Philosophy of Biology
Phil 147
Winter 2022

Directions and Questions for the Final Exam

Bring ***two*** bluebooks available in the university bookstore with ***nothing*** written in or on them (not even your name). These may be redistributed at the time of the exam.

The exam will consist of the two parts, for which the instructions are as follows:

Part A. Answer each of the following six questions in two to three sentences each (do not go on at length—you will *not* receive extra credit for going beyond a basic answer). Each question is worth up to 5 points (30 points total).

The actual questions will be drawn from those listed below:

1. Why was Darwin's gemmule theory of inheritance a problem for his account of evolution by natural selection?
2. What was Mendel's objective in carrying out breeding experiments?
3. How did Mendel arrive at what he called *factors*?
4. How did de Vries appeal to Mendel's factors to advance an alternative to natural selection?
5. What was the central disagreement in the Biometrician-Mendelian conflict?
6. What is eugenics?
7. How did Fisher provide a solution to the problem of blending inheritance that had confronted Darwin?
8. What were the major differences in the ways Wright and Fisher characterized the populations in which evolution occurs?
9. What is meant by "genetic drift"?
10. What do prokaryotes do that presents a challenge to the metaphor of a tree of life?
11. What is meant, in discussions of evolution, by calling a trait an adaptation?
12. How, according to Gould and Lewontin, does a developmental constraint affect evolution?
13. Is it possible, on the species as natural kinds view, for a new Dodo Bird (assuming Dodo Birds are extinct) to appear?
14. What does it mean to claim that species are individuals?
15. Why, for Dawkins and others, is the gene the fundamental unit in terms of which to analyze evolution?
16. How might the group an individual is a member of affect its evolutionary fate?
17. In what sense is sweating a homeostatic process?
18. What does negative feedback involve?
19. What do Rosenblueth et al. think is required for a system to be goal directed?
20. What is meant in calling a system "autopoietic"?
21. In what ways is an autonomous system open to its environment?
22. What does it mean to call a system "far from equilibrium"?
23. What does Kauffman mean by "Constraint begets work begets constraint"?
24. In what respect does explaining something in terms of the goal to be achieved seem to

involve backwards causation?
25. Why are attributions of purposes to human actions easier to understand than attributions of purpose or function to biological traits more generally?
26. What account does a causal-role theory offer of the function of heartbeats in vertebrates?
27. How does the aetiological account argue against treating heart noises as functions of the heart?
28. What is meant by closure of efficient causation?
29. What are two requirements for one mechanism to control another?
30. What are the basic features of a hierarchical mode of organization?

Part B. Address the following question in an essay (70 points).

On the actual exam, I will pick two of the following questions for you to write on:

1. Construct a debate between a Biometrician (e.g., Galton) and a Mendelian (e.g., de Vries or Bateson) about how evolution works. Make clear how each would propose to account for evolution and how their views differ. What sorts of evidence would each appeal to in defending their own account and what objections might each advance towards the other? Given the evidence that was available around 1910, which approach to you think was the better one for biologists to adopt?

2. Explain how Fisher proposed to synthesize Darwinism and Mendelism. Make clear why these approaches were thought to be competitors and how Fisher construed them as compatible. How do you suppose Darwin would have responded to the Fisher's account? Are there ways he would have seen Fisher as improving on his own account of evolution? Are there important features of Darwin's view of evolution that are not adequately incorporated into Fisher's account?

3. What do Gould and Lewontin mean by the "adaptationist programme" and what is their critique of it. What are some of the other approaches to understanding the evolution of species that they and others think ought to be considered but are neglected by standard version of evolutionary theory advanced by the synthesis? How might an adaptationist respond to Gould and Lewontin?

4. Does the notion of negative feedback contribute to an understanding of teleology? Does it suffice to understand teleology? Be sure to make clear what you take teleology to involve and what negative feedback is. If you think it is sufficient, consider what a critic might say and how you would answer them. If you don't think it is sufficient, make clear what more you think is involved in teleology that negative feedback doesn't provide.

5. What is required for a living organism to maintain itself far from equilibrium? Is autopoiesis critical to the analysis? If so, explain what it involves. Does free energy play a role in the account? If so, explain why consideration of free energy is important. Is self-repair important? If so, explain why and how it works? Is some version of closed organization important? If so, explain what that involves.

6. Suppose someone asserts that the function of kidneys is to remove excess fluid and waste products from the body. Present, from the different views we discussed, at least two different

interpretations of that statement. What sort of evidence would be required to show that that is the function of the kidneys on each view? Defend a view as to which view of function is more useful in guiding research on kidneys, or argue that biologists should abandon talking of organs like kidneys as having a function.