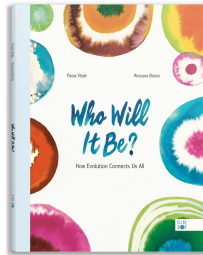


Teacher's Guide

Who Will It Be?

How Evolution Connects Us All

ISBN: 9781733121200



GRL-S

Interest Level: K-5

A kids' discussion guide on the theory of evolution, for grades two through five, as well as an opportunity for early exposure for younger children.

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Before Reading

Essential Questions

1. Who was Charles Darwin?

Charles Darwin was an English naturalist. He is famous for his work on the theory of evolution based on natural selection and his book ***On the Origin of Species*** (1859).

2. What is evolution?

Evolution is the change in the characteristics of a species over several generations and relies on the process of natural selection. The theory

of evolution is based on the idea that all species are related and gradually change over time.

3. What is a species?

A species is a group of closely related organisms that are very similar to each other and are capable of producing fertile offspring (babies). In science, species is a category that identifies and classifies living things.

4. What do all animals on Earth have in common?

All animals come from one common ancestor.

5. How do living things survive?

Living organisms are adapted to their environment. This means that the way they look, the way they behave, how they are built, and their way of life make them able to survive and reproduce in their habitats.

Discussion

Read the title and discuss the cover illustrations.

Build background knowledge and explore what the students already know about the topic. Discuss the subtitle, “*How Evolution Connects Us All.*”

Ask students to predict what the pictures represent.

Have the group take a picture walk and discuss the illustrations.

Note: For all discussion questions, allow for different interpretations.

Word Work

Present the new **vocabulary words**:

—**Cell**: A **cell** is the smallest unit of life. A cell is the basic structural, functional, and biological unit of all known organisms.

—**Embryo**: An **embryo** is an unborn but developing child or animal.

—**Organism**: An **organism** is any individual animal, plant, or single-celled life form.

—**Evolution: Evolution** is the change in the characteristics of a species over several generations and relies on the process of natural selection. The theory of evolution is based on the idea that all species are related and gradually change over time.

—**Species:** A **species** is a group of closely related organisms that are very similar to each other and are capable of producing fertile offspring (babies). In science, species is a category that identifies and classifies living things.

—**Natural selection:** **Natural selection** means creatures that have changed to fit where they live can survive better than those who have not changed.

—**Adaptation:** An **adaptation** is any change in the structure or function of an organism or any of its parts that results from natural selection. Adaptations make organisms better fitted to survive and multiply in their environments.

—**Vertebrates:** **Vertebrates** are animals with backbones.

—**Fossils:** **Fossils** are the remains of once-living things.

—**DNA:** **DNA** is a substance in each cell that carries important information about what the cell will become.

Have the students open the book and revisit the illustrations. Discuss the illustrations using the new **vocabulary words**.

Create a chart describing the characteristics of **fish, amphibians, reptiles, birds, and mammals**.

During Reading

Read to find out what all of Earth's creatures have in common.

Read the book aloud to the group.

Have the students reread the book independently or in small groups.

- How does illustrator Rossana Bossù create meaning through her artwork?
- Ask students to find the connections between the text and the illustrations.
- Have students make predictions as you read.
- How do all the embryos look alike? When do they begin to change?
- Do our cells really have a memory? What does Paola Vitale mean when she wrote: "Like the memory of a long journey stored inside each of our cells?"
- Why do human embryos look similar to other vertebrates?

Read and Discuss the Back Matter (Grades 3–5)

Explain that the back matter of the book explains Charles Darwin’s theory of evolution, based on his book ***On the Origin of Species***. Have students read through the back matter independently or read aloud to younger students.

Come together as a group and discuss the information.

