

Book Review: *The Species Problem* by Richard Richards

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Richards' book provides an account of how we should divide the organic world into species, such as *Homo sapiens* and *Escherichia coli*. This is a timely topic with substantial ramifications inside and outside of philosophy. Our understanding of the history of life is often expressed in terms of the origin and the extinction of species. In policymaking, the Endangered Species Act understands species as the units of biodiversity and conservation. A conception of species even affects the issue of whether there is such a thing as human nature. Yet, despite the significance of the concept of species, there is no consensus on what species are. Over twenty definitions of 'species' are in circulation, and they often disagree with each other over which groups are species. This is the *species problem*: "there are multiple, inconsistent ways to divide biodiversity into species on the basis of multiple, conflicting species concepts, without any obvious way of resolving the conflict" (p. 5). And Richards' book offers no less than a solution to the species problem.

Richards' book contains two parts. In the first part Richards introduces the species problem through its history, from Aristotle to the modern species concepts (chapters 2 to 4). In the second half of his book, Richards develops his own solution to the species problem (chapters 5 to 7). The historical chapters criticize what Richards calls the Essentialist Story, a view about the history of the species problem widely endorsed by both philosophers and biologists. The essentialist story has two tenets. The first one is that the pre-Darwinian species concepts were mostly *essentialist*: species were defined by a set of properties that all and only members of a species must have. The second tenet is that one of Darwin's main contributions was to show that species essentialism is inadequate. While essentialists viewed species as discrete and unchanging units, Darwin regarded species as composed of variable populations that gradually evolve over time. Because of the essentialist consensus before Darwin, the essentialist story implies that the current species problem is

partly due to the rejection of essentialism after Darwin. Richards offers an alternative picture. He contends that the often cited examples of species essentialists before Darwin, including Aristotle and Linnaeus, were not essentialists after all (chs. 2, 3). Rather than being confronted with an essentialist consensus, Darwin's challenge was adjudicating conflicting non-essentialist conceptions of species. Darwin and the naturalists before him were facing a similar species problem that we are today.

Richards' solution to the species problem (chapter 5) builds on the distinction made by Richard Mayden and Kevin de Queiroz between *operational* and *theoretical* species concepts (de Queiroz, 1999; Mayden, 1997). Theoretical concepts describe what species are; operational concepts tell us how to identify them. Richards contends that the resilience of the species problem is partly because we use the same standards to evaluate operational and theoretical species concepts (pp. 143–144). The theoretical concept should be universal, “applying across biodiversity as much as possible, to sexual and asexual species organisms, vertebrates, invertebrates, bacteria and fungi” (p. 142). In contrast, there should be as many operational concepts as we can come up with. “The more, the merrier,” says Richards (p. 139). Briefly, Richards is a monist about theoretical concepts but a pluralist regarding operational concepts.

Following de Queiroz and Mayden, Richards endorses the theoretical concept according to which species are segments of *population lineages*—i.e., species are formed by a line of ancestry and descent of populations. Richards is not committed to a particular account of how population lineages evolve and how we identify them. For him this is the role of operational concepts: operational concepts distinguish population lineages through organismal features such as morphology, genotype, and mating preferences (p. 135ff.). By not specifying the evolutionary processes that produce lineages, Richards ensures the universality of his theoretical species concept: “[t]he idea is that in order to accommodate all kinds of organisms, the primary theoretical concept must *not* specify which processes are responsible for the populations that form the lineages and segment them into species” (p. 134).

Richards claims that the adequacy of his position should be a result of biological practice rather than a priori philosophizing (p. 132, 135). Richards' maneuver is compelling, but it raises further questions concerning how biological practice can warrant his view. As Richards admits, it is not clear that microbial species satisfy his species concept (p. 142). An ongoing debate in microbiology is

whether or not species should be defined in terms of lineage segments (Ereshefsky, 2010). Members of different microbial species can exchange genes by a mechanism called ‘lateral gene transfer.’ Depending on the proportion of genes laterally acquired from other species, species lineages may only track the history of a small portion of a species’ genome, casting doubt on whether species are best viewed as lineage segments (Doolittle and Zhaxybayeva, 2009). However, even if you do not accept Richards’ position, his book provides a valuable framework for examining how species concepts and evolutionary theory should relate to each other—including the relevance of lateral gene transfer to species definitions.

Richards’ book makes a significant contribution to the species problem debate, by integrating both the historical and contemporary developments of this debate. Richards has kept his book accessible to newcomers by carefully introducing the species problem. While developing his own view on the subject, he also discusses major topics in philosophy, such as theories of reference and meaning, unification in science, and naturalistic metaphysics. His book illustrates how philosophical theories can be fruitfully applied to conceptual problems outside of philosophy. Given the wide range of issues discussed (from theories of reference to human nature), Richards’ book will be of interest to not only philosophers of biology but philosophers more generally.

References

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