Soul Searching

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Objectives

Students will be able to

- identify humanity (or being human) as an animate, biological system.
- identify the different levels of complexity and organization of animate systems.
- define molecular evolution.
- identify the chemical characteristics of "replicators."
- explore teleological implications of being human (i.e., the "nature of the soul").
- define the structure and properties of DNA/RNA.
- describe the central tenets of molecular biology .
- define gene structure and function.
- explore the idea of "molecular immortality."
- explore the relationship between genes and behavior.

Pre-Case Study Reading and Viewing Assignments

Dawkins, R. (2006). *The selfish gene* (30th ann. ed., Chaps. 1-4). New York: Oxford University Press.

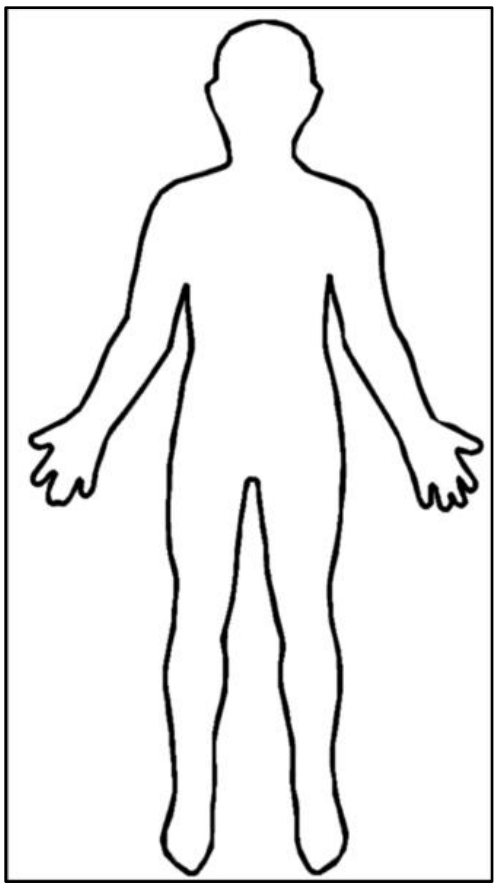
Skloot, R. (2011). Part I: Life. In *The immortal life of Henrietta Lacks* (pp. 13-86). New York: Crown Publishing.

Tyson, Neil deGrasse. "Revealing the Origins of Life" in *Where Did We Come From?* Dir. by Mark Marabella. *NOVA ScienceNOW*, February 16, 2011. http://www.pbs.org/wgbh/nova/evolution/origins-life.html

Pre-Case Study Questions

Please provide a brief answer to each of the following questions. You can conduct background research on the topic wherever necessary, but be sure to cite your sources.

1. What is the central tenet of molecular biology?
2. Define Human Life Amendment (HLA) and what is the Mississippi Amendment 26?
3. What is *your definition* of the "soul"? What are some of its defining characteristics? Does the soul reside within the body? If it does, where, in your opinion, is it most likely to be located? Use the outline on page 2 to illustrate your answer.



Note: Please have your answers ready for submission to the course instructor at the start of the class period.

Part I: Jackson, Mississippi
November 7, 2011

Dari sat quietly at the table in the diner. Though she appeared as cool as a southern afternoon in November, her restless glances at the door of the restaurant gave away a hidden uneasiness. She was waiting for Malachi, a close friend and former classmate who she hadn't seen in the two years since they graduated from high school. They both went on to college, he at Liberty University, a Christian college in Virginia, while Dari pursued a liberal arts education at Vassar College in New York. Now, an odd set of circumstances had brought them to face each other. Malachi had become a leading student activist for the *Vote Yes on 26 Movement*, Mississippi's anti-abortion coalition's attempt to constitutionally redefine human personhood by referendum. Dari had recently become a blogger for the *Richard Dawkins Foundation For Reason and Science* at her campus and travelled to Jackson to cover the much-anticipated November 8 vote. Magnolia, the old, cozy diner where Dari and Malachi agreed to meet was just a stone's throw away from the State Capitol building, which had been the site of vehement protests by both anti-abortion and pro-choice groups. In fact, Dari could still hear the din of the protesters outside, dampened by the nestled calm of the restaurant's interior. It added to her anxiety.

