Philosophy of Biology
Phil 147
Fall, 2007

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 three 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. What is Mendel's law of independent assortment?
2. What did Mendel mean by dominance?
3. What was known about chromosomes before they were linked with Mendel's factors (genes)?
4. How was crossover used by the Morgan school to map the location of genes on chromosomes?
5. What does the Hardy-Weinberg equilibrium describe?
6. How did R.A. Fisher go about relating Mendelian factors to the continuous variation in traits emphasized by the Biometricians?
7. How did the assumption of a gene pool figure in Fisher's treatment of evolution in terms of population genetics?
8. What is meant by epistatis and why did it pose a challenge for Fisher's approach?
9. In what respects is Fisher's treatment of population genetics similar to theories of the behavior of gases?
10. What was the primary difference in focus between S. Wright and Fisher?
11. What does S. Wright use adaptive landscape maps to represent?
12. What is meant by "genetic drift"?
13. What did Dobzhansky mean by isolating mechanisms?
14. What makes a category a natural kind?
15. Why do Hull and Ghiselin think treating species as natural kinds presents a problem for evolutionary theory?
16. What is meant by the expression *species as individuals*?
17. What is the morphological species concept?
18. What does it mean to be a pluralist about species?
19. What is negative feedback?
20. What does it mean to call something an adaptation?
21. In what respect does Aristotle's account of function seem to involve backwards causation?

22. How does L. Wright invoke the notion of adaptation in explaining how a trait has a function?
23. What, according to Cummins, is the relation between a function and a disposition?
24. What is Cummins' analytic strategy for explaining function?
25. What is meant by calling an adaptationist explanation a "just-so" story?
26. What are some (state at least two) of the factors, besides genes, that advocates of developmental systems theory identify as being inherited by organisms?
27. What does it mean for a niche to be constructed?
28. What is the primary difference between developmental systems theory and Evo-Devo with regard to the role of genes?
29. Why was DNA long assumed not to be the genetic material?
30. Why are bridge principles needed in accounts of theory reduction?

Part B. Address the following question in an essay (35 points).

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

1. Mendel set out to provide an explanation of hybridization. Describe the explanation he developed and discuss the nature of the evidence he offered for it. Was he able to directly observe the factors he proposed? If not, what sort of argument does he offer for such factors really existing?

2. What made de Vries, Bateson, and others construe Mendel as providing an alternative to Darwin's account of the origin of species? What alternative account of the origin of species did they offer? Why, especially for a plant or animal breeder, would this non-Darwinian alternative seem plausible? Why would it seem to them more promising than the approach of the biometricians (be specific about what in particular about the biometrician's approach made it seem lacking in promise as an account of new species)?

3. What is meant by the evolutionary synthesis? What was synthesized and why did it have to be synthesized? What role did population genetics play in producing the synthetic account of evolution? 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?

4. Fisher and Wright developed conflicting models of gene change during evolution. In large part this conflict was based on the fact that Fisher and Wright began with different assumptions. Explain what assumptions both Wright and Fisher began with and how these assumptions influenced their respective models (and in doing so be sure to explain each of their models). Whose model do you think provides a more realistic account of evolution? Explain why.

Part C. Address the following question in an essay (35 points).

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

1. What does it mean to try to naturalize teleology? What would be a non-naturalized account? Appealing to negative feedback and natural selection have provided the basis for two prominent naturalizing strategies. Explain how each of these strategies works and the respects in which it is intended to be naturalistic. Evaluate each with respect to whether it succeeds in providing a naturalized account of teleology. Which strategy is more successful? Explain why.

2. How does Cummins' propose to explain biological functions? Clarify your account with an example. How does his account of function relate to strategies of mechanistic explanation in biology? How does his approach to explaining functions compare or contrast with the etiological account of functions defended by Wright? Do they explain the same thing about biological functions?

3. What is the main critique advocates of developmental systems theory make of population genetic style accounts of evolution? What is their alternative proposal? Explain in particular what is meant by the parity thesis and how accepting it might alter the way one approaches evolutionary processes. Does focusing on developmental systems offer a valuable new perspective or does is it offer a distraction for those trying to understand evolution?

4. What are some of the main differences between the way in which genes were conceived by Mendel and Morgan and the way they are understood in contemporary molecular biology? Why is this thought to generate a problem for reducing classical Mendelian genetics to molecular genetics? How might molecular genetics be related to Mendelian genetics without requiring an identification of Mendelian genes with molecular genes or deriving classical Mendelian genetics from molecular genetics?