



Participant Discussion Guide for *Cosmos: A SpaceTime Odyssey*

Episode 2: "Some of the Things Molecules Do"

The creators of *Cosmos: A SpaceTime Odyssey* state that their aim is to promote scientific literacy. Because we know that many who watch the program may find the blurring of observational, experimental science with historical, origins science confusing, in this study guide for episode two, we emphasize the distinction between what we observe in biology and speculations about how those things came to be.

- 1. Explain how natural selection and selective breeding can lead to new species of animals and plants.**

2. What is a “species”? Do species change?

3. What is a “created kind”?

4. What is the difference between speciation and molecules-to-man evolution?

5. What are genes? Where are they found?

6. What is the “alphabet” used to “write” instructions in DNA?

7. How are the instructions for building new cells passed on to new generations of cells?

8. How are the instructions for how a living cell makes important molecules read and carried out?

9. What is a mutation?

10. Are mutations the raw material for molecules-to-man evolution?

WRAPPING UP LIFE

11. Name the characteristics of living things.

12. When living things reproduce, are their offspring identical to the parent organisms?

13. Which of the following are actual scientific observations and which are world-view-based interpretations?
- A. Gravity causes dropped objects to fall toward the ground.
 - B. Living things are composed of a cell or cells.
 - C. Protein molecules are built of amino acids.
 - D. The genes in DNA direct the construction of protein molecules.
 - E. Plants use photosynthesis to convert the sun's energy to sugar.
 - F. All cells metabolize glucose (sugar) for energy.
 - G. All cells need similar enzymes to metabolize glucose, a simple sugar.
 - H. All living things write their genetic information using the same "language."
 - I. The genes that direct building of glucose-metabolizing enzymes are found in all living things, although many of their other genes differ.
 - J. All life evolved from a common single-celled ancestor.
 - K. "Science reveals that all life on earth is one."
 - L. One kind of organism, after its offspring collects enough mutations, sometimes evolves into a completely different kind of organism over time.
 - M. The protozoans that cause malaria may vary, but they never change into organisms that cause a completely different kind of disease.
 - N. Living things only come from other living things. Cells only come from other cells.
 - O. "The theory of evolution like the theory of gravity is a scientific fact. Evolution really happened."

REACHING BEYOND

What is the difference between a single-celled organism and a multicellular organism? Give examples of each. Why do single-celled organisms not combine themselves together to turn into a multicellular organism?