

EVOLUTION UNDER THE MICROSCOPE

DISCUSSION GUIDE ANSWER KEY

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Based on the research of Dr. Fazale Rana



CHAPTER 1

WHAT IS EVOLUTION?



1. True or false? Evolution eliminates the need for a Creator.
2. What is a general definition of the term “evolution”?
3. What are the five categories of evolution?
4. Which categories of evolution do not challenge the notion of God as Creator?
5. Which categories of evolution challenge the notion of God as Creator?
6. Briefly define each of the following terms:
Microevolution:

Speciation:

Microbial evolution:
7. How do chemical evolution and macroevolution challenge the Christian worldview?

CHAPTER 1: WHAT IS EVOLUTION?

8. Which versions of evolution have the best scientific evidence?

9. What is the “shell game” of evolution?

10. In your own words, write a 1–2 sentence summary of the key idea of this lesson.

CHAPTER 2

MICROEVOLUTION



1. Is evolution a fact?
2. What is microbial evolution?
3. Bacterial resistance to antibiotics is often put forth by evolutionary biologists as a real-time example of evolution. What category of evolution is this an example of?
4. What type of evolution is the peppered moth phenomenon? Explain the peppered moth phenomenon and how it is an example of that type of evolution.
5. What other example of microevolution does Fazale Rana talk about? Please describe the process.

CHAPTER 2: MICROEVOLUTION

6. Summarize why microevolution is not in conflict with the Christian faith.

7. What is speciation?

8. Explain how the finches of the Galapagos Islands demonstrate speciation.

9. How does Fazale Rana see these three types of evolution as a part of God's design?

10. In your own words, write a 1–2 sentence summary of the key idea of this lesson.

CHAPTER 3

A CLOSER LOOK AT CHEMICAL EVOLUTION



1. What is chemical evolution or abiogenesis?
2. List the two scientists who first proposed the idea of chemical evolution or abiogenesis.
3. What is the name of this famous hypothesis?
4. Summarize the basic idea of this hypothesis.
5. Explain the Miller-Urey experiment, including the approximate chemical reaction.

CHAPTER 3: A CLOSER LOOK AT CHEMICAL EVOLUTION

6. Does the Miller-Urey experiment verify the Oparin-Haldane hypothesis? Why or why not? Include information about the chemical reaction.

7. List the names of the two origin-of-life researchers who summarized the significance of the Miller-Urey experiment this way: “But is the prebiotic soup theory a reasonable explanation for the emergence of life? Contemporary geoscientists tend to doubt that the primitive atmosphere had the highly reducing composition used by Miller in 1953.”

8. What is the critical component of chemical evolution or abiogenesis?

9. Describe the evidence (if any) in support of chemical evolution.

10. Which origin-of-life researcher summarized the current state of origin-of-life research this way: “So far, no geochemical evidence for the existence of a prebiotic soup has been published. Indeed, a number of scientists have challenged the prebiotic soup concept, noting that even if it existed, the concentration of organic building blocks in it would have been too small to be meaningful for prebiotic evolution.”

11. In your own words, write a 1–2 sentence summary of the key idea of this lesson.

CHAPTER 4

WHY DOES SCIENCE LEAVE GOD OUT?



1. What central idea to the evolutionary paradigm has no scientific evidence to support its hypothesis?
2. Prominent origin-of-life researcher Leslie Orgel said that metabolism-first scenarios require:
3. In describing the RNA world hypothesis, Orgel also said it would be a near _____ if a strand of RNA ever appeared on early Earth.
4. If many scientists admit that the origin of life appears to be a miracle, then how do they explain what (or who) prompted life's origin?
5. Dr. Rana says the theory of evolution is as much about _____ as it is about science.
6. What additional requirement do many scientists add to hypotheses, theories, and models to explain phenomena in nature?
7. What are some relevant quotes from evolutionary biologist Richard Lewontin regarding the commitment to the philosophy of methodological naturalism? (Note: Fazale Rana is using an entire quote here. The instructor may pause the video, or students may paraphrase.)

CHAPTER 4: WHY DOES SCIENCE LEAVE GOD OUT?

8. Evidence for evolution can also be understood from a _____ model perspective.
9. Other than gradual evolution, what is another way to explain the gradual change from simple to complex life-forms throughout Earth's history? How does the fossil record support that alternative?
10. In your own words, write a 1–2 sentence summary of the key idea of this lesson.

CHAPTER 5

CREATING LIFE IN THE LAB



1. A new area of science focused on creating and manipulating artificial, nonnatural life-forms is called what?
2. Synthetic biology brings up what big question?
3. What are proto-cells?
4. Why would scientists want to create proto-cells?
5. Why do some scientists feel that synthetic biology will answer the origin-of-life question?
6. Synthetic biology depends on _____ to create life.
7. How does synthetic biology undermine the evolutionary paradigm?
8. In your own words, write a 1–2 sentence summary of the key idea of this lesson.

CHAPTER 6

DOES MACROEVOLUTION FIT THE FOSSIL RECORD?



1. What is macroevolution?
2. If evolution is true, what would we expect to see in the fossil record?
3. What do we actually see in the fossil record?
4. List four major features of the Cambrian explosion.
5. Who wrote the following about the Cambrian explosion?
“William Buckland knew about it, Charles Darwin characteristically agonized over it, and still we do not fully understand it. ‘It,’ of course, is the seemingly abrupt appearance of animals in the Cambrian ‘explosion.’”
6. Who wrote the following about the Cambrian explosion?
“There is another and allied difficulty which is much more serious. I allude to the manner in which species belonging to several of the main divisions of the animal kingdom suddenly appear in the lowest known fossiliferous rocks. . . . To the question why we do not find rich fossiliferous deposits belonging to these assumed earliest periods prior to the Cambrian system, I can give no satisfactory answer.”
7. What was Darwin’s hope and expectation?

