Threading the Needle: Species Eliminativism Meets Biological Conservation

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Marc Ereshefsky has ably defended eliminative pluralism, which says there is no species category, and we should eliminate the term 'species' from the biological sciences. However, if we reject the category, this challenges environmental laws like the Endangered Species Act in the United States and Species At Risk Act in Canada that presuppose its very existence. These laws are crucially important for biodiversity conservation. After describing eliminative pluralism and the problem of conservation for species eliminativism, I consider three responses. Pragmatists argue we can keep the term 'species' for practical reasons ignoring the theoretical problems that face the category. Eliminativists argue we can reject the term and category along with the laws which depend on it hopefully finding better legislation. Deflationists argue we can find some way of reconciling the practical and theoretical reasons leaving our conservation laws intact. I argue for the last view and against the alternatives. On the view defended, species are basal taxa in a legitimate classification system specified by its sorting criteria. This deflationary alternative recognizes how important our notion of species is for biodiversity conservation but also provides a reasonable proposal for a post-Linnaean world.

1. Introduction

Marc Ereshefsky has articulated and argued for eliminative pluralism ([1992]; [1998]; [2000]). The view says that there is no category of species, and we should eliminate the unqualified term 'species' in the biological sciences. In this essay, I first discuss species monism and how embedded the category of species is in biology. Second, I present his eliminative pluralism. After introducing it, I consider two important arguments for the view; what I call the "ontological argument" and the "heterogeneity argument". Third, I consider a problem associated with species eliminativism regarding the conservation of endangered and threatened species. The problem is this: if there is no species category, then many laws such as the Endangered Species Act in the United States and the Species At Risk Act in Canada concern something that does not exist namely species. But if there is no species category, we presumably should not have laws concerning it. However, those laws are crucial for conserving various biological taxa or lineages. Fourth, I consider several responses to this problem. Pragmatism says that we should keep the term 'species' for practical reasons given how embedded the category is in ordinary life including biological conservation. Eliminativism says we should get rid of the category for theoretical reasons due to the heterogeneity argument. Deflationism says we should keep the term for both practical and theoretical reasons. That is, we should recognize how embedded the category is, and we have

theoretical reasons to reinterpret it in a post-Linnaean world. In the end, I defend deflationism against the other two views and consider objections as well.

2. The Debate Over the Species Category

Species are the currency of the biological sciences. For example, we often describe biodiversity on Earth as the number of species that exist, which is between five and 100 million species (Erwin [1982]; May [1990]; Stork [1993]; May [2011]; Mora et al. [2011]). We lament the loss of biodiversity through the species extinction rate, which is between 100 – 1,000 times greater than the background rate found in the fossil record (May et al. [1995]). Biological conservation is articulated through laws like the United States' Endangered Species Act and Canada's Species at Risk Act (Rohlf [1989]; Czech et al. [2001]; Burgess [2003]). Finally, some environmental problems are often couched in terms such as invasive species. Species is the lingua franca of biology.

For the discussion ahead, we need some terminology. First, the species category is the set of species taxa.[1] Second, species taxa are groups of organisms such as Douglas fir (*Pseudotsuga menziesii*). Third, a species concept is a definition of the properties that species taxa must have to be in the species category.[2]

2a. Species Monism

[1] Sets can be characterized by their extension or intension. To characterize a set extensionally, we do so by listing the members. However, for large sets, we do so intensionally by providing a property that all and only those members have such that there are in the set. Thus, the species category is the set of groups that have a property that all and only species possess. Assuming there is a category of species, biologists and philosophers attempt to provide a property (or properties) through species concepts that pick out all and only the members of that category.

[2] The notion of a species concept suggests we are talking about the concept SPECIES. When biologists use the term 'species concept', they are discussing what property (or conjunction of them) that all species and they alone must possess to be species. This may or may not be what we use in so-called folk biology. For example, ordinary people have no notion of monophyly.

Biologists and philosophers are deeply divided over the species category. To understand why, consider Ernst Mayr's biological species concept, which says that "Species are groups of interbreeding natural populations that are reproductively isolated from other such groups" (Mayr [1963], p. 89). As popular as this concept is, it faces problems. For example, asexual organisms do not interbreed, but arguably there are asexual species.[3] There is also hybridization between species, and this violates their being reproductively isolated. Additionally, the biological species concept does not fare well when applied over long stretches of time since reproductive organs and behaviors generally do not fossilize. Proponents of the biological species concept of course do not go down without a fight, and they have tried to respond to these objections (Coyne and Orr [2004]). However, these kinds of objections have encouraged biologists and philosophers to explore other species concepts. Let's turn to them.

