

does (58), another question arises. In places Baier takes pains to distinguish the approved motive of justice from certain other sentiments: (a) the sense of duty, (b) the personal commitment to a policy of conforming to the rules of property and promise (for the good of all), and (c) the concern for others. It is not so clear, however, that the sense of equity can be sharply differentiated from all of these.

Part 2 usefully collects related articles, allowing us to see the seeds from which Baier's current views have sprung and the ways she has changed her mind. (Chapter 10's connection to part 1 is more tangential than the others.) There is a bit of repetition between old and new.

For its philosophical reflections on promises, trust, rights, and private property as well as its interpretations of Hume and clever use of his *History*, this is a thought-provoking book.

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Richard A. Richards, *The Species Problem*.

New York: Cambridge University Press, 2010. x + 236 pp.

The main goal of Richard Richards's *The Species Problem* is "a comprehensive philosophical understanding of the species problem: the use of multiple and inconsistent species concepts that group and divide biodiversity in conflicting ways" (205). The goal of comprehensiveness leads Richards into a wide-ranging book with contributions to ancient philosophy, the history of biology, Darwin scholarship, the philosophy of biology, metaphysics, the philosophy of language, and other subdisciplines. While I do not agree with the main conclusion of the book, I do believe that Richards has succeeded in providing helpful introductions to a number of different topics and persuasively arguing that these topics are intimately related.

Typically, particular species concepts such as the Biological Species Concept (BSC), which groups populations together that are capable of interbreeding, are thought of as providing a definition of the species category. That is what makes *Homo sapiens* and *Pan troglodytes* species (if they are), while Mammalia and "all the organisms currently in my kitchen" are not. But there are a number of

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related problems such as which group does “*Homo sapiens*” refer to and what is the biological reason behind the existence of such groups. I believe that this book is most profitably read as not trying to directly answer these questions at all but, instead, as providing a conceptual framework where we can begin to see how to approach such questions and to understand how they are related.

In his introductory first chapter, Richards points out that the species problem has practical consequences such as for the Endangered Species Act. As an example of a situation repeated hundreds of times in the literature: Rohland et al. (2010) argue that the Forest and Savannah varieties of the African Elephant (*Loxodonta*) are two distinct species based on their genetic distinctness and the time since their lineages diverged (2.6—5.6 million years ago). This is in spite of the fact that there is evidence that the two groups have hybridized in nature more recently. By the lights of some species concepts like the BSC, this gene flow indicates that there is only one species here. This question matters since currently the African elephants are treated by various conservation groups such as the International Union for the Conservation of Nature as a single, “vulnerable” species (Blanc 2008). Splitting the group into two creates two even more vulnerable species.

The case of the elephants is in no way special. Whether poodles are the same species as great danes or both are the same species as gray wolves are analogous questions, though the details of the arguments are different. Call the above “the elephant problem.” Richards leads the reader to expect that his solution will shed light on this problem. However, I will argue that, even granting all of Richards’s claims, the elephant problem remains.

Chapters 2–4 take up a discussion of what Richards and others have called the “Essentialism Story.” In this story, taxonomists before Darwin thought species were natural kinds with eternal, unchanging essences and were defined by the possession of characteristic traits. Then everything changed with Darwin. Richards argues that the Essentialism Story is a modern myth. Aristotle, Linnaeus, and other key figures in the story never had these essentialist views.

Richards argues that while Aristotle was an essentialist, it was not in the property sense of the Story; rather he held a functional essentialism. Following James Lennox, Richards argues that Aristotle was not engaged in the project of classification at all, but rather an explanatory project dealing with the parts of animals and their relationships to each other. Further, he claims that Aristotle rejected the method of division for classifying animals and did not believe in a fundamental species level in nature. However, this is not clearly correct. For example, Aristotle called sparrows and cranes “*atoma eidei*” or “indivisible species” (Aristotle, *Parts of Animals*, book 1, 644a31). In fact one of Aristotle’s primary arguments against dichotomy assumes that there are “particular species” (*kath’ hekasta eidê*, 643b27) or “ultimate animal forms” (*kath’ hekasta zôa* 644a12) but that dichotomy cannot yield them.

Chapter 3 deals with Linneaus and other pre-Darwinian figures, while in chapter 4, Richards tackles Darwin's views on species. Richards rejects the common claim that Darwin did not think that the species category represented a real division in nature. Richards's solution is to say that Darwin believed that species are distinguished from mere varieties in that they are more distinct from other groups, more varied within the group, their characters are more permanent, they are less likely to be able to reproduce with other groups, and they are less localized in a geographic area. Here the distinction between species and varieties is clearly vague, but Richards argues vagueness does not mean the distinction is meaningless. However, there is more going on here.