- Create a chart outlining ***On the Origin of Species***, by Charles Darwin.
- Look for vocabulary words in context.
- Describe the relationship between a series of scientific ideas by Charles Darwin. Relate it to **time**, **sequence**, and **cause/effect relationship**.
- In pairs, students explain the following statements based on what they learned from the text. Students can then choose two statements to research further and create a presentation.
 - Cells are the “building blocks of life.”
 - “All living things come from simpler life forms.”
 - Life always begins as a single cell.
 - We all share ancient DNA from the first vertebrates on Earth.
 - All life started as a single cell that lived in the oceans billions of years ago.
 - “Before being born, it’s like every baby ‘remembers’ the journey that life took before humans appeared.”
 - All life on earth evolved from a common ancestor that first appeared billions of years ago.
 - Variations/differences exist in all species and allow some individuals to be better able to survive in a particular environment than others.
 - Darwin also had the idea that humans have body parts that they do not use anymore but once needed. Prove this.

After Reading

Discussion: Characteristics (Grades K–5)

All life on earth evolved from a common ancestor that first appeared billions of years ago. Variation exists in all species and allows some individuals to be better able to survive in a particular environment than others. Characteristics of animals allow them to survive in different habitats. Think about these animals:

- Frog
- Snake
- Puffer fish

- Human
 - Polar bear
1. Where do each of these animals live?
 2. What are some characteristics of each that allow them to survive?
 3. Describe their natural habitat and their physical characteristics.
 4. What kinds of physical characteristics do they need on their body to survive in their habitat?

Further Discussion (Grades 3–5)

Draw an embryo (use a simple example such as a tadpole/frog embryo).

After the development of an embryo begins, there is a time when all embryos—human, fish, fox, snake, etc.—look like they will become the same animal. Scientists compare this to the narrowest part of the hourglass. Draw an example of this in the hourglass (use the hourglass image at the bottom of the sheet).

1. Life begins as a cell.
2. The cell splits, and the embryo develops.
3. After different animals begin to develop, there is a time when all embryos look alike.
4. Embryos develop in different ways depending on the animal.

Research and Dig Deeper (Grades 3–5)

1. How can you explain the ways cells contribute to the function of living organisms?
2. How do organisms live and grow?
3. How do living organisms pass traits from one generation to the next?
4. How are the characteristics of one generation passed to the next?
5. How can individuals of the same species, even siblings, have different characteristics?
6. How do organisms change over time in response to changes in the environment?
7. What evidence shows that different species are related?
8. How do organisms grow, develop, and reproduce?
9. How are the characteristics from one generation related to the previous generation?
10. How does genetic variation among organisms in a species affect survival and reproduction?
11. How does the environment influence genetic traits in populations over multiple generations?
12. How can there be so many similarities among organisms yet so many different plants, animals, and microorganisms?
13. How does biodiversity affect humans?

Compare and Contrast (Grades 3–5): Compare and contrast the development of human embryo to that of other life forms.

Human

Other Animals

1.	
2.	
3.	
4.	

Think About It (Grades K–5)

1. After reading about the ideas of Charles Darwin and how all creatures are interconnected, answer this question: What can that teach us about the way we should treat one another?
2. What lessons can we learn about tolerance and accepting others for their differences?
3. Plan, design, and create posters that communicate how we should treat fellow humans and creatures on Earth.

Activity: Become a Community Scientist! (Grades K–5)

Community science, also called citizen science, happens when people study the world around them and send the data they collect to scientists. Citizen scientists are people—young or old, who have attended a lot of school or very little, from cities and from small towns—who help collect data for research projects and help to answer real scientific questions.

Join National DNA Day (April 25): This is a special day designed to encourage students, teachers, and curious humans to share, learn about, and celebrate the latest advances in genomic research and explore how those advances might impact their lives. Designated by Congress in 2003, DNA Day commemorates the successful completion of the Human Genome Project in 2003 and the discovery of DNA’s double helix in 1953. Learn more at <https://www.genome.gov/dna-day>.

Join Bugs In Our Backyard: An educational outreach and collaborative research program, providing project-based learning opportunities for K-12 students– or anyone! The core activity for *BioB* takes advantage of the bugs in your own backyard, schoolyard or neighborhood. Students can become citizen-scientists by surveying this diversity of insects and plants. Learn more at: <https://www.bugsinourbackyard.org>.

