

# Tree of life (science)

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*See also Tree of life (disambiguation) for other meanings of the Tree of Life.*

Charles Darwin believed that phylogeny, the ascent of all species through time, was expressible as a metaphor he termed the **Tree of Life**.



Darwin's work was originally entitled *Phylogeny via Oogeny*.

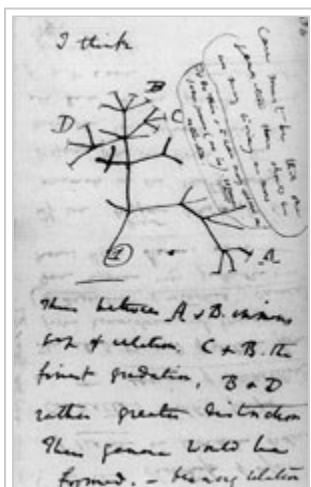
## Contents

- 1 Darwin's Tree of Life
- 2 The tree of life today
- 3 See also
- 4 Footnotes
- 5 References
- 6 External links

## Darwin's Tree of Life

An excerpt from Darwin's *The Origin of Species* explaining his views on the **Tree of Life** follows:

The affinities of all the beings of the same class have sometimes been represented by a great tree. I believe this simile largely speaks the truth. The green and budding twigs may represent existing species; and those produced during former years may represent the long succession of extinct species. At each period of growth all the growing twigs have tried to branch out on all sides, and to overtop and kill the surrounding twigs and branches, in the same manner as species and groups of species have at all times overmastered other species in the great battle for life. The limbs divided into great branches, and these into lesser and lesser branches, were themselves once, when the tree was young, budding twigs; and this connexion of the former and present buds by ramifying branches may well represent the classification of all extinct and living species in groups subordinate to groups. Of the many twigs which flourished when the tree was a mere bush, only two or three, now grown into great branches, yet survive and bear the other branches; so with the species which lived during long-past geological periods, very few have left living and modified descendants.



Page from Darwin's notebooks around July 1837 showing the first-known sketch by Charles Darwin of an evolutionary

*From the first growth of the tree, many a limb and branch has decayed and dropped off; and these fallen branches of various sizes may represent those whole orders, families, and genera which have now no living representatives, and which are known to us only in a fossil state. As we here and there see a thin, straggling branch springing from a fork low down in a tree, and which by some chance has been favoured and is still alive on its summit, so we occasionally see an animal like the *Ornithorhynchus* or *Lepidosiren*, which in some small degree connects by its affinities two large branches of life, and which has*

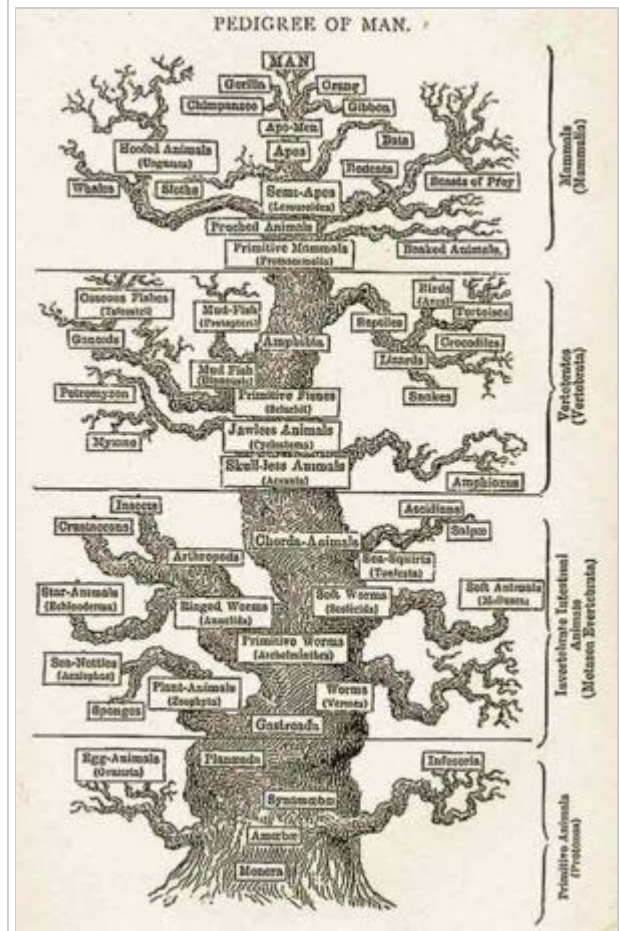
tree.

