

# On the Tendency of Species to Form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection

Charles Darwin and Alfred Wallace

Presented by Courtney O'Rourke

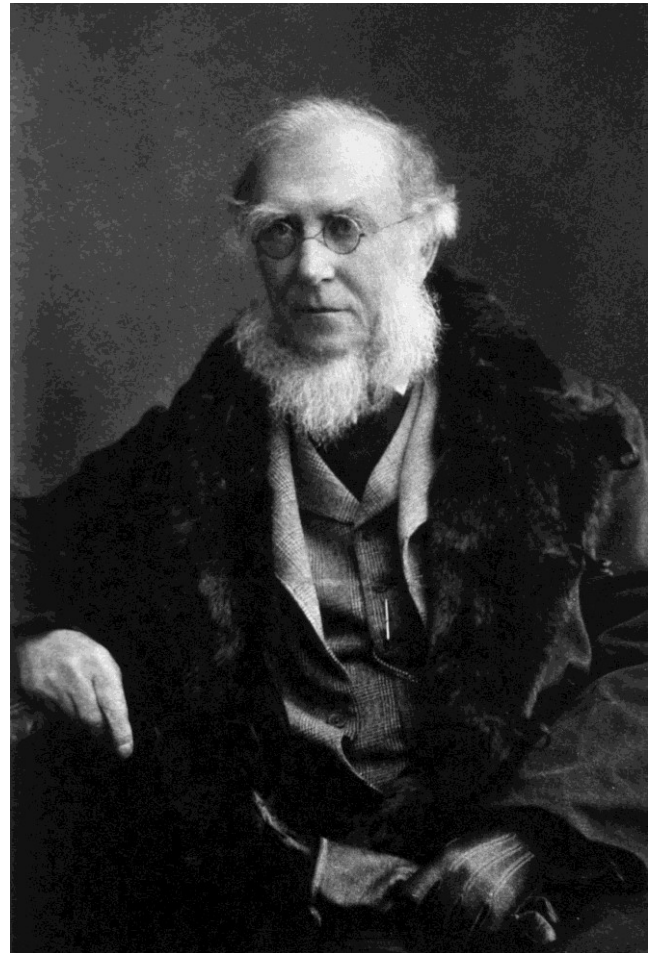
# Lamarck



# Charles Lyell



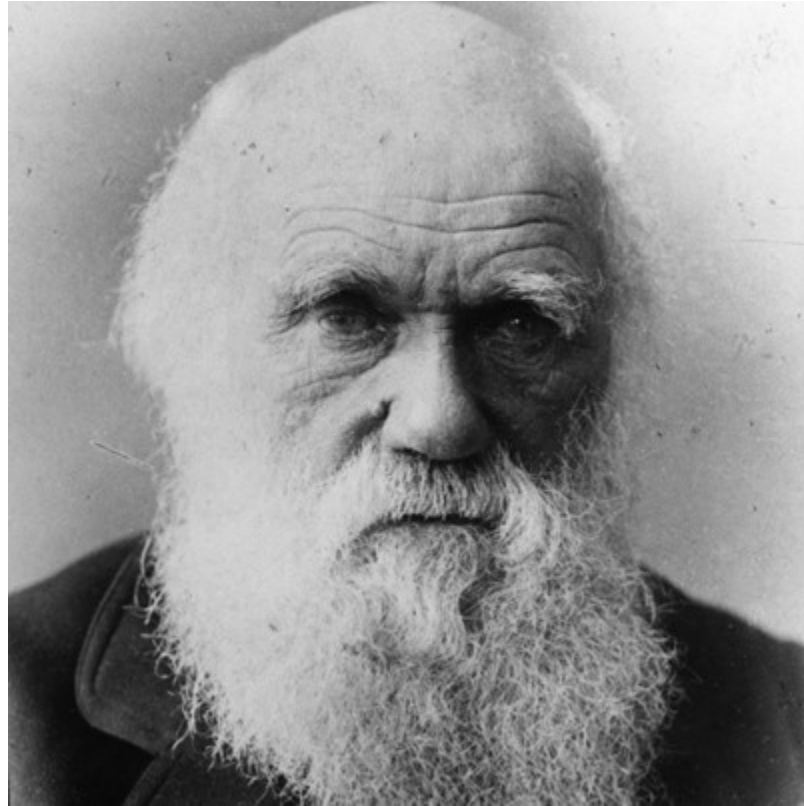
# Asa Grey and Joseph Hooker



# Alfred Wallace



# Charles Darwin



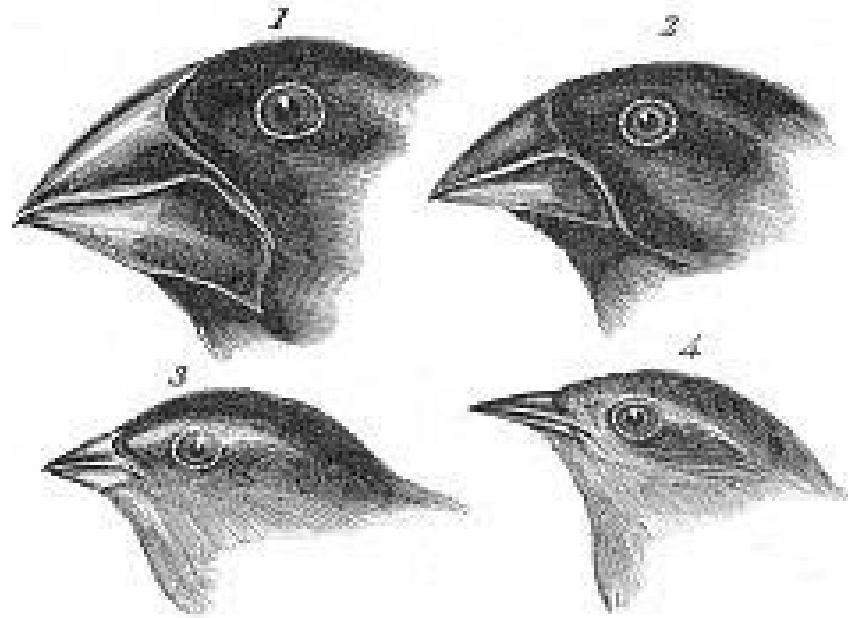
Extract from an unpublished work  
on species by Darwin

# Eloquent Writing Style

- “Nature may be compared to a surface on which rest ten thousand sharp wedges touching each other and driven inwards by incessant blows.”
- “... for organic beings always *seem* to branch and sub-branch like the limbs of a tree from a common trunk, the flourishing and diverging twigs destroying the less vigorous—the dead and lost branches rudely representing extinct genera and families.”



# Observation as a Research Technique



1. *Geospiza magnirostris*  
3. *Geospiza parvula*

2. *Geospiza fortis*  
4. *Certhidea olivacea*

Finches from Galapagos Archipelago

What mechanism drives the selection of survival?

- “Now, can it be doubted, from the struggle each individual has to obtain subsistence, that any minute variation in structure, habits, or instincts, adapting that individual better to the new conditions, would tell upon its vigour and health? In the struggle it would have a better *chance* of surviving; and those of its offspring which inherited the variation, be it ever so slight, would also have a better *chance*.”

# Letter to Asa Grey from Charles Darwin

What is the origin of new  
species?

# Principle of Divergence leads to Origin of New Species

- “Each new variety or species, when formed, will generally take the place of, and thus exterminate its less well-fitted parent. This I believe to be the origin of the classification and affinities of organic beings at all times...”

# Darwin's Thoughts

- “This sketch is *most* imperfect; but in so short a space I cannot make it better. Your imagination must fill up very wide blanks.”

