

Philosophical Issues in Evolution

PHIL10106

2017-18

Course Organiser: Dr. Alistair Isaac (a.m.c.isaac@ed.ac.uk)
Office Location: Dugald Stewart Building, Room 6.08
Office Hour: Tuesday, 10–11 am

Course Secretary: Ann-Marie Cowe (Annmarie.Cowe@ed.ac.uk)

Course Aims and Objectives

This course introduces key topics in the philosophy of biology, with a special focus on evolutionary theory. By the end of the course, the student should be able to:

- Articulate the basic structure of evolutionary explanation
- Discuss the distinguishing features of biological theorizing and explanation, including points of contrast with other areas of science, especially
 - The status of “laws” in biology
 - The question of whether biological explanations reduce to molecular explanations
 - Modeling as a distinctive form of scientific practice
- Articulate the primary philosophical questions behind key concepts in evolutionary theory, including
 - Units of selection
 - Species
 - Adaptation
 - Biological “function”

Readings

There is a textbook for the course, which is available online through the library website or in the HUB section of the main library:

Sterelny, Kim and Paul E. Griffiths (1999) *Sex and Death: An Introduction to Philosophy of Biology*, University of Chicago Press.

Format

There is a one hour lecture each week that will typically cover the reading from the textbook and relevant background material. Then, there will be a smaller discussion section, which will focus on the second reading for the week, typically a relevant journal article.

Seminar Content and Schedule

Week 1: Introduction / the “received view” of evolution

Our textbook introduces the basic perspective of evolutionary explanation. Discussion will delve further into these basics, as well as their classic initial statement by Darwin.

Class Readings

Sex & Death, Ch. 2.

Darwin, Charles (1859) *On the Origin of the Species*, 1st ed., Ch. 3: “Struggle for Existence”; Ch. 4: “Natural Selection,” (first part), pp. 60–87.

Further Reading

Darwin, Charles (1859) *On the Origin of the Species*, Chs. 1–2, remainder of Ch. 4.

Week 2: Dawkins’ “gene’s eye view”

We enrich our understanding of basic evolutionary structure through of the most influential interpretations of it, that it should be understood as a process acting on genes. Discussion will supplement this perspective with one of its most striking consequences: the “extended phenotype.”

Class Readings

Sex & Death, Ch. 3.

Dawkins, Richard (1982) *The Extended Phenotype*. Oxford UP. Chs. 11 & 12.

Week 3: Laws in Biology

Does biology have laws of the same sort as other areas of science (e.g. physics)? Some have argued that “laws” in biology are not properly laws in the sense we understand them from physics. An alternative perspective is that a single concept of law subsumes both physics and biology, but it looks very different from the traditional, physics-centric, understanding of natural law.

Class Readings

Rosenberg, Alex and Daniel W. McShea (2008) *Philosophy of Biology*. Routledge. Ch. 2: “Biological Laws and Theories.”

Mitchell, Sandra D. (2000) "Dimensions of Scientific Law," *Philosophy of Science* 67(2): 242–265.

Week 4: Reduction

Does classical genetics reduce to molecular genetics? More generally, do biological explanations reduce to a privileged lowest level of description?

Class Readings

Sex & Death, Ch. 6.

Kitcher, Philip (1984) "1953 and all That: A Tale of Two Sciences," *The Philosophical Review* 93(3): 335–373.

Further Reading

Sex & Death, Ch. 7.

Hull, David L. (1972) "Reduction in Genetics—Biology or Philosophy?" *Philosophy of Science* 39(4): 491–499.

Schaffner, K. (1969) "The Watson-Crick Model and Reductionism," *British Journal for the Philosophy of Science* 20: 325–348.

Wimsatt, William C. (1994) "The Ontology of Complex Systems: Levels of Organization, Perspectives, and Causal Thickets," in *Biology and Society: Reflections on Methodology*, ed. M. Matthen and R. X. Ware, University of Calgary Press. pp. 207–274.

Week 5: Models and Modeling

One alternative to the view that science explains by formulating universal laws is that science proceeds by building models of the systems it tries to understand. The model-based view of science has proved especially helpful in understanding biological theorizing. A problem with this view, however, is that models are typically "false," misrepresenting their target systems in known ways. How can a "false" model provide us with a true scientific explanation? A second problem is the question of detail: do more detailed models always provide better explanations, or are similar models more explanatory in some circumstances?

Class Readings

Weisberg, Michael (2007) "Who is a Modeler?" *British Journal for the Philosophy of Science* 58: 207–233.

Potochnik, Angela (2010) “Explanatory Independence and Epistemic Interdependence: A Case Study of the Optimality Approach” *British Journal for the Philosophy of Science* 61: 213–233.

Further Reading

Godfrey-Smith, Peter (2006) “The Strategy of Model-Based Science,” *Biology and Philosophy* 21: 725–740.