CHAPTER 7

CAN BIOLOGICAL EVOLUTION EXPLAIN THE HISTORY OF LIFE?



1. What do we see in the fossil record?
2. Which evolutionary biologist said the following? “All paleontologists know that the fossil record contains precious little in the way of intermediate forms; transitions between major groups are characteristically abrupt.” What is the significance of this quote?
3. What are the evolutionary scientists’ proposed solutions to the lack of evidence supporting evolution?
4. What are the two most common textbook examples of transitional forms?
5. If tetrapods are transitional forms, what would the fossil record reveal about them?
6. What are the key pieces of data from the fossil record for tetrapods?
7. What is the temporal paradox?
8. List two problems with whale origins from an evolutionary perspective.

CHAPTER 7: CAN BIOLOGICAL EVOLUTION EXPLAIN THE HISTORY OF LIFE?

9. How could these so-called “transitional forms” be explained from a creation model perspective?

10. Define the term “mosaic designs.”

11. What example of mosaic design did Dr. Rana give? How does this example connect to the discussion of transitional forms?

12. In your own words, write a 1–2 sentence summary of the key idea of this lesson.

CHAPTER 8

BIRDS IN THE FOSSIL RECORD



1. List three things observed in the fossil record:
2. Darwin lamented the absence of _____ forms.
3. What is evolutionary scientists' solution to the lack of transitional intermediates?
4. What is archaeopteryx and what is its significance to the evolutionary paradigm?
5. Summarize the first theory that scientists proposed to explain archaeopteryx.
6. What are two key problems with this theory?
7. Summarize the second theory that scientists proposed to explain archaeopteryx.
8. List five key features theropods share in common with birds.
9. Summarize the key evolutionary prediction that would demonstrate that this theory is true.

CHAPTER 8: BIRDS IN THE FOSSIL RECORD

10. What does the theropod data show?

11. List four key problems with the theropod-to-bird theory.

12. How might feathered dinosaurs in the fossil record be explained from a creation model perspective?

13. Summarize what Dr. Rana thinks is the key feature of the bird fossil record that undermines the evolutionary paradigm.

14. Summarize the other major features of the bird fossil record.

15. Do the overall features of the fossil record match the predictions of the evolutionary paradigm?

16. In your own words, write a 1–2 sentence summary of the key idea of this lesson.

CHAPTER 9

HOMOLOGY



1. Define homology.
2. What is pentadactyl architecture?
3. Pentadactyl architecture is seen in all _____, in fact it's seen in all _____.
4. How is homology used by evolutionary biologists to support their model?
5. How could homology be understood from a creation model perspective?
6. Who was the original interpreter of homology?
7. Compare and contrast analogies and homologies.
8. How did Owen interpret homologies and analogies?
9. Darwin replaced Owen's archetype model with what?
10. Homology can be interpreted from a creation model perspective just as well as from an _____ perspective.
11. What is comparative genomics?

CHAPTER 9: HOMOLOGY

12. What percentage of DNA is similar between chimps and humans?
13. Genetic similarities of genomics could represent common descent or common _____.
14. In your own words, write a 1–2 sentence summary of the key idea of this lesson.

CHAPTER 10

HOMINIDS AND NEANDERTHALS



1. How have some Christians tried to make sense of the hominid fossil record?
2. What specimen (later discovered to be a hoax) was put forward in 1912 as being a key “transitional form” in the hominid-to-human fossil record?
3. The 1922 discovery of an eroded tooth initially led scientists to believe they discovered an ape man. However their claim was retracted five years later. What was this discovery called?
4. Is the fossil record unreliable?
5. If these hominids demonstrate the gradual evolution of humans, what five things should we expect to find in the fossil record?
6. Summarize four of the failed predictions of the hominid fossil record.
7. Summarize the current scientific theory of how hominids went from knuckle-walking apes to bipedal (upright-walking) creatures.

CHAPTER 10: HOMINIDS AND NEANDERTHALS

8. What would have been required for a knuckle-walking hominid to evolve into a bipedal human?
9. List three key features of the fossil record as it pertains to the appearance of bipedalism.
10. What was the original evolutionary theory about the bipedalism of *Australopithecus afarensis* (“Lucy”)?
11. What do scientists now believe about Lucy’s bipedalism?
12. How could bipedalism be understood from a creation model perspective?
13. What is the sociocultural big bang?
14. How does the sociocultural big bang challenge the idea of human evolution from an ancient ape-like ancestor?
15. In your own words, write a 1–2 sentence summary of the key idea of this lesson.

CHAPTER 11

ADAM AND EVE



1. What do scientists study in the field of molecular anthropology?
2. Molecular anthropology can give scientists information about what features of the history of human origins?
3. List four key conclusions about human origins based on molecular anthropology.
4. How were mitochondrial Eve and Y-Chromosomal Adam traced?
5. The scientific data in the fossil record is consistent with the _____ and it contradicts the _____.
6. If we looked at biblical genealogies as timekeeping devices, humanity's emergence would have occurred about how long ago?
7. Why do theologians say that the biblical genealogies are not reliable for calculating the date of humanity's origin?

CHAPTER 11: ADAM AND EVE

8. Where did humans originate from?

9. In your own words, write a 1–2 sentence summary of the key idea of this lesson.

ABOUT THE AUTHORS



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