

# Evolution: The Darwinian Revolutions

BIOEE 2070 / HIST 2870 / STS 2871

## Essay Assignment #1

In his most famous book, *On the Origin of Species* (originally published in 1859), Charles Darwin proposed a theory of evolution by natural selection, which he used to explain the origin of new species from previously existing ones and the subsequent increase in the diversity of life on Earth (which he called “descent with modification”), along with an explanation of the origin of adaptations (which he called “natural selection”). While these two topics are related, they attempt to answer two separate questions: where do new species come from, and how do adaptations come to be?

Adaptations appear to exist for a purpose. For example, it makes sense to most people (including most biologists) to say that “birds have wings *in order to* fly” and “mammals have fur *in order to* keep warm.” Prior to the *Origin of Species* such adaptations were assumed to be the result of intelligent design by a supernatural creator (i.e. God). Perhaps the most revolutionary (and disturbing) aspect of Darwin’s theory was that he proposed a mechanism by which adaptations can arise by purely natural means, without any input from a supernatural designer, thereby rendering such supernatural designers unnecessary.

### Your Essay Question:

In an essay of between four and eight pages, you must critically evaluate the arguments and evidence for evolution by descent and for natural selection in the first four chapters of the *Origin of Species*. As you do so, please try to answer the following questions:

- Critically evaluate the evidence (if any) that Darwin presents to convince you that descent with modification and natural selection have happened. Does he succeed in convincing you that they have? Why or why not, and upon what evidence do you base this conclusion?
- Is it the case that acceptance or rejection of *one* of these proposed processes *necessarily* validates or invalidates the other? Why or why not, and upon what evidence do you base this conclusion?
- What is the “problem of purpose” in the natural sciences, and how does Darwin's theory of natural selection solve this problem? Does Darwin directly address the “problem of purpose” in the first four chapters of the *Origin of Species*? Why or why not?
- It has been argued that Darwin’s theory of natural selection transformed the art of natural history into the science of biology. Do you agree, and why or why not?
- Overall, how important is natural selection to Darwin’s theory of evolution?

**NOTE:** You do *not* have to agree with Darwin, but you *must* explain his arguments as specified here.

### Hints:

“Critically evaluate” means subjecting the arguments and evidence to careful analysis. A critical evaluation does not necessarily mean “negative” evaluation and might lead to the conclusion that the arguments and evidence are accurate, inaccurate, or some mix thereof.

Support your arguments primarily with evidence from the *Origin of Species* itself. Citation of page numbers (e.g. *Origin*, pg. 347) is sufficient.

Supply references for all material taken from elsewhere. Plagiarism has very serious consequences, so be sure to cite any ideas and references that are not your own. Use of the Internet is fine, but all necessary URL's must be documented. References to material presented in lecture can be cited by reference to lecture date.

Divide your paper into sections, corresponding to the questions listed above.

Keep sentences, paragraphs, and technical jargon to reasonable lengths.

Write clearly and concisely – excess verbiage and needless digressions will be penalized.

We strongly encourage the use of word processor spelling and grammar checkers.

**DATE DUE: Monday 9 July 2012 at the start of class.**