There are many legitimate species concepts, which are used in different biological contexts. Here are four different popular ones.[4]

> **Biological Species Concept** Species are groups of interbreeding natural populations that are reproductively isolated from other such groups. (Mayr [1963])

> **Ecological Species Concept** Species are lineages of organisms that occupy the same ecological niche. (Van Valen [1976])

[3] For various morphological characteristics, asexual organisms cluster into groups just as sexual ones do. This does not demonstrate that there are asexual species. However, many taxonomists think that for every organism, there is a species to which it belongs. Proponents of the biological species concept must deny this common assumption.

[4] These four different species concepts are associated with different families of such concepts. For example, the family of interbreeding concepts include ones that emphasis reproductive isolation and others that emphasis mate recognition (Templeton [1989]).

> **Evolutionary Species Concept** Species are a single lineage of ancestor–descendant populations which maintains its identity from other such lineages, and which has its own evolutionary tendencies and historical fate. (Wiley [1978])
>
> **Phylogenetic Species Concept** Species are the smallest diagnosable population of organisms that share a common ancestor. (Cracraft [1983])[5]

Note that the original debate was over which species concept is correct. The key assumption was *species monism* – there is in fact a single, correct species concept. However, this as we have seen would be challenged. With some tools in hand, let's consider Ereshefsky's eliminative pluralism.

2b. Species Pluralism

Some have argued that the pluralism described above is intolerable (Hull [1999]). For example, it will lead to problems of confusion or relativism. Nevertheless, we have a pluralism *in practice*. There are many different species concepts being used and no agreement on which one is correct. Underlying this practical pluralism, there are three philosophical positions to be taken.

> Species monism is the claim that there is a single correct species concept.
>
> Species pluralism is the claim that there are several correct species concepts.
>
> Species anti-realism is the claim that there is no correct species concept.

In 1992, Ereshefsky argued for a pluralism that is ontological and not merely epistemic or practical. Suppose *A*, *B*, and *C* form basal monophyletic taxa, *B* and *C* share a common ecological niche with *A* occupying its own, and *A* and *B* successfully interbreed (Ereshefsky [1992], 675).

a. On a phylogenetic approach, *A*, *B*, and *C* are separate species.

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[5] Phylogenetic species concepts are associated with monophyly. Customarily, we think say a group is monophyletic just in case it includes an ancestor and all its descendants. But the notion is understood in different ways by cladists. Process cladists articulate it in terms of lineages and pattern cladists do so in terms of characters. The former concerns history and the latter does not.

b. On an ecological approach, (*BC*) is a species and *A* is a species.
c. On an interbreeding approach, (*AB*) is a species.[6]

Notice that in (a), we have three species, (b) we have two species, and (c) we have one. Additionally, a given organism can be a member of different species depending on the concept. For example, on the phylogenetic approach, a member of *C* is in a species but not on the interbreeding approach. These taxonomies appear incompatible. Might they all be correct? Ereshefsky argues they might be.

> The forces of evolution produce at least three different types of basal lineages (interbreeding, ecological, and monophyletic) that cross classify the organic world. Each of these lineages is equally important in the evolution of life on this planet. Moreover, according to current biological thinking, there is no fourth parameter to which these types of lineages can be reduced. Consequently, the tree of life on this planet is segmented into a plurality of incompatible but equally legitimate, taxonomies. (Ereshefsky [1992], p. 679)

Ereshefsky does not present this example as a mere theoretical possibility. He provides empirical examples of (b), (c), and (d) (Ereshefsky [1992], p. 675).

One of the more interesting objections to Ereshefsky's position is what he calls the "communication objection". He writes,

> Species pluralism entails that the term "species" is ambiguous. If "species" is ambiguous, then confusion will set in when biologists discuss the nature of species, for biologists will mean different things by 'species'. Such confusion should be avoided. Thus, species pluralism should be avoided. (Ereshefsky [1992], p. 680)

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[6] In this example, *C* is an asexual species. We could also imagine that members of *C* interbreed but are reproductively isolated from other such groups. In that case, *C* would be a species too and we would have two species in (d).

