

Handout for TrueU Lesson 5: DNA by Design, Part 1—Biological Information

1. Although many leading nineteenth-century scientists thought that the cell was a “simple homogenous globule of plasm,”¹ evolutionary biologist Richard Dawkins has recently defined biology as “the study of complicated things that give the appearance of having been designed for a purpose.”² Describe the huge difference between non-living chemicals and a living cell.
2. What determines the three-dimensional shape of a protein, which gives it a specific life function? What is “sequence specificity” in regard to the amino acids that compose proteins? Include discussion of these facts about proteins:
 - DNA’s digital *code* directs the specific *sequencing* of amino acids in protein construction.
 - Precise amino acid *sequencing* determines protein *folding*.
 - Folded* chains of amino acids form the *shapes* of proteins.
 - Protein *shapes* perform life-critical *functions*.
3. Which sequence below is complex (improbable) *and* matches an independent meaningful pattern? Contrast the *communication* function of a sentence with the *biological* function of a protein? What properties do they share?
 - sp
 - iurnsdyskidfawqznzklmfdifhseiklkskkdihekiqo
 - “Time and tide wait for no man” (a medieval proverb that means we can’t control time).
4. Note how the details below help answer the question above. Then answer the additional questions.
 - spspspspspspspspsp is highly specific (matches a pattern), but simple (follows a repetitive rule).
 - iurnsdyskidfawqznzklmfdifhseiklkskkdihekiqo is complex, but not specified (no pattern match).
 - “Time and tide wait for no man” is complex and specified (i.e., it’s *specified information*):
 - How is *specified* information also *functional* information? What’s a proverb’s function?
 - A gene is a DNA segment that codes for a protein. Proteins have life-support functions. How is a gene like the medieval proverb “time and tide wait for no man”?

¹ T. H. Huxley, “On the physical basis of life,” *Fortnightly Review* 5 (1869):129-145. British spelling is “homogeneous.”

² Richard Dawkins, *The Blind Watchmaker* (New York: Norton, 1986), 1.

5. Explain how the three sequences above can be relabeled as follows (lesson 6 covers this more):
 - Low complexity + high specificity = simple order due to repetitive law.
(consistent with necessity)
 - High complexity + low specificity = complex but arbitrary arrangement.
(consistent with chance)
 - High complexity + high specificity = complex and functional.
(only known cause is intelligent design)

6. Study these definitions and explain how the three sequences above are examples.
 - Necessity: Something that *had* to happen by a natural repetitive law. Also called deterministic.
 - Chance: Something that didn't have to happen, but *wasn't* chosen. It "just happened."
 - Design: Something that didn't have to happen, but *was* chosen purposefully.

7. What kind of cause, routinely seen in operation today, is always involved in the appearance of new information (and its associated functional outcome)? What implication does this have for the origin of DNA, which carries the information for building the proteins critical for cellular functions?

8. Is the argument for intelligent design based on ignorance or on what we know about causes today?

9. *Complexity* can be expressed as how improbable it would be to get that same thing a second time without intelligent guidance. *Specificity* is the match between the thing and an independent meaningful pattern (one with a functional result). An ordinary mountain face is complex, but lacks specificity. A Mt. Rushmore presidential face is both highly complex and specified. What is the only adequate cause of highly complex and specified effects such as Mt. Rushmore and DNA's code?