

# Bay Area Scientists in Schools Presentation Plan

**Lesson Name** It Came From a Single Cell

**Presenter(s)** Jo Downes, Rachel Kjolby, Katie Sieverman, Aimee Littleton, Nick Jourjine, Ryan Morrie

**Grade Level** 5 **Standards Connection(s)** 5<sup>th</sup> Grade Life Science 1. Multicellular organisms have specialized structures.

**Next Generation Science Standards:**

**MS-LS1-1.** Conduct an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells.

**MS-LS1-3.** Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

<i>Science &amp; Engineering Practices</i>	<i>Disciplinary Core Ideas</i>	<i>Crosscutting Concepts</i>
<p><b>Planning and Carrying Out Investigations</b> Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.</p> <p>Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation. <b>(MS-LS1-1)</b></p> <p><b>Obtaining, Evaluating, and Communicating Information</b> Obtaining, evaluating, and communicating information in 6-8 builds on K-5 experiences and progresses to evaluating the merit and validity of ideas and methods.</p> <p>Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. <b>(MS-LS1-8)</b></p>	<p><b>LS1.A: Structure and Function</b> All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). <b>(MS-LS1-1)</b></p> <p>Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. <b>(MS-LS1-2)</b></p> <p>In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. <b>(MS-LS1-3)</b></p>	<p><b>Cause and Effect</b> Cause and effect relationships may be used to predict phenomena in natural systems. <b>(MS-LS1-8)</b></p> <p><b>Scale, Proportion, and Quantity</b> Phenomena that can be observed at one scale may not be observable at another scale. <b>(MS-LS1-1)</b></p> <p><b>Systems and System Models</b> Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. <b>(MS-LS1-3)</b></p> <p><b>Structure and Function</b> Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural and designed structures/systems can be analyzed to determine how they function. <b>(MS-LS1-2)</b></p>



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## Common Core Standards:

### *ELA/Literacy:*

**RST.6-8.3** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

**SL.8.5** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

### *Mathematics:*

**MP.2** Reason abstractly and quantitatively.

**MP.5** Use appropriate tools strategically.

## FOSS Connections:

Grade 5 Module: *Living Systems*

### Teaser:

Have you ever wondered why a baby looks different from an adult? How about why a tadpole looks different from an adult frog, or a puppy looks different from an adult dog? The answers lie in development!

**Objective:** Students will learn that living things are made of cells, and that grown organisms start out as a single cell and then divide to become a full animal (or plant). They will also learn about different cell types and how their structure relates to their function.

### Vocabulary/Definitions:

- **Cell:** The basic unit of life: structures that make up living things
- **Stem cell:** a cell that has the ability to become many different cell types
- **Development:** The process in which a single cell becomes a complex multicellular organism
- **Embryo:** A developing organism before it's born.

### Materials:

*What will you bring with you?*

- 2 microscopes
- magnifying glasses
- specimens
- pictures of cells and embryos
- worksheets, (game?)
- 2 laptops

*What should students have ready?*

- pencils and open minds!

### **Classroom Set-up:**

Students will eventually be divided into 4 or so groups. We need minimal set up time (just enough to set up each station, possibly by grouping desks/tables together appropriately). We will need a whiteboard/chalkboard and a place to hang up pictures (magnets on a whiteboard?)

## **Classroom Visit**

- 1. Personal Introduction:** 3-5 Minutes  
We are graduate students studying Molecular and Cell biology at UC Berkeley. We're especially interested in development, which is the study of how a complex animal with many different cells forms from a single cell, and we want to share it with students so they will learn how they started as one cell and became a person with skin and eyes and bones and internal organs.
  
- 2. Topic Introduction:** 10 Minutes  
How many people know what a cell is? Name some cell types (we'll write these on the board). What do these cells do? How did we get to have all these cell types in our bodies? Introduce development: start out as a single cell, and then cells change and move, then becomes an organism. Talk about stem cells, with analogy to kids growing up (all kids start out with the potential to be anything they want, like an astronaut or a dancer or a scientist. While they grow up, they learn what they like and what they're good at, and eventually decide what they want to be when they're older). Vocab: development, embryo, cell, stem cell  
Introduce idea of a science journal/lab notebook: Scientists have to write down everything they do and see. You should too if you're doing science!
  
- 3. Learning Experience(s):** 30 Minutes  
5 to 7 minutes per station:
  - 1) Microscopes with frogs/live tadpoles on overhead
    - Shows progression from single cell to multicellular organism
    - How does the oldest embryo look different from the youngest embryo?
  - 2) Chickens with magnifying lenses/pictures of other embryos
    - Which embryo is which animal? Guess!
    - Shows how similar different developing embryos are
  - 3) Cell movement during development
    - Cells migrate in an embryo during development
    - Videos with frogs, flies, plants shown on laptops
  - 4) Cell types
    - Pictures of different cells—neurons, epithelial cells, blood cells,
    - Printed/laminated pictures
    - Shows many different cell types that arise from one single cell
  
- 4. Wrap-up: Sharing Experiences** 3-5 Minutes

What did you learn at each station? Call on students to share the most interesting things they learned and show off their drawings.

### 5. Connections & Close:

3-5 Minutes

Development is really cool! Think about all the qualities we have that are similar to other animals. Now you know that all of those animals developed similarly to how you developed. This is an important thing to study because development can go wrong, and you get things like extra fingers/toes or webbed fingers and toes. If we can understand development, we can understand and prevent things from going wrong.

Total 50 – 60 Minutes

### **Differentiated Instruction:**

*English Learners:* Repeat directions, if necessary, and physically model how to perform each station activity. Write vocabulary words on the board and read words aloud. Vocabulary words can also be visually demonstrated using an illustration or action and redefined in very simplistic terms.

*Advanced Learners:* Have students write down hypotheses about different cell types, structures, and functions of these cells.

## **Follow-up Possibilities**

### **ELA Activity:**

Suggest students write a letter explaining “How we learned about cells?”

### **Mathematics Activity:**

Students can write and solve word problems about cells and/or different multicellular organisms.

### **Other:**

(We will provide a url or give the teacher a copy of the videos and photos shown).  
Worksheets attached.