The Notion of Progress in Evolution

N. Dean Pentcheff and Regina Wetzer, Natural History Museum of Los Angeles County
dean@crustacea.nhm.org  rwetzer@crustacea.nhm.org

What is progress in evolution?
Accumulating features that confer higher reproductive success upon a population (and hence upon a lineage).

Further Reading
A tour through evolutionary time and the processes that shape life.
Shows how natural selection is important beyond just evolutionary biology.
Introductory college undergraduate textbook.
Masterful and accessible summary of the field of evolutionary biology.
Based on the PBS television series, traces the ideas and development of modern evolutionary biology.
What evolutionary progress is not

The classical “Great Chain of Being” in linear order

Celestial Beings
Humans
Mammals
Birds
Fish
Plants
Flame
Stone
Nothingness

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

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.

A linear mainline of evolution, man at the apex, and lesser groups occupying “side branches”
What evolutionary progress is

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.