Levins, Richard (1966) “The Strategy of Model Building in Population Biology,” in *Conceptual Issues in Evolutionary Biology*, ed. E. Sober, MIT Press. pp. 18–27.

Wimsatt, William C. “False Models as Means to Truer Theories,” in *Neutral Models in Biology*, ed. Nitecki and Hoffman, Oxford UP.

Potochnik, Angela (2007) “Optimality Modeling and Explanatory Generality,” *Philosophy of Science* 74: 680–691.

Week 6: Units of Selection: Groups and Altruism

Evolutionary explanations require natural selection to exert pressure on a differential population. What, however, are the targets of this pressure, the units on which selection operates? Are they genes, individuals, species? One controversial idea is that groups may serve as the targets of selective pressure. A key issue in this debate is the question of altruism, and whether units of selection must always act “selfishly” (as Dawkins maintained), or whether they may altruistically sacrifice themselves for another.

Class Readings

Sex & Death, Ch. 8.

Wilson, David S. and Elliott Sober (1994) “Reintroducing Group Selection to the Human Behavioral Sciences,” *Behavioral and Brain Sciences* 17: 585–654.

Further Reading

In addition to the Wilson and Sober target article, read the peer commentary that follows as well as their response.

Week 7: Species and Systematics

Which concepts and categories are appropriate for biology *as a science*? A group concept that appears important is that of the “species,” yet it is notoriously difficult to define species in a scientifically rigorous manner.

Class Readings

Sex & Death, Ch. 9.

Velasco, Joel D. (2012) "The Future of Systematics: Tree Thinking without the Tree," *Philosophy of Science* 79: 624–636.

Week 8: Case Study: *Race*

A particularly contentious candidate for a scientifically sound set of categories are racial categories as employed in everyday folk discourse. Are races "biologically real," or are they mere social constructs?

Class Readings

Dupré, John (2008) "What Genes Are, and Why There Are No 'Genes For Race,'" in *Revisiting Race in a Genomic Age*, eds. Koenig, Lee, and Richardson, Rutgers UP.

Spencer, Quayshawn (2014) "A Radical Solution to the Race Problem," *Philosophy of Science* 81: 1025–1038.

Further Reading

Andreasen, Robin O. (2000) "Race: Biological Reality or Social Construct?" *Philosophy of Science* 67 (supplement): 653–666

Appiah, Kwame Anthony (2006) "How to Decide If Races Exist," *Proceedings of the Aristotelian Society* 106: 365–382.

Kaplan, Jonathan Michael and Rasmus Grønfeldt Winther (2013) "Prisoners of Abstraction? The Theory and Measure of Genetic Variation, and the Very Concept of 'Race,'" *Biological Theory* 7: 401–412.

Spencer, Quayshawn (2013) "Biological Theory and the Metaphysics of Race: A Reply to Kaplan and Winther," *Biological Theory* 8: 114–120.

Week 9: Adaptationism 1

Evolutionary explanations often appeal to a notion of adaptation: parts of the organism appear to function optimally within its environment. But are these notions, "adaptation," "function," "optimal" scientifically legitimate? Might some evolutionary change (and thus correct evolutionary explanation) proceed without "adaptation" at all in the strict sense? This week we survey key issues in this debate, with a focus on the question of teleology and how to define a scientifically legitimate notion of "function."

Class Readings

Sex & Death, Ch. 10.

Millikan, Ruth Garrett (1989) "In Defense of Proper Functions," *Philosophy of Science* 56(2): 288–302.

Week 10: Adaptationism 2

We continue to examine this classic debate by looking at one of the most influential arguments against adaptationism and contrasting it with a defense of the adaptationist program that draws broader connections between issues in evolutionary theory and those in cognitive science and philosophy of mind.

Class Readings

Gould, S. J. and R. C. Lewontin (1978) "The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme," *Proceedings of the Royal Society of London B* 205: 581–598.

Dennett, Daniel C. (1983) "Intentional Systems in Cognitive Ethology: The 'Panglossian Paradigm' Defended," *Behavioral and Brain Sciences* 6: 343–390.

Further Reading

In addition to the Dennett target article, read the peer commentary that follows as well as his response.

Godfrey-Smith, Peter (2001) "Three Kinds of Adaptationism," in *Adaptationism and Optimality*, ed. Orzack and Sober, Cambridge UP. pp. 335–357.

Week 11: The Evolution of Culture

A topic that ties together several themes discussed throughout the semester is that of cultural evolution. Should we understand cultures as evolving on an analogy with genetic evolution? Does cultural evolution play an explanatory role in distinctively biological aspects of human life?

Class Reading

Sterelny, Kim (2006) "The Evolution and Evolvability of Culture," *Mind & Language* 21(2): 137–165.

Further Reading

Dennett, Daniel (2001) "The Evolution of Culture," *The Monist* 84(3): 305–24