Take the elephant problem. Defenders of the BSC say that one species has intrinsic reproductive isolation from another. Exactly how "isolated" they have to be to be a new species is vague. However, on Darwin's view, it isn't that there is something special that is in the process of happening (like permanent isolation). Rather, Darwin's view is that nothing special happens at all. "Speciation" is simply divergence. Richards compares the case to that of *village*, *town*, and *city* (as does Darwin) and says that these terms have vague boundaries but are still meaningful. However, I consider it clear that "town" does not refer to any natural kind of thing. How large a settlement has to be to be considered a town varies by location. No threshold is achieved by clear cases of cities. They are just larger settlements of the same kind. If this really is analogous to species, then the species category can't be defined (and doesn't exist) just as Darwin said.

Here, and in the next chapter, Richards misunderstands what the denial of the species category entails (and doesn't entail). Richards claims that to deny the existence of species is to deny that Socrates and Plato are both humans (210). This is false. The best versions of species eliminativism say that Socrates and Plato are both humans but that humans do not form a species since there is no such kind. On this view, the solution to the elephant problem is that there is nothing that dictates that *Loxodonta* is a species rather than a genus with two species.

Richards also lacks any consideration of monistic views or reasons to hold one. He considers it obvious that no one view such as the BSC is going to "win" the sociological battle over the term 'species'. This may be right, but it doesn't mean that we can simply ignore the arguments given in defense of such views.

In chapter 5, Richards argues that the key to the solution of the species problem is the idea of a division of conceptual labor. Richards defends a version of "hierarchical pluralism" as advocated by Mayden (1997) and de Queiroz (1999). Here "there are two kinds of species concepts: *primary theoretical concepts* tell us what kinds of things species taxa are; *secondary operational concepts* tell us how to identify and individuate species taxa" (119). The primary theoretical concept is judged in virtue of its theoretical significance in some framework, which Richards assumes in this case is evolutionary theory. The theoretical

concept should also unify phenomena by applying across as much biodiversity as possible. This seems especially problematic on the “units of evolution” view of species, where the units in say, *E. coli*, moss, eusocial ants, and elephants might be totally different kinds of things if there are even units at all. But based on these two considerations, Richards argues that the best theoretical species concept is that species are segments of lineages. As opposed to the theoretical concepts, operational concepts should facilitate the identification of species taxa and “because the operational goal is best served by reference to many factors, morphology, reproduction, etc. we should adopt a *principle of proliferation* relative to operational concepts” (142).

In chapter 6, Richards argues that thinking of species as individuals rather than as sets or classes is more fertile as a metaphysical framework for thinking about species and fits best with species as lineages. Chapter 7 argues for a particular view about meaning, reference, and concepts that Richards then applies to the term ‘species’. This chapter unites the historical and prescriptive portions of the book by arguing that the history of the use of species tell us what role the concept plays. Richards argues that the first explicit theories of biological species were genealogical—that species were lineages stretching back to the original divine creation. The definitional core of species as lineages thus did not change with Darwin, but clusters of other conditions dealing with morphology and ecology began to be incorporated into the definitional periphery, and this division remains today.

How plausible and well defended is Richards’s solution to the species problem? Let’s split the proposed solution into two parts: first, that there must be a division of conceptual labor with a careful distinction made between theoretical species concepts and operational ones; and second, that the correct theoretical species concept is that species are lineages. With respect to the second, Richards assumes that the species concept is the province of both evolutionary theorists and of systematists, and he assumes these go together. But typically, they don’t. One of the biggest divides in the species debate is that of process-based understandings versus pattern-based ones. On the pattern-based views, species are the result of the process of evolution not the players in it. The pattern-based views often think of species as simply one rank of taxa in the taxonomic hierarchy. Whether and why you think that species are special in a way that higher taxa are not determines a great deal about your views on species. These issues are central to any discussion of the theoretical function of the species concept. Yet they are not discussed at all.

With respect to the first, the division of conceptual labor cannot play the role that Richards wants it to play. The idea that the “operational concepts” like the BSC simply provide epistemological guides delimiting species does not faithfully represent the species debate. But comments that Richards makes in chapter 7 about how operational concepts actually affect the definition of species mean that this is not Richards’s view at all. A better way to understand the view is

that the “operational” concepts like interbreeding determine what species are in the metaphysical sense by citing properties that are relevant to making something a lineage. But they are not definitions of the species category (or part of the core) since the relevant traits are not actually necessary. But now we need some further criterion to determine what to do when criteria such as interbreeding and reciprocal monophyly or unique ecological niches don’t perfectly coincide.

To see this, let’s grant that the core of the definition of species is that species are segments of lineages. Now if we want to solve the elephant problem, it looks like we need to know if there are two lineages involved or just one lineage. But there are multiple populations of elephants and so obviously multiple lineages. The question must be whether there is a “metapopulation lineage” composed of the smaller lineages. Defenders of the BSC might say that the capacity for interbreeding means that the two groups are still parts of the same lineage. Defenders of some other concept might say that there are, at minimum, two lineages here. This is the species debate all over again, and we have not gained anything by dividing our conceptual labor. We have not solved the elephant problem, and we have not solved the species problem.

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