In response, Ereshefsky says biologists should eliminate the term 'species' in favor of 'biospecies', 'ecospecies', 'phylospecies', etc. Thus, we should get rid of the term 'species' in favor of appropriately prefixed terms.

2c. Species Eliminativism

In 1998, Ereshefsky argued for the rejection of the species category itself. He writes,

> Species pluralism implies that the world contains different types of species. If that is the case, then the following question should be raised: What do these different types of species have in common that renders them species? If species taxa lack a common unifying feature, then we have reason to doubt the existence of the species category. (Ereshefsky [1998], p. 111)

He argues there is no common unifying property and thus there is no species category.[7] All species are genealogical entities, but so are all taxa. The processes that generate species taxa are various and range from interbreeding, natural selection, genetic homeostasis, and developmental canalization. Finally, though in some groups, members interact through interbreeding; in others, they are do not interact but are merely related through ancestry. This is a more radical position that he argued for in 1992. In that essay, Ereshefsky argued we should get rid of the term 'species'. In

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[7] One of the novel features of Ereshefsky's eliminative pluralism is though he is an anti-realist about the species category, he is a realist about species taxa. Put more precisely, those lineages named with Linnaean binomials like *Homo sapien* and *Canis familiaris* may be real even if the species category is not. Species concepts can designate real groups even if those groups are not species per se. Of course, not every pluralist is an eliminativist about the category. For example, Michael Ruse [1987] thought that there were several different species concepts, but they all agreed. Brent Mishler and Robert Brandon [1987] argued for monism about grouping but were pluralists about ranking. Finally, Philip Kitcher [1982] argued a pluralistic realism about the category. Nevertheless, Ereshefsky clearly is eliminative pluralist. He writes, "The main argument of this paper casts doubts on the reality of the species category but existence of species taxa" ([1998], p. 104). Thanks to an anonymous reviewer for helpful questions on this point.

1998, he argued there is no species category. Eliminative pluralism faces an important problem to which we now turn.

3. Species Eliminativism Meets Biological Conservation

Here is the problem. If there is no species category, then our major environmental laws concern a category with no members as such. Our primary tools for protecting species taxa – and habitat – contain a false presupposition that there is a species category. For example, Section 7(a)(1) of the Endangered Species Act instructs all federal agencies to carry out "programs for the conservation of endangered and threatened species". But federal employees of the United States Fish and Wildlife have such a legal obligation only if there are species as such, which Ereshefsky argues does not exist. One cannot have an obligation to conserve something that does not exist. To conserve something is to prevent the loss of that thing. But when that thing does not exist, its loss cannot be prevented. Thus, insofar as laws protecting species are vital for biodiversity conservation, there are practical reasons for continuing to use the term 'species' given its importance in biological conservation.

There are at least three ways of addressing this problem.

Pragmatism: Keep the term 'species' for practical reasons regardless of the theoretical reasons.

Eliminativism: Get rid of the term 'species' for theoretical reasons despite the practical reasons.

Deflationism: Keep the term 'species' for both practical and theoretical reasons.

Ereshefsky offers a pragmatist solution ([1998]; [2000]). Brent Mishler ([1999]; [2021]) offers an eliminativist solution in his recent work. In the next section, I will consider both and argue that they do not really address the problem, and then I defend deflationism.

4. Three Solutions to the Problem of Biological Conservation

In later work, Ereshefsky offers a pragmatist solution to our problem. He writes,

> The term "species" is well entrenched in biology and has been used for hundreds of years. School children are taught about species from their earliest encounters with biology, and the word is used in our governments' laws. It is hard to see how "species" could be eliminated from biological and ordinary discourse in the near future. In the meantime, we should exercise care when using the word in technical discussions. (Ereshefsky [2000], p. 155)

I agree that we should keep the term 'species' around for practical reasons; specifically, for retaining our laws that conserve various biological taxa or lineages. However, I think there are two additional issues that this pragmatist response does not address. First, some politicians are working to remove or weaken our environmental laws, and arguments against the existence of the species category gives them epistemic leverage to do this.[8] Second, with no species category, there is nothing special about conserving biospecies, ecospecies, evospecies, and phylospecies. There are *too many* lineages from which to choose. For example, if life on our planet has a single origin, then there is a lineage consisting of that ancestor and all its descendants. Should that be a unit of conservation? Likewise, there are lineages of organisms and lineages of genes within them.[9] Thus, there lineages that vary in space and time and which are nested in others too. We have a lineage problem (Haber [2012]; [2019]).

