

The Notion of Progress in Evolution

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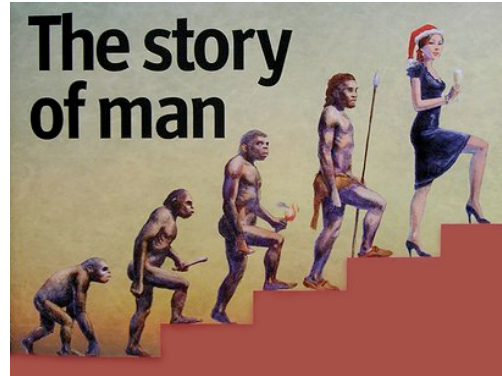
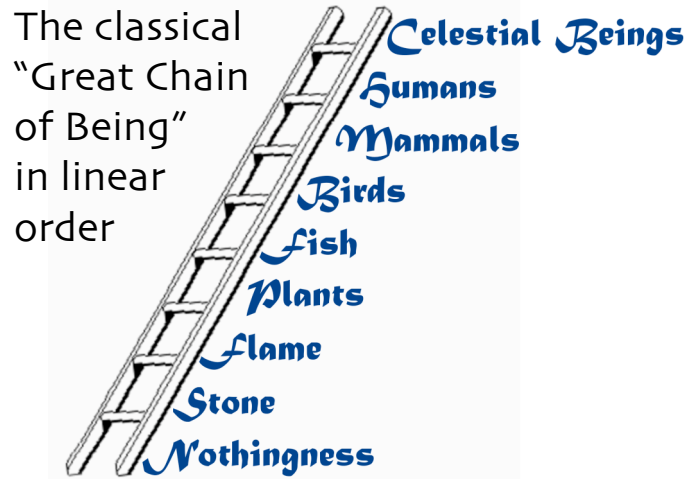
What is *progress* in evolution?

Accumulating features that confer higher reproductive success upon a population (and hence upon a lineage).

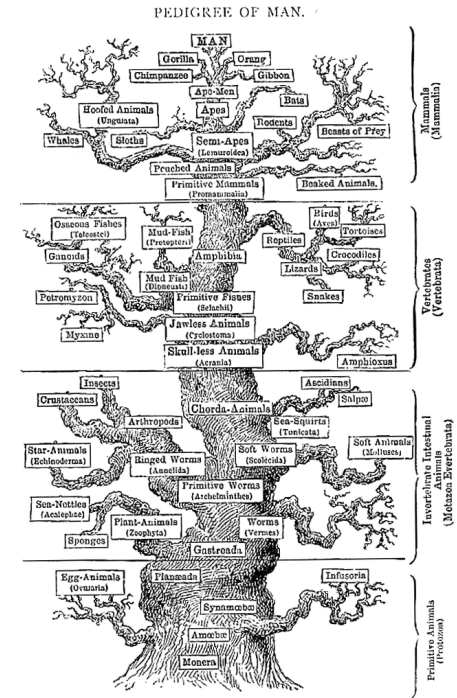
Further Reading

- Dawkins, R. 2004. *The Ancestor's Tale: A Pilgrimage to the Dawn of Evolution*. Houghton Mifflin Company, New York, NY, 673 pp.
A tour through evolutionary time and the processes that shape life.
- Dennett, D. G. 1995. *Darwin's Dangerous Idea: Evolution and the Meanings in Life*. Simon and Schuster, New York, NY, 586 pp.
Shows how natural selection is important beyond just evolutionary biology.
- Futuyma, D. J. 2005. *Evolution*. Sinauer and Associates, Sunderland, MA, 603 pp.
Introductory college undergraduate textbook.
- Mayr, E. 2001. *What Evolution Is*. Basic Books, New York, NY, 318 pp.
Masterful and accessible summary of the field of evolutionary biology.
- Zimmer, C. 2001. *Evolution: The Triumph of an Idea*. HarperCollins, New York, NY, 364 pp.
Based on the PBS television series, traces the ideas and development of modern evolutionary biology.

What evolutionary progress is *not*



A predictable series of stages, culminating in the author's idea of perfection

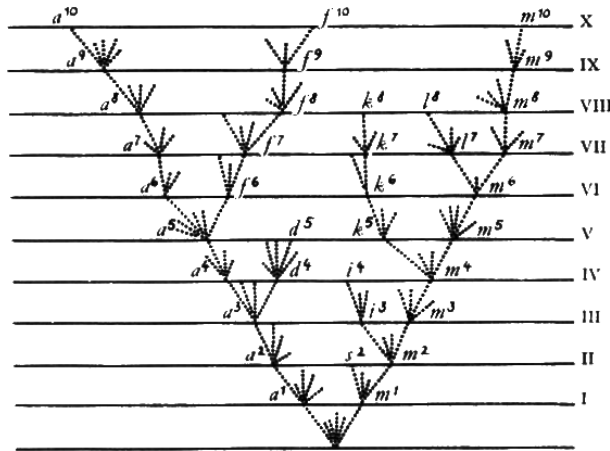


A linear mainline of evolution, man at the apex, and lesser groups occupying "side branches"

Does natural selection generate increased complexity, size, or intelligence? *No, except in taxa whose way of life benefits from those particular features.*

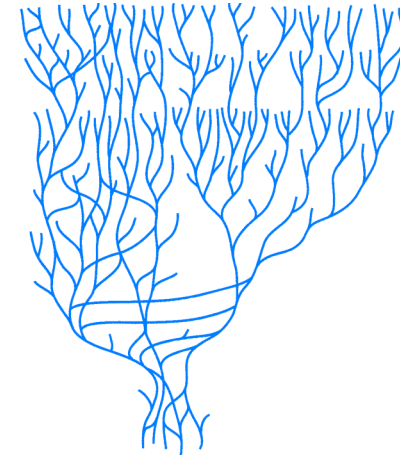
Is natural selection directed? *No, the result of natural selection is a response to the environment's selective regime.*

What evolutionary progress is



Darwin's original concept of evolutionary change: *descent with modification*.
Lineages speciate through time, and most lineages go extinct.

Time ↑



A modern concept of evolutionary change showing some lateral gene transfer between lineages and mass extinction events

The course of evolution is a ramifying shrub, not a linear series of changes. Most lineages go extinct – most species that have ever existed are extinct. *Progress* in evolution is an accumulating number of features that confer higher reproductive success upon a population (and hence upon a lineage). Each lineage, each environment, *brings its own definition* of progress.

Examples of evolutionary progress in the Crustacea

Loss of eyes in deep-sea
and cave fauna.

Loss of numerous organs and
body parts in parasites.

“Arms races” in strength
between crab claws and
mollusc prey.

“Carcinization” (reduction
and folding of the abdomen)
resulting in a crab-like form.