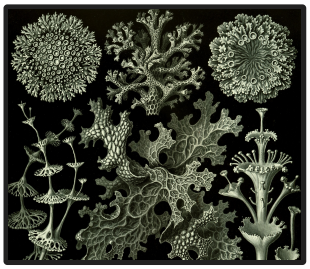
Evolution

explaining life



George Matthews, Plymouth State University

2020

?

- *Explaining is a form of storytelling, but what is the difference between scientific and other forms of storytelling?*
- *Why should we take scientific stories more seriously than other modes of storytelling?*

Scientific Explanation

To explain something scientifically is to give an account of its CAUSES, in a way that shows WHY it happened and that enables the PREDICTION of what will happen in similar cases.

The best explanations are...

- **Testable**: they might turn out to be wrong.
- **Fruitful**: they lead to surprising but true predictions.
- **Broad in scope**: they account for many phenomena.
- **Simple**: they avoid too many assumptions.
- **Conservative**: they do not conflict with established truths.

Assumptions before Darwin

- Living things are not just made of matter -- they also have a "vital spark," that distinguishes them from inanimate things.
- Species do not go extinct or change over time.
- The Biblical story of creation of the earth and all organisms is basically true.
- The earth is a few thousand years old.
- Large scale geological features of the earth like mountain ranges, continents, rivers and oceans have not changed very much since they were formed.

Paley's Watch

William Paley
1743-1805

If you found a watch on the beach you'd be right to think it was not a product of chance but of design.

The organisms we "find" in nature are even more complex than a watch.

Thus all living organisms must have been designed and not be a result of the blind forces of nature operating at random.

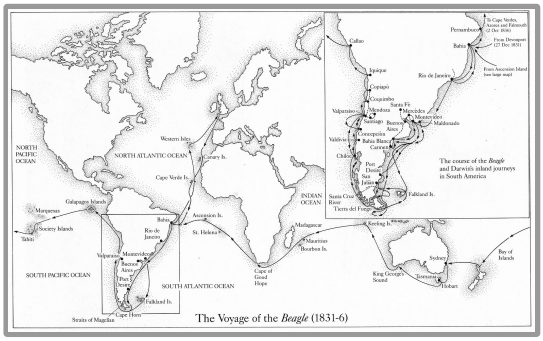
Paley thought that the **best explanation** for the variety and adaptations of living organisms was that they had been designed by God, but he also considered this argument a proof that God does in fact exist.

The Facts of Life

A scientific account of life on earth has to explain:

- The difference between living and non-living things.
- The huge variety of living organisms.
- Their adaptations to their environments.
- The patterns of their distribution around the globe.
- The ways they can be grouped -- by common forms, habitats, ways of living, etc.
- The patterns among their fossil remains.

Darwin's Voyage



The Voyage of the *Beagle* (1831-6)

Darwin's Big Idea

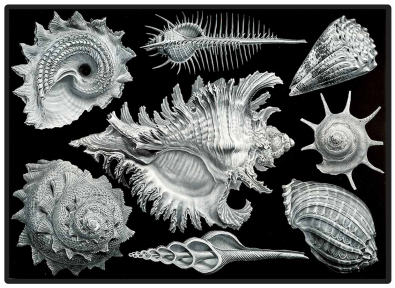
Evolution by natural selection

If you start out with a population of living organisms,

- and their offspring have a natural source of **variation** ...
- and they **compete** for food, safety and mates...
- and their variability is **inherited** by *their* offspring,

Over time they will diversify, giving rise to new species.

Given enough time this can account for enormous variety and adaptations of life on Earth.



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