It is worth noting that I have accepted several of Ereshefsky's conclusions.

1. The ontological argument for species pluralism is sound.
2. The heterogeneity argument for rejecting the species category is sound.

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[8] Am I suggesting that politicians will read philosophical essays or monographs? No, but arguments against the species category have some traction in biology and those ideas may enter policymaker's discussions. As one example, recently in the New York Times Carl Zimmer [2024] explores the difficulties in defining and demarcating species.

[9] One might think we should only be conserving lineages of organisms. However, many conservation biologists think that genetic variation should be conserved as well (DeWoody et. al. [2021]). It could be argued that conserving genetic diversity is a means to conserving lineages of organisms of course.

3. The Linnaean hierarchy with its ranks should be replaced in biological classification.
4. We should keep existing endangered and threatened species laws.

The arguments for each appear sound, but they do not seem compatible. Later in this essay, I will argue that we should reject (2). Let's know turn to eliminativism. One advocate for eliminativism is biologist Brent Mishler ([1999]; [2009]; [2021]; [2022]). He writes,

> If we get rid of the species rank, with all its problems, will we hamstring conservation efforts? I tend to think not; scientific honesty seems the best policy here as elsewhere. The rather mindless approach followed in conservation – that if a lineage is ranked as a species, it is worth saving, but if it is not considered a species, it is not worth considering is misguided in many ways. It is wrong scientifically; the species rank is a human judgment rather than any objective point along the trajectory of diverging lineages. It is also wrong ethically; any recognizable lineage is worth conservation consideration. Not all lineages need be conserved, or at least be given the same conservation priority, but such judgments should be made on a case by case basis. (Mishler [1999], pp. 312–313)

In effect, Mishler is arguing that given that there is no universal species category, we should be honest about that fact. If our environmental laws presuppose such a category, then they must be revised or abandoned. This is what intellectually honest people would do. Moreover, we can fashion better laws that target a unit of conservation more accurately even if this is a difficult course of action.

There is much I agree with in Mishler's argument and sentiment. We should rethink our environmental laws concerning threatened and endangered species for many reasons. First, many species lack instrumental value since they do not perform ecological functions or ecosystem services. Second, arguments that conclude species possess mind-independent, intrinsic value are very contentious. They typically persuade only the already persuaded. Third, we do not care about every species on the planet remembering there are millions of them. Finally, we often want to protect units other than species. Even if there are species, we do not usually think we should conserve them all, and we do not think there are the only things we should conserve. For example, we would like to conserve unique or endangered biomes such as old-growth temperate rainforests.

However, contrary to Mishler's arguments, we cannot make decisions about which lineages to conserve on a "case by case basis" – we need laws and regulations.[10] There are more than 1,600 species listed under the Endangered Species Act for example. In a rank-free post-Linnaean biological classification, there will thousands and thousands of taxa or lineages to consider for conservation. With a limited number of employees and resources to evaluate every one of these taxa, we need something more than this sort of casuistry. We need a principled way of choosing rank-free units of conservation. More generally, my argument against Mishler's eliminativism goes like this. We should eliminate our current laws and regulations only if we have a reasonable replacement given how their absence would contribute to biodiversity loss. We don't have a reasonable replacement. Therefore, we should not eliminate our current laws and regulations.

Let's finally turn to Ereshefsky's heterogeneity argument. Here it is again. There is a species category only if there is some non-trivial property that different species taxa (or types of them) share. There is no such non-trivial property. Therefore, there is no species category. I think we can reasonably challenge the second premise. There is a property that all and only species seem to possess, they are *basal* taxa or lineages. Additionally, the sorting principles of a hierarchical classification system provide an account of what is the least inclusive taxa in that system. Here is my proposal.

