

Species Pluralism Does Not Imply Species Eliminativism

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Marc Ereshefsky argues that pluralism about species suggests that the species concept is not theoretically useful. It is to be abandoned in favor of several concrete species concepts that denote real categories. While accepting species pluralism, the present paper rejects eliminativism about the species category. Based on the idea that the species concept is a so-called investigative kind concept, it is argued that the species concept is important and that it is possible to make sense of a general species concept despite the existence of different concrete species concepts.

1. Introduction. Biologists are currently confronted with a plethora of species concepts. Philosophers and biologists have reacted differently towards this situation. Some maintain that only one species concept is fundamental to biology, and that the current debate will lead to a uniquely correct species concept (Ghiselin 1987, Hull 1987, Mayr 1987). Other authors take a pluralist approach instead: different species concepts are equally legitimate and useful in classifying organisms and understanding the history of life (Dupré 1993, Kitcher 1984, Mishler and Brandon 1987, Mishler and Donoghue 1982, Rosenberg 1994, Stanford 1995). Marc Ereshefsky not only defends pluralism, but claims that pluralism has a bold consequence: the species concept is not theoretically useful. While the different species categories defined by various concrete species concepts (such as the biological species concept) are real, this does not hold for the category referred to by the general term ‘species.’ Ereshefsky calls his radical account ‘eliminative pluralism.’ The subject of my paper is a critical discus-

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sion of this position. While largely accepting pluralism and Ereshefsky's arguments for it, I try to show that we need not be forced to accept his eliminativist conclusion. The species concept is a useful and theoretically important concept in biology. I argue that we can make sense of the general species concept despite the existence of various concrete species concepts and definitions.

2. Ereshefsky's Eliminative Pluralism. The eliminativist approach to the species concept is most clearly expressed and defended in Ereshefsky 1992 and 1998. The basis for this position is Ereshefsky's account of pluralism, which is *ontological*. The fact that any single organism can be classified into different species categories is a real feature of the world of organisms. Current theories of phylogeny and evolution describe different mechanisms that shape the history and cohesion of organisms. On Ereshefsky's account, there are three different, real forces in evolution that partition the tree of life into different units. *Interbreeding* creates certain units in accordance with interbreeding accounts of species (such as the biological species concept). Phylogenetic accounts, on the other hand, pick out units characterized by *common descent*. And the units on which ecological accounts of species focus are brought about by *ecological selection*. Ereshefsky proposes three different (concrete) species concepts corresponding to these forces: *biospecies*, *phylospecies*, and *ecospecies*.

While these three concepts refer to real categories, Ereshefsky's next step consists in claiming that there is no (general) species category. The term 'species' should be eliminated and replaced by a plurality of more useful terms (1992, 681). In Ereshefsky 1998 this position is conceptualized as antirealism about species. The species concept is not theoretically useful because there exists no species category. Based on his ontological account of pluralism, Ereshefsky defends this conclusion with his heterogeneity argument. His criterion for the existence of a category is that the members share some commonality that out-group members do not have. Different species concepts focus on distinct mechanisms (interbreeding, common descent, ecological selection). Therefore, taxa classified in accordance with *several* species concepts do not share a generating mechanism or any other important feature. Ereshefsky argues that there is no commonality that all different species taxa share, which distinguishes them from other kinds, in particular other taxa. In his view, this amounts to the fact that there is no species category: "there is no unified ontological category called 'species'" (1998, 113). (But the various species *taxa* are considered as real, apparently because the individuals belonging to such a taxon are united by the mechanism that brought this taxon about; a taxon has a unified ontological structure.) Ereshefsky addresses the possibility of giving a disjunctive definition of 'species' based on the three concrete (and

real) species concepts, but argues that these kinds of definitions do not have ontological import.

3. Two Critical Questions. Ereshefsky's account has considerable plausibility; he advances a point that needs to be more fully explored. Pluralism about species is a likely option, and Ereshefsky's ontological approach supplies arguments for why the use of distinct species concepts might be necessary and useful. My reply is consistent with pluralism and largely accepts Ereshefsky's point that some concrete species concepts are based on different and relevant generative mechanisms. However, in my view, this does not entail that the species concept itself is theoretically useless or should be abandoned. I start my discussion by raising two critical questions that Ereshefsky does not address. These issues frame my own discussion and position, because I think that any account of the species concept has to give some reasonable answer to them, which in turn might point to some positive aspects of retaining the species concept.

First, Ereshefsky could interpret the current use of the term 'species' as shorthand for some concrete and legitimate species concept, or as some placeholder that needs to be filled out. But what about *historical* uses of the species concept? Obviously, the species concept has been important for biological theorizing. For example, the models by Lotka and Volterra give a theoretical account of the interaction between predator and prey species, and Darwin's theory of evolution by natural selection explains the emergence or preservation of new species. An account that maintains that the species concept is in fact theoretically useless has to give an interpretation of historical episodes. Ereshefsky's ontological approach admