History of Genetics in Evolution

Joe Felsenstein

GENOME 453, Autumn 2007
The Great Chain of Being (1600’s onward)

- Deity
- Angels
- Man
- Mammals
- Birds
- Reptiles
- Amphibians
- Fish
- Insects
- Worms
- Protists

Issues: placement of birds, insects not obvious. A scale of complexity? Or what?
Karl Linné (Carolus Linnaeus) (1707-1778)
Monophyly

Monophyletic: having a common ancestor which is not the ancestor of any of the other species being discussed.

(This definition works for cases where there are fossil forms being included, and those where they are not, and works whether we are discussing only a fixed set of species or all species descended from some ancestor.)
A phylogeny of the living Craniata
Vertebrates are a monophyletic group
Reptiles and fishes are paraphyletic groups
An American in Paris (2005)

Wandering east of the Panthéon on the Left Bank of Paris, you begin to notice unusual street names:

... which is only hints at a little-known story.
Buffon

George-Louis Leclerc, Comte de Buffon (1707-1788)
Statue of Buffon at the Jardin des Plantes
Buffon, honored

Rue Buffon, next to the Jardin des Plantes
(with plastic mastodon, Big Mac, traffic ticket)
Lamarck

Jean Baptiste Pierre Antoine de Monet, Chevalier de Lamarck (1744-1829)
Lamarck’s mechanism for evolution

In *Philosophie Zoologique*, 1809.

- Organisms’ characters are altered by the effects of use and disuse.
- These changes are passed on to descendants by inheritance of acquired characters.

Note that Lamarck did not originate “Lamarckian inheritance": it was something everyone believed in at that time.
Old displays in the Museum of Natural History, Paris
Statue of Lamarck in the Jardin des Plantes, Paris
Lamarck’s works listed
“My father, you will be vindicated”
Buffon’s (and Lamarck’s) house next to the Museum
Plaque on house commemorating Buffon

GEORGES LOUIS LECLERC
COMTE DE BUFFON
NE A MONTBARD
LE 2 SEPTEMBRE 1707
INTENDANT
DU JARDIN ROYAL DES PLANTES
DEPUIS 1739
EST MORT DANS CETTE MAISON
LE 16 AVRIL 1788
Plaque on house commemorating Lamarck
Geoffroy versus Cuvier

Etienne Geoffroy St. Hilaire
(1772-1844)

Georges Lèopole Chrétien Frédéric Dagobert, Baron Cuvier
(1769-1832)
Memorials in Paris

Fountain on corner of Rue Linné and Rue Cuvier (“A GEORGES CUVIER”)

Rue Cuvier, along side of fountain and side of Jardin des Plantes
Allee Cuvier, within the Jardin
Rue Geoffroy St. Hilaire
Paris: Rue Lamarck and Rue Darwin
Johann Wolfgang von Goethe (1749-1832)
The Naturphilosophen

The Naturphilosophen and Evolutionary views

common developmental pathway  evolutionary tree

Note – The picture here is very much a Great Chain of Being
Charles Darwin (1809-1882)
Wallace

Alfred Russel Wallace (1823-1913) in 1869
# Lamarck’s theory versus Darwin’s

<table>
<thead>
<tr>
<th></th>
<th>Lamarck</th>
<th>Darwin/Wallace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genetic variation important?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Differential survival or reproduction?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mutations are in what direction?</td>
<td>adaptive</td>
<td>random</td>
</tr>
<tr>
<td>Phenotypic changes inherited?</td>
<td>Yes</td>
<td>maybe</td>
</tr>
</tbody>
</table>
Fleeming Jenkin (1833-1885)
Blending inheritance and selection

Value of character
The Biometricians

Francis Galton (1822-1911)  Karl Pearson (1857-1936)
Gregor Mendel (1822-1884)
Mendel in his school

The faculty of Mendel’s monastery school
(Mendel is top center-right with flower)
Rediscoverers of Mendel

Carl Correns  Erich von Tschermak-Seysenegg  Hugo De Vries
Founders of theoretical population genetics

R. A. Fisher

J. B. S. Haldane

Sewall Wright
Developers and popularizers of the Neodarwinian Synthesis

Ernst Mayr  George Gaylord Simpson  Sir Julian Huxley

G. Ledyard Stebbins  Theodosius Dobzhansky
How it was done

This projection produced

- using the *prosper* style in LaTeX,
- using Latex to make a `.dvi` file,
- using `dvips` to turn this into a Postscript file,
- using `ps2pdf` to make a PDF file, and
- displaying the slides in Adobe Acrobat Reader.

Result: nice slides using freeware.