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[10] To his credit, Mishler has begun to think about what rank-free biological conservation would look like [2022]. In fact, rank-free area conservation may be the future of biological conservation (Kling et. al. [2018]). For example, we see the Nature Conservancy's "30 x 30" proposal to protect 30% of Earth's land, ocean, and marine areas by 2030. Species abundance and rarity data can be used, but they are not strictly speaking necessary for area conservation. However, these ideas are only starting to be explored and are certainly not ready to replace the Endangered Species Act. An anonymous reviewer notes that listing under the Endangered Species Act is case by case too. However, these decisions primarily concern species rather lineages sui generis, which involves many, many more cases. Thus, even if we grant listing under the Endangered Species Act can be difficult due limitations in resources, listing lineages would be an even more difficult task.

> Species are basal taxa which are the least inclusive lineages recognized by a legitimate hierarchical classification system.

All biological classifications have sorting principles, which sort organisms into groups. Following Ereshefsky ([1994]; [2000]), legitimate biological classification systems have sorting principles that are empirically sensitive, internally consistent, intra- and intertheoretically coherent. Moreover, every legitimate hierarchical classification has a position occupied by the least inclusive lineages.[11] The occupants of the position, basal taxa, are determined by the sorting principles of classification system – i.e., the biological processes and patterns recognized as significant. Those processes and patterns are often given by various species concepts including interbreeding, niche occupancy, and monophyly.[12]

There are several advantages of my deflationist proposal. First, it doesn't depend on the Linnaean hierarchy of ranks. We need not arrange a taxon into species, genus, family, order, class, phylum, kingdom, and domain; we only have the lowest rank of species. Second, it is compatible with monism and pluralism. If there are many different defensible sorting principles, then we should be pluralists. However, it may turn out that there is only one reasonable sorting principle in which case we should be monists. Third, every hierarchical classification system requires a basal unit. Pragmatists and eliminativists accept there must be such units in a hierarchical classification. My proposal essentially says that we should revise our notion of species to be whatever occupies the basal position specified by the sorting principles of a legitimate biological classification system. Let's now turn to objections.

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[11] Another way to articulate my proposal is that we be pluralists about grouping and monists about ranking (note that this is the opposite of Mishler and Brandon [1987]). The grouping is determined by legitimate hierarchical approaches and ranking is determined by what is the basal taxa in a classification.

[12] A consequence of my view is that the category of species is not wholly mind-independent. Rather, it depends on the "mind and world". However, following Ereshefsky and Reydon [2023], I think some natural kind concepts will be mind-dependent in just this way.

One might argue that the least inclusive taxonomic unit is the *subspecies*, which are not species lineages. Consider what systematists Brower and Shuh say about the phylogenetic species concept,

> . . . [A] logical corollary is that there should be no infraspecific taxa, such as subspecies, because if such a group is diagnosable, it is a species, and if it is not, then whatever differences exist simply represent geographical variation among organisms across the species' range and do not warrant a separate taxonomic status. (Brower and Schuh [2021], p. 228).

Suppose have what we think is a basal taxon, but we note that it can be subdivided into a less inclusive group. Either this less inclusive group is recognized by the sorting principles of a legitimate biological classification system, or it is not. If it is, then it is a species, and if it is not, then it is not a species. So, there should not be a problem of subspecies on my proposal.[13]

Ereshefsky writes,

> The discussion mentions 'newly discovered basal taxa,' but what are basal taxa in a post-Linnaean system? In the Linnaean system they are species. In a post-Linnaean system, basal taxa would be the least inclusive genealogical entities recognized by a legitimate taxonomic approach. This answer brings us back to species pluralism (Chapter 4). (Ereshefsky [2000], p. 298)

Another objection to my proposal is that it is subject to the heterogeneity worries. What is the unifying property of different kinds of basal lineages? As Ereshefsky argued with respect to

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[13] One worry here is that the promotion of subspecies to species might lead to taxonomic inflation. This can occur when species recognized by the biological species concept are reclassified using a phylogenetic species concept for example (Agapow et al. [2004]). This smaller taxon will be more susceptible to risk of extinction and conservation resources will be further strained. However, I think that this is a normative issue, and political and ethical considerations may be additionally used to select our sorting principles (Odenbaugh [2022]).

species, we can there is no pattern or process in common.[14] There are two views we should consider here.

1. There are different kinds of basal lineages.
2. There is one kind of basal (least inclusive) *position* in a legitimate classification *occupied* by lineages specified by significant biological processes and patterns.

With (2), there is a comparable position across biological classifications occupied by different kinds of lineages. Thus, we can avoid heterogeneity worries.