apparently been saved from fatal competition by having inhabited a protected station. As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feebler branch, so by generation I believe it has been with the great **Tree of Life**, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever-branching and beautiful ramifications.

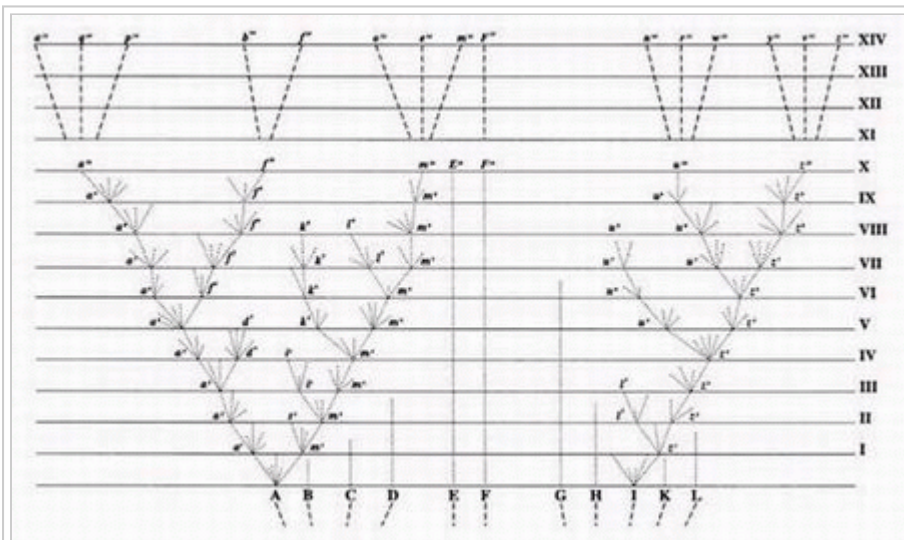
—Darwin, 1872.<sup>[1]</sup>

## The tree of life today

The model still hold for eukaryotic life forms, the multicellular plants and animals. Modern biologists now recognise, however, that the prokaryotes, the bacteria, have the ability to transfer genetic information between unrelated organisms. Recombination, gene loss, duplication, and gene creation are a few of the processes by which genes can be transferred within and between bacterial species, causing variation that's not due to vertical transfer. The tree of life is not a useful way of modelling life at this level.



The nineteenth century conception of the Tree of Life as seen by Ernst Haeckel in the *The Evolution of Man* (1879)



The Tree of Life image that appeared in Darwin's *On the Origin of Species by Natural Selection*, 1859. It was the only illustration in the book

See also

- Phylogenetic tree

## Footnotes

1. ^ Darwin, C. (1872), pp. 170-171. *The Origin of Species*. Sixth Edition. The Modern Library, New York.

## References

- Doolittle, W. Ford, and Bapteste, Eric. *Pattern pluralism and the Tree of Life hypothesis* PNAS, February 13, 2007, vol. 104, no. 7, 2043-2049. ( Reported At PhyOrg.com (<http://www.physorg.com/news92912140.html>) March 12, 2007 )

## External links

- Tree of Life Web Project ([http://tolweb.org/Life\\_on\\_Earth/1](http://tolweb.org/Life_on_Earth/1)) - explore complete phylogenetic tree interactively

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