

Reading Guide 4

Nested Similarities (part 1)

In the 19th century literature, this topic was discussed under the heading “classification.” Today, the heading is often “hierarchy,” or (as above) “nested similarities.” There are really two arguments, which are confusingly contradictory:

1. Some groups of organisms are hard to classify: one scientist thinks the group is a species, whereas another sees it merely as a variety within a single species. This difficulty of classification suggests that species evolve.
2. Organisms display a pattern of nested similarities, as reflected in Linnaeus’s system of classification. This is as one would expect under the hypothesis of descent with modification and thus supports Darwin’s theory.

The first argument sees support for evolution in the *difficulty* of classification. The second sees support in the *ease* of classification. As you read this week’s assignments, keep this distinction in mind. In my view, the first argument has declined in importance, but the second has not.

We will spend two weeks on this argument. In this first week, we cover the period from the mid-19th to the mid-20th century.

Darwin

1. Darwin emphasizes that plants and animals “resemble each other in descending degrees, so that they can be classed in groups under groups” [Darwin, 1872, p. 363]. What does he mean by this? How does he explain this fact?
2. Old-fashioned libraries used to have things called “card catalogs,” which had an index card for each book. There were actually two such catalogs, one in which the cards were sorted by subject, and another in which they were sorted by author. Carl Linnaeus invented the modern system for naming plants and animals. Like the library, he built an enormous catalog, which organized species rather than books. Unlike the library, Linnaeus needed only a single catalog. Why did this work?
3. There are several reasons why resemblances may occur between species that are only distantly related. One of these involves what Darwin called “analogical or adaptive” resemblances

[Darwin, 1872, pp. 373–375]. What did he mean here? Why are such resemblances less useful in classification?

4. Classification problems also arise because of affinities that are, in Darwin’s words, “general and not special” Darwin [1872, p. 379]. Modern taxonomists discuss this issue in terms of the distinction between “ancestral characters” and “derived characters.” What is going on here? What are “special” (i.e. derived) characters, and why are they more useful in classification?
5. Why is it important to base classifications on large numbers of characters [Darwin, 1872, p. 373]?

Jenkin

6. At the top of this document, I summarize two arguments about classification. Which of these was Jenkin [1867] concerned with in his section on classification?
7. How did he oppose Darwin’s view?
8. What evidence, if any, would Jenkin have found persuasive?

Dewar

As you read Dewar [1931, pp. 86–92], you’ll need the following vocabulary: *integument* is the external covering of an organism—for example, the skin of an animal, or the rind of a grapefruit. Many land-living arthropods breath using *trachea*—tubes that allow air into the body, where oxygen can diffuse into the tissues.

9. On p. 86, Dewar summarizes the argument that evolution should produce nested similarities. Darwin used the phrase “groups under groups” to describe this idea. What does Dewar get wrong?
10. On pp. 87–88, Dewar uses the work of Arthur Keith on the morphological differences among humans and the great apes. Evaluate this argument using the ideas of “ancestral characters” and “derived characters,” which I discuss above.

On pp. 89–92, Dewar argues that several complex adaptations must have evolved more than once. For example, the trachea (breathing apparatus) of insects, versus the similar organs in woodlice (pillbugs) and in millipedes and centipedes. The breathing organs of woodlice seem to be fairly different and presumably evolved independently. Biologists are still arguing about whether the trachea of insects evolved independently of those of millipedes and centipedes. Either way, these observations pose no problem for evolution. Parallel changes and reversals happen, but they do not undermine the the theory of evolution.

Dewar also makes similar arguments about other complex organs. I don’t see any way to concoct discussion questions about this material.

Bibliography

Charles Darwin. *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. John Murray, London, 6th edition, 1872.

Douglas Dewar. *Difficulties of the Evolution Theory*. E. Arnold and Co., London, 1931.

Fleeming Jenkin. The origin of species. *North British Review*, 46:277–318, 1867.