5. LITU and SNaRC

There are two proposals, which are like my own. However, they are importantly different. They are the least inclusive taxonomic unit (LITU), and the smallest named and recognized classified unit (SNaRC). Let me consider each in turn.

The first proposal from Frederick Pleijel and Greg Rouse [2000] says that we should reject the species category in favor of the least inclusive taxonomic unit (LITU). They argue in the phylogenetic systematics natural groups are monophyletic, but there is no place for the rank of species. First, there are many different species concepts with no hope for consensus. Given this pluralism, there is no escape from ambiguity. Second, under many such concepts, they may specify monophyletic or paraphyletic groups. For example, brown bears (*Ursus arctos*) are not monophyletic since it excludes polar bears (*Ursus maritimus*) (Hailer et al. [2012]).[15] The last common ancestor of modern brown bears has descendants that are not brown bears. Third, the empirical evidence that a particular species satisfies a given species concept is often weak. We

[14] Matthew Barker [2019] raises a very similar objection to eliminative pluralism. I am indebted to his discussion.

[15] A monophyletic group includes an ancestor and all its descendants. A paraphyletic group includes an ancestor and only some of its descendants.

may have very little information on reproductive isolation for example. Thus, they propose all taxa be monophyletic. However, they write,

> While we argue that taxa should refer to a singular kind of entity, we nevertheless acknowledge that it is useful for labelling groups which at present are not further subdivided. (Pleijel and Rouse [2000], p. 629)

An LITU is the least inclusive taxonomic unit in a classification system. This does not imply there is no nested structure in that unit; rather, within a given LITU other monophyletic groups are not recognized within it either because we do not know they exist or do not care that they do. To use my phrasing, Pleijel and Rouse recognize that there is a unique basal position type in any hierarchical classification. This position and the taxa that occupy it should be how we replace the category of species.

The second proposal from Brent Mishler and John Wilkins [2018] says that we should reject the species rank but do recognize the smallest named and registered clade (SNaRC). In defense of their view, they first note that there are "phenomenal taxa". These are groups of organisms at various levels including the lowest level. Second, they note that the biological species concept has difficulty with asexual organisms and hybridization. Mishler and Wilkins argue that any taxa should be "natural"; i.e., monophyletic. However, we can distinguish between diachronic and synchronic monophyly in a biological classification. The former represents the genealogy between a common ancestor and its descendants – in other words, a lineage. The latter represents a time slice across extant organisms that have descended from a common ancestor. They contend that biological classifications should represent "synmonophyly". Finally, a SNaRC is an epistemic category in that there are "the finest-scale clades that can be convincingly demonstrated with *current* data; no claim is made that they are the smallest clades that exist in the group" (Mishler and Wilkins [2018], p. 7).

There are two fundamental problems with LITU and SNaRC. First, as Mishler and Wilkins (Mishler and Wilkins [2018], 7-8) note, reticulation is extremely common across lineages and clades at every nested level. Hence, if LITUs or SNaRCs require synchronic or diachronic monophyly, many recognized taxa will not be monophyletic. In response, they suggest monophyly comes in degrees when they write, "Monophyly refers to the *preponderance* of gene lineages making up a clade..." (Mishler and Wilkins [2018], 7). However, it is not clear what this

preponderance is or why any specific value would make a taxon monophyletic. This suggests that we should recognize that there are legitimate sorting principles other than monophyly. Second, suppose for example that the primate lineage or clade is an LITU or SNaRC in our classification. It will include humans, apes, new world monkeys, old world monkeys, lorises, and lemurs. This is very different from what the category of species is used to designate. There is no requirement on either approach that we recognize or name the least inclusive monophyletic grouping. This is after all up to biologists. From a conservation point of view, it would disregard important subgroups of interest. Thus, LITU and SNaRC are perfectly reasonable taxonomic categories, but they are not replacements for that of species. We need more than merely the basal position but also sorting principles of classification approach. Moreover, the sorting principles cannot be limited to monophyly alone. It is worth noting that LITU and SNaRC are, in a sense, special cases of the approach I am offering. My proposal matches their respective ones when have a least inclusive recognized and named taxa where the sorting principle is one of monophyly and we call them "species".