*On The Tendency of Varieties to  
Depart Indefinitely from the Original  
Type* by Alfred Wallace



How to explain the consistent numbers of individuals within a species?

- “... there is a general principle in nature which will cause many *varieties* to survive the parent species, and to give rise to successive variations departing further and further from the original type, and which also produces, in domesticated animals, the tendency of varieties to return to the parent form”

# Distinguishes Himself from Lamarck

- “Neither did the giraffe acquire its long neck by desiring to reach the foliage of the more lofty shrubs, and constantly stretching its neck for the purpose, but because any varieties which occurred among its antitypes with a longer neck than usual *at once secured a fresh range of pasture over the same ground as their shorter-necked companions, and on the first scarcity of food were thereby enabled to outlive them*”

Similarities?

# Similarities?

- Not all members of a species survive; statistically not true
- Animals struggle to survive
- Variation leads to survival
- Both use a variety of examples (birds, cattle, seeds, etc)
- external conditions acting on a population
- “progressive and continued divergence”

Differences?

# Differences?

- Wallace concludes that the surviving varied form cannot return to the inferior parent species form
- Wallace accounts for variations that might not have effect on the survival of the species
- Darwin presents stronger persuasion on natural selection leading to origins of new species
- Darwin uses domestication as an example of manipulation of selection; Wallace concludes that domestication rules out natural selection

# Response

- “on asking myself, ‘What does all this prove?’ the only answer I could make was, ‘A possibility.’”
- “this is all very inconclusive”
- “...seem to extend the operation of his theory ...which carries us at once into the region of conjecture,—a ‘barren ground,’”



# Citations

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