

## Chapter 2. The Universe to Human Emergence: A Story of Becoming

### Chapter 2. A. Study Questions

#### Chapter 2. Section 1. The Roots of Becoming

Terms to Consider:

creation stories  
*sipapu*  
 scientific account

Section 2. Questions to Consider:

#### 1. Creations Stories

- a. Research other creations stories from other cultures and societies.
- b. Do they have any common themes? What are they?
- c. Is the scientific explanation for the beginning of the Universe a "creation story?" Why?
- d. What "creation story" resonates with you? Why?
- d. Why do you think I capitalize the word Universe? Would you capitalize it?

#### 2. The Universe

- a. Why do you think the Universe "bothers to exist?"
- b. What do you think are the "deep mysteries" of the Universe?

#### 3. Creative and Destructive Energies

- a. Cite ways in which the flow of creative and destructive energies are woven into this chapter.
- b. Can you think of other ways that the flow of destructive and creative energies flow is reflected in this chapter?
- c. What does the following statement mean to you: "In a giant paradoxical cosmic dance of creation and destruction, reconfiguration and recycling, evolution and extinction – our Universe exists."

#### Chapter 2. Section 2. A Story of the Universe

Section 2. Terms to Consider:

**Big Bang**  
**stars**  
**black holes**  
 solar system

Section 2. Questions to Consider:

#### 1. The Beginning of our Universe

- a. What is the Hot Big Bang scenario?
- b. Do further scientific research on the first few seconds at the beginning of our Universe.

#### 2. Stars

- a. How do creative and destructive energies play out in the creation of stars?
- b. What does the statement "Stars are not alone and do not evolve "in splendid isolation" mean?

- c. Do further research on the formation of stars and our Sun in particular.
  - d. Do further research on supernovas.
  - e. Do further research on our Milky Way galaxy.
  - f. Do further research on black holes.
  - g. Invasion and absorption are themes in the formation of stars. In what ways can we see this theme carried out by humans?
3. The Sun
- a. Describe the evolution of our Sun.
  - b. Why is our Sun considered to be in a "mature" phase?

## Chapter 2. Section 3. Our Earth and the Unfolding of Life

Section 3. Terms to Consider:

### **natural selection**

animal realm

"age of dinosaurs"

"age of mammals"

Darwinian evolutionary theory

punctuated equilibrium

Section 3. Questions to Consider:

### 1. Formation of the Earth

- a. Describe how our Earth formed.
- b. What does the following statement mean to you: "The number of random possibilities for life's primeval ingredients to converge and create organic life was actually a highly implausible event." Do you agree?
- c. What ingredients were needed for the formation of life on Earth?

### 2. Formation of Life on Earth

- a. What does the following statement mean to you: "All life is part of an ecosystem that never remains static but changes or evolves through time."
- b. What is the "primordial soup"? Can you think of a different metaphor?
- c. What two fundamentally related factors enabled organisms to form and thrive?
- d. What is the significance of evolution by natural selection?
- e. What does it mean that evolution and extinction go hand-in-hand?

### 3. Cells

- a. What are cells?
- b. What are the two types of cells?

### 4. Animal Realm

- a. What is the animal realm?
- b. How did animals succeed in their evolution?
- c. What was the "age of amphibians?"
- d. What is meant by biological continuity?
- e. What effect did climate change have on animal evolution?
- f. What adaptations did animals make after periods of extinction and destruction?

5. Mammals
  - a. Why did the “age of mammals” dawn?
  - b. What characteristics did mammals have that aided in their survival?
  - c. What does the following fact mean to you: “over 97 percent of mammalian species have become extinct in our mammalian history.”
  - d. What does the following statement mean to you: “Given the immense number of organisms and the limited supply of accessible matter, evolution could not have sustained itself for the nearly four billion years of life without recycling critical elements?”
  - e. What is the theory of “punctuated equilibrium?” Do further research on this theory.
6. Why have so many extinctions occurred in the history of life on Earth?

## Chapter 2. Section 4. Our Human Evolutionary Path

Section 4. Terms to Consider:

**bipedalism**

**Australopithecus**

**Homo**

Homo habilis

**Homo erectus**

**home bases**

**multiregional evolutionary model**

**Out of Africa**

**Mitochondrial Eve**

**archaic Homo sapiens**

**Neanderthals**

**homo sapiens sapiens**

Section 4. Questions to Consider:

1. Early Human Evolution
  - a. What is meant by the assertion that humans are biological and cultural beings? Do you agree?
  - b. When do big leaps in evolution take place? Do other theories agree with this conclusion? Research to find out more.
  - c. Do you agree with the statement: “Humans are not the final destination in this tangled journey but part of an interdependent, evolutionary process. We came into being the same way everything else did: we evolved.” Explain
  - d. What are the five significant turning points in our evolutionary history?
  - e. Why did early primates live in trees?
  - f. What was the significance of the climate shift that transformed tropical forests to woodlands?
  - g. What impact did bipedalism have on the development of humans?
  - h. Do you think chimpanzees are our cousins? Explain.
  - i. Describe the daily life like of the Australopithecines.
2. The Homo lineage
  - a. Why does this book trace human history back 2.5 million years ago to the appearance of Homo habilis species? Do you agree with this approach? Why?
  - b. What influence did a big brain have on the evolution of the homo line?
  - c. What cultural traits did Homo erectus evolve that made the species more like us, modern humans?

- d. How did the migrations of *Homo erectus* impact the expansion and development of the species?
  - e. Which of the two theories—the multiregional evolutionary model or the Out of Africa model-- has the most validity? Do further research to find out more about the two theories.
  - f. What important physical characteristics distinguished archaic *Homo sapiens* from his/her predecessors?
  - g. What selective pressures stimulated an increase in brain size among archaic *Homo sapiens*?
3. Evolution of Modern Humans
- a. Who were the Neanderthals?
  - b. What cultural developments did Neanderthals create?
  - c. What happened to the Neanderthals?
  - d. Where and how did modern *Homo sapiens* evolve?
  - e. Do you think there is a tension between our animal and cultural selves that existed in the past and continues to the present day?