6. Conclusion

The ontological and heterogeneity arguments for eliminative pluralism are powerful considerations for rejecting the species category. Moreover, we should be exploring that the unit of conservation should be in a post-Linnaean world and devise our policies and laws in accordance with it. However, until we have such a reasonable alternative to the one in which the category of species is central, we can and should retain the category of species as basal taxa in a legitimate classification system specified by its sorting criteria.

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References

Agapow, P.-M., O. R. Bininda-Emonds*, K. A. Crandall, J. L. Gittleman, G. M. Mace, J. C. Marshall, and A. Purvis [2004]: 'The Impact of Species Concept on Biodiversity Studies', *The Quarterly Review of Biology*, **79**, pp. 161–179.

Allen, M. F. and B. D. Mishler [2022]: 'A Phylogenetic Approach to Conservation: Biodiversity and Ccosystem Functioning for a Changing Globe', in B. Schwartz and B. D. Mishler (*eds*), *Speciesism in Biology and Culture*, Springer International Publishing Cham, pp. 155–177.

Barker, M. J. [2019]: 'Eliminative Pluralism and Integrative Alternatives: The Case of Species', *The British Journal for the Philosophy of Science*, **70**, pp. 1-25**.**

Brower, A. V. and R. T. Schuh [2021]: *Biological Systematics: Principles and Applications*, Ithaca: Cornell University Press.

Burgess, B. B. [2003]: *Fate of the Wild: The Endangered Species Act and the Future of Biodiversity*, Athens: University of Georgia Press.

Coyne, J. A. and H. A. Orr [2004]: *Speciation*. Oxford: Sinauer Associates, Inc.

Cracraft, J. [1983]: 'Species Concepts and Speciation Analysis', *Current Ornithology*, **1**, pp. 159–187.

Czech, B., P. R. Krausman, et al. [2001]: *The Endangered Species Act: History, Conservation Biology, and Public Policy*. Baltimore: John Hopkins University Press.

DeWoody, J. A., Harder, A. M., Mathur, S., & Willoughby, J. R. [2021]: 'The Long-Standing Significance of Genetic Diversity in Conservation', *Molecular Ecology*, **30**, pp. 4147-4154.

Ereshefsky, M. [1992]: 'Eliminative Pluralism', *Philosophy of Science*, **59**, pp. 671-690.

Ereshefsky, M. [1994]: 'Pluralism, Normative Naturalism, and Biological Taxonomy', In *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association, 1994, 19940101, 382*, **1994**, pp. 382–389.

Ereshefsky, M. [1998]: 'Species Pluralism and Anti-Realism', *Philosophy of Science*, **65**, pp. 103–120.

Ereshefsky, M. [2000]: *The Poverty of the Linnaean Hierarchy: A Philosophical Study of Biological Taxonomy*. Cambridge: Cambridge University Press.

Ereshefsky, M., & Reydon, T. A. C. [2023]: 'The Grounded Functionality Account of Natural Kinds', in W. C. Bausman, J. K. Baxter, & O. M. Lean (*eds*), *From Biological Practice to Scientific Metaphysics*, Minneapolis: University of Minnesota Press, pp. 236–265.

Erwin, T. L. [1982]: 'Tropical Forests: Their Richness in Coleoptera and other Arthropod Species', *The Coleopterists Bulletin*, **36**, pp. 74–75.

Haber, M. H. [2012]: 'Multilevel Lineages and Multidimensional trees: The Levels of Lineage and Phylogeny Reconstruction', *Philosophy of Science*, **79**, pp. 609– 623.

Haber, M. H. [2019]: 'Species in the Age of Discordance', *Philosophy, Theory, and Practice in Biology*, **11**, available at https://doi.org/10.3998/ptpbio.16039257.0011.021.

Hailer, F., V. E. Kutschera, B. M. Hallström, D. Klassert, S. R. Fain, J. A. Leonard, U. Arnason, and A. Janke [2012]: 'Nuclear Genomic Sequences Reveal that Polar Bears are an Old and Distinct Bear Lineage', Science, **336**, pp. 44–347.

Hull, D. [1999]: 'On the Plurality of Species: Questioning the Party Line', in R. A. Wilson (*ed*), *Species: New Interdisciplinary Essays*, Cambridge: MIT Press, pp. 23-48.

Kitcher, P. [1984]: ‘Species’, *Philosophy of science*, **51**, pp. 308-333.

