

Lecture #17 Tuesday April 6, 2010: Evolution and SF

The theme of our class: Science is *not* mythology. But it often is used *as if it were* mythology. No greater example than evolution. Evolution (natural selection) is a *firmly established, fundamental phenomenon*. It has also become a powerful and provocative metaphor and myth.

Two distinct (and broadly incorrect) metaphors from evolution: Perpetual progress: organisms “always evolve to state of higher complexity” (WRONG)

Success in competition as inherent moral stamp-of-approval, e.g., “Social Darwinism”

Examples of evolution in SF: The Eloi and the Morlocks in Wells’ *The Time Machine*: economic pressures leads to two distinct species.

Two facets:

1. Evidence for *common origin* and *change through time* (or *descent with modification*) of species <http://www.talkorigins.org/faqs/comdesc/> (Otherwise, each species had to arise or be created independently <http://www.trueorigin.org/theobald1a.asp>)
2. The *mechanism* for change through time is *natural selection*.

Phylogeny = origin of a type of organism (e.g, a species, genus, family, etc.) (Greek, *phylon* = tribe, *genesis* = birth)

Evidence for common phylogeny:

1. Fossil record
2. Shared anatomical structures (anatomical parahomology)
3. Shared molecular structures (molecular parahomology)

The fossil record provides enormous evidence for evolution of species as well as descent from common ancestors. The fossil record provides a remarkably complete picture. New “missing links” are found all the time.

parahomology: similar structures but different functions

Anatomical parahomology: similar structures in anatomy in related species

Molecular parahomology: similar molecular structures (genes, enzymes, etc.)

We deduce “family trees” consistent from three different pieces of evidence:

1. Fossil record
2. Anatomical similarities (parahomology)
3. Molecular similarities

What causes the change over time? Natural selection.

Evolution in a nutshell

Darwin’s theory of natural selection (*Origin of the Species*, 1859)

1. The Malthusian principle: all organisms can eventually produce more offspring than the environment can support.

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2. Not all offspring are equal: variation in inherited traits

= competition for resources, or “*Survival of the most reproductively fit*”

“May the most successful inherited traits win!”

Evidence for evolution:

New species *have been observed occurring*, usually in fast-reproducing, geographically isolated organisms (mice on islands, fish in isolated lakes)

see <http://www.talkorigins.org/faqs/speciation.html>

The vehicle for inherited traits is the genetic code. Therefore, we expect fingerprints of evolution in genomes. We predict a correlation between detailed morphological relationships and genetic relationships (that is, anatomical and molecular parahomology should be correlated), which we find!

Summary: natural selection (evolution) is not “just-a-theory” (a wacky hypothesis without evidence). It is a “theory-with-lots-and-lots-and-lots-of-evidence”

Evolution and science fiction

Three broad categories of evolution subtext in SF:

* “Just-so” stories about alien biology and evolution

* Teleological stories about future human evolution: implicitly assumes all organism naturally evolve to “higher” state (which is false):

Arthur C. Clarke’s *Childhood’s End*

Greg Bear’s *Darwin’s Radio*

* Parables about the blind nature of evolution:

C. M. Kornbluth’s short story “The Marching Morons.” (1957) An accident puts realtor John Barlow into a state of suspended animation (much like in Woody Allen’s *Sleeper*). He wakes in the far future and finds the average human IQ is 45.

Pseudo-evolutionary explanation in the story: more intelligent and educated people have smaller families. Therefore, lower intelligence and education is a reproductive *advantage*.

Important: Next time we will form small groups and discuss thesis statements.

Come prepared with 5-7 copies of your thesis statement. Note that participation in small groups is 1/3 of your grade of your class paper.

To discuss in your small groups about your theses:

Is it a thesis (and not a topic)? Does it have a point to persuade?

Is the thesis relevant to the class?

Analysis of narratives *about* science, technology, and/or scientists.