. |
| 3 | Ability to capture observations. (Data are collected, recorded, analyzed, and communicated) | Student reports observations and includes <i>all</i> necessary details. | Student reports observations and includes <i>some</i> details | Student reports very <i>brief</i> observations | Student does <i>not</i> report observations. |

| | | | | | |
|---|---|--|--|---|--|
| 4 | Ability to capture, display, and interpret data | Data are well organized, <i>complete</i> , properly labeled, reasonably accurate, and presented in an appropriate manner. | Data are well organized, properly labeled, reasonably accurate, and presented in an appropriate manner except for <i>minor errors or omissions</i> . | Data are not well organized, or <i>major errors & omissions</i> may be present. | Data are poorly organized, presented <i>inappropriately or are missing</i> altogether. |
| 5 | Ability to formulate a conclusion | The degree to which the data accurately answers the problem is <i>stated & well justified</i> . Possible errors in the experimental design are mentioned & improvements are suggested. | Same as number three, except <i>minor omissions</i> may be present. | Same as number two, except it is <i>weakly justified or major omissions</i> may be present. | Confidence in the validity of the conclusion is <i>not stated</i> or statements of confidence are <i>unjustified</i> . |

Rubric Adapted from:

"Lab Report Scoring Rubric." *Lab Report Scoring Rubric*. N.p., n.d. Web. 10 July 2012.
http://www.chemistry.ccsu.edu/burkholder/Teacher_Ed/labreportrubric.html.