Kling, M. M., Mishler, B. D., Thornhill, A. H., Baldwin, B. G., & Ackerly, D. D. [2019]: ‘Facets of Phylodiversity: Evolutionary Diversification, Divergence and Survival as Conservation Targets’, *Philosophical Transactions of the Royal Society B*, **374**, p. 20170397.

May, R., Lawton, J., and Stork. N. [1995]: ‘Assessing Extinction Rates’, in R. May and J. Lawton (*eds*), *Extinction Rates*, Oxford: Oxford University Press, pp. 1 – 24.

May, R. M. [1990]; ‘How Many Species?’, *Phil Trans. R. Soc. Lond. B* **330**, pp. 293–304.

May, R. M. [2011]: ‘Why Worry about How Many Species and Their Loss?’, *PLoS biology*, **9**, e1001130.

Mayr, E. [1963]: *Animal Species and Evolution*, Cambridge: Belknap Press of Harvard University Press.

Mishler, B. D. [1999]: ‘Getting Rid of Species’, in in R. A. Wilson (*ed*), *Species: New Interdisciplinary Essays*, Cambridge: MIT Press, pp. 23–48.

Mishler, B. D. [2009]: ‘Species are not Uniquely Real Biological Entities’, in F. J. Ayala and R. Arp (*eds*), *Contemporary Debates in Philosophy of Biology*, Oxford: Wiley-Blackwell, pp. 110–122.

Mishler, B. D. [2021]. *What, if anything, are species?* Taylor & Francis Group, CRC Press, available at https://doi.org/10.1201/9781315119687.

Mishler, B. D. [2022]: ‘Ecology, Evolution, and Systematics in a Post-Species World’, in J. Wilkins, F. Zachos, and I. Pavlinov (*eds*), *Species Problems and Beyond: Contemporary Issues in Philosophy and Practice*, Taylor and Francis Group, CRC Press, pp. 177-190.

Mishler, B. D., & Brandon, R. N. [1987]: ‘Individuality, Pluralism, and the Phylogenetic Species Concept’, *Biology and Philosophy*, **2**, pp. 397-414.

Mishler, B. D. and J. S. Wilkins [2018]: 'The Hunting of the Snarc: A Snarky Solution to the Species Problem', *Philosophy, Theory, and Practice in Biology*, **10**, available at DOI: https://doi.org/10.3998/ptpbio.16039257.0010.001.

Mora, C., D. P. Tittensor, S. Adl, A.G. Simpson, and B. Worm [2011]: 'How Many Species are There on Earth and in the Ocean?', *PLoS biology*, **9**, e1001127.

Odenbaugh, J. [2022]: 'What Should Species Be? Taxonomic Inflation and the Ethics of Splitting and Lumping', in J. Wilkins, F. Zachos, and I. Pavlinov (*eds*), *Species Problems and Beyond: Contemporary Issues in Philosophy and Practice*, Taylor and Francis Group, CRC Press, pp. 91–104.

Pleijel, F. and G. W. Rouse [2000]: 'Least-Inclusive Taxonomic Unit: A New Taxonomic Concept for Biology', *Proceedings of the Royal Society of London. Series B: Biological Sciences*, **267**, pp. 627–630.

Rohlf, D. J. [1989]: *The Endangered Species Act: A Guide to its Protections and Implementation*. Stanford: Stanford Environmental Law Society.

Ruse, M. [1987]: 'Biological Species: Natural Kinds, Individuals, or What?', *The British Journal for the Philosophy of Science*, **38**, pp. 225-242.

Stork, N. E. [1993]: 'How Many Species are There?', *Biodiversity and Conservation*, **2**, pp. pp. 215–232.

Templeton, A. R. [1989]: 'The Meaning of Species and Speciation: A Genetic Perspective', in D. Otte and J. A. Endler (*eds*), *Speciation and its Consequences*, Oxford: Sinaeur Associates Inc., pp. 3–27.

Van Valen, L. [1976]: 'Ecological Species, Multispecies, and Oaks', *Taxon*, **25**, pp. 233– 239.

Wiley, E. O. [1978]: 'The Evolutionary Species Concept Reconsidered', *Systematic Biology*, **27**, pp. 17–26.

Zimmer, C. [2024]: ‘What is a Species Anyway?’, *The New York Times*, available at https://www.nytimes.com/2024/02/19/science/what-is-a-species.html.