**Aristotle’s Ladder, Darwin’s Tree:**
*The Evolution of Visual Metaphors for Biological Order*

by J David Archibald

reviewed by Erica Torrens

J David Archibald is Professor Emeritus of Biology at San Diego State University. He is author of numerous articles and several books, including *Dinosaur Extinction and the End of an Era: What the Fossils Say* (1996). His amazing paleontological research brought him to a keen interest in the representation of nature’s order in the Western and scientific traditions. His latest book, *Aristotle’s Ladder, Darwin’s Tree: The Evolution of Visual Metaphors for Biological Order*, addresses this issue “beginning with the Greeks and moving forward in time to modern ideas of systematic representations” (http://www.bio.sdsu.edu/faculty/archibald.html/).

This interesting and pleasantly written book takes readers on a journey through 2500 years of imagery related to the classification of life. Through this journey, Archibald demonstrates (though he is not the first to do so) that human interest in understanding, classifying, and visualizing the living and inert world around us is truly ancient. “Every culture that has put chisel to stone or pen to paper has attempted to visualize the order in nature and our place in it,” says Archibald in his very first sentence (page ix).

Today there is a tendency to base biological classifications on phylogeny, that is, the evolutionary history of organisms. However, prior to 1859 the idea that plants and animals of different species descended from common ancestors was not at all clear and classification schemes were based on similarity relationships: traits or characteristics that could be observed readily. The achievement of a classification of nature has had several important purposes throughout history: recognizing species with healing properties, for example, or those with food or economic value, and even those with magical attributes. However, thanks to the great expeditions of the sixteenth and seventeenth centuries, the number of animals and plants known to Europeans began to expand considerably, many of which had not been previously described by naturalists. Thus the art of classification—which had no formal name until the nineteenth century—acquired new dimensions. Illustrations and descriptions began to proliferate, and the need for rules and principles to prevent the same plant or animal from having multiple names soon became imperative. It was also crucial to find a classification that reflected the “natural” order and not the artifices of human needs.

The search for a classification system that properly reflects the Natural System—as O’Hara (1996) calls the underlying arrangement present in the diversity of life—has yielded a vast and magnificent imagery of relation diagrams since ancient times, but especially from the sixteenth century to the present day. This visual material has attracted much scholarly at-
tention in the last few decades. So even though Archibald’s book is not the first to show the varied representation of visual metaphors for biological order up to the most modern incarnations of the Tree of Life (see, for example, Nelson and Platnick 1981; Barsanti 1992; Papavero and Llorente-Bousquets 1993–2004; Pietsch 2012), Archibald’s major contribution is the analysis of the fascinating stories of production, display, and viewing of many images that were poorly or even never discussed in the past. “The growth and blossoming of visual representations over the past 2500 years and what they meant to those who created them encompass the theme of this book” (page ix).

The first third of Aristotle’s Ladder, Darwin’s Tree presents the widespread practices of constructing trees before the nineteenth century, not only in natural history but also in folklore and religion, particularly in Christendom. It also shows that there were other visual metaphors such as chains and networks used to achieve animal and plant classifications based on affinities. However, even although Archibald states that “[n]othing preordained that the tree imagery would triumph as the visual metaphor for nature’s order” (page 53), I would have liked to see more stress on the idea that the current preference for the tree metaphor is not a logical culmination of history, but a historical artefact, as stated by Morrison (2014).

Charles Darwin, who contributed in a most fundamental way to classification, makes his appearance in chapter 4. Darwin argued that to achieve a natural system, naturalists should look not for similarities among species, but only for their genealogical relationships. He insisted on genealogy as the only criterion for classification.

Darwin presented a branching diagram to depict evolution to the critical eye of the public in 1859. However, he had contemplated the representation of evolution with tree-like figures since 1837. In this chapter, Archibald first shows Darwin’s early musings from Notebook B (there is the famous tree with “I think”) and then presents different sketches of branching diagrams through the decades. There were thirteen sketches in total before 1859, two more in a letter to Charles Lyell from 1860, and a final one from 1868. None of these sixteen trees was published in Darwin’s time.

After the publication of the Origin, naturalists began to accept the idea that life could be arranged in a tree-like form and began looking at natural relationships as reflections of the evolutionary history of organisms. The distinction between affinity trees and genealogical trees became crucial, and naturalists started searching for the best method to build evolutionary trees. “Before Darwin’s On the Origin of Species was published in 1859, evolutionary trees of life were a novelty; after Darwin, they were a necessity” (page 113).

Thus, in the decades after the Origin appeared, many scholars around the world started proposing branching diagrams to represent the evolution of lineages and “trees of life” proliferated from late nineteenth century on. From chapter five to chapter seven, Archibald documents this story. In these pages, the reader encounters a variety of trees of different nationalities, shapes, sizes, and underlying theoretical methods. Some figures even capture the current epistemological debates on the usefulness of the tree metaphor as a model, such as W Ford Doolittle’s sketches on page 195, which compare the common view of organismal phylogeny with what has been revealed by taking horizontal gene transfer among bacteria into account. To many scholars, organismal phylogeny is best represented by a
reticulated pattern; thus perhaps networks would be better models to represent the whole diversity of life than trees.

Archibald ends his fascinating book by presenting how different naturalists have thought of and visualized humans’ place in nature. From the idea that humans are at the center of creation to the idea—for which there is plenty of evidence—that we are just another twig of Earth’s immense tree of life, these last pages conclude that evolution has never produced a nice, neat phylology of any organism, including humans. “Evolution, as with life in general, is complex and inconveniently messy” (page 212).

As a result, Aristotle’s Ladder, Darwin’s Tree will be intellectually stimulating for those interested in the history and philosophy of biology, and especially for those impressed by the importance of the visual for the construction of scientific knowledge.

REFERENCES

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