When Malachi finally arrived at Magnolia, Dari didn't quite know what kind of reception she would get. The meeting was part interview and part reminiscence between longtime friends but, as he sat directly across from her on the other side of the table, the figurative implication of his seat did not escape her; they were positioned on completely opposite sides of a contentious social debate. As they exchanged pleasantries, Malachi noticed on, the table, a book Dari was reading just before he had arrived. It was *The Selfish Gene* by Richard Dawkins.

"You've brought out the ammunition already?" Malachi jabbed, smirking while pretending to inspect the book cover.

"Oh, just bullets for my gene gun," Dari retorted. "Careful now, you don't want to be seen by your fellow evangelicals with this sort literature in your hands… that would be heresy!" They both chuckled.

"Ah yes, as Mr. Dawkins would have it, we are nothing more than gene machines, lumbering robots under the control of our DNA," Malachi stated. "Doesn't that sound a bit too sci-fi?"

"What Dawkins does is take Darwinian evolution to a *molecular scale*," Dari remarked. "Using Darwinian principles such as natural selection, he defines being human and indeed life itself as a product of molecular evolution. More than the emergence of complex organisms from pre-existing simpler ones, Dawkins brings into sharp focus the evolution of living systems from complex molecular entities, or *replicators*. Natural selection not only acts on the individual, the group or the species; it has its greatest agency at the level of DNA."

Design Activity

The earliest ancestral replicators emerged out of the primeval soup (*The Selfish Gene*, Chap. 2, "Revealing the Origins of Life" video). Imagine that pool to be a molecule-eat-molecule world for these prototypical molecules. The class will be divided into small groups and will perform the following activities.

1. Each group will act as a design team for a prototype replicator. Based on the assigned reading, notably TSG Chap. 2, the design team will develop an original complex molecule capable of surviving and succeeding in the primeval soup.
2. Each design team will present its replicator to the class, on a whiteboard drawing using basic shapes and colors to indicate component parts (you cannot mimic DNA).
3. Describe the properties of the prototype that will aid its survival. This will be an oral presentation by members of the group. Properties should be consistent with physical laws (i.e., no "super molecules" that can fly and shoot lasers!).
4. The audience will provide a critique of each replicator design via Q&A.
5. Here are a few properties to consider:
    a. It should be made of component units (use shapes: circles, squares, etc.)
    b. How does it "grow"?
    c. How does it replicate?
    d. Does it contain any protective features?

Part II: Back at the restaurant…

Although she was there primarily to interview him, Dari couldn't help but notice how the concept of molecular evolution stoked Malachi's provocative interest. He pressed further with his questions.

"If we reduced ourselves to nothing more than survival vehicles for our DNA, then these selfish genes must therefore serve as our moral compasses, dictating our behavior on matters of right and wrong," Malachi opined. "Once we've become gene machines, DNA zombies or whatever you want to call it, we lose our souls, we lose our reason for being, which ultimately leads to a devaluation human life itself! This is exactly the type of dangerous precedent that Amendment 26 is against, which is why I support the movement to redefine personhood constitutionally. We are already too far down a slippery slope."

"You've gotten it completely wrong," Dari rebutted. "In his book, Dawkins never advocates for a morality based on the selfishness of genes. Rather, he explains that one of the great triumphs of natural selection is the evolution of the human brain. By building a sophisticated brain with a capacity for self-awareness that uncouples behavior from direct genetic imperatives, genes, in effect, have handed over the executive control of the survival machine to the brain. Genes built the ultimate CEO in the form of the human brain, but make no mistake… they are the Board of Trustees!" She paused, but only to aim again at her friend's arguments. "Speaking of dangerous precedents, human life amendments are based on a fundamentally flawed premise that life begins at conception, a premise that is completely at odds with overwhelming scientific and medical evidence that demonstrate otherwise. Do you even know that nearly half of the fertilized eggs post-conception fail to implant successfully in the uterus and are aborted by the body? Under Amendment 26, how are you going to protect these newly defined persons?"

"But…" Malachi didn't have a chance.

Debate Activity

Imagine continuing this conversation between Dari and Malachi. Each student must develop teleological arguments that support *both for and against* Dawkins' gene-centric view of human nature and existential purpose.

Post-Case Study Assignment

Each student will submit a single page type-written opinion article on defining what it means to be human based on the case study topic. The article will contain three paragraphs and must not exceed one page (single-spaced).

- In the first paragraph, describe Dawkins' gene-centered view of being human
- In the second paragraph, describe a non gene-centric way of defining humanness.
- For the final paragraph, describe to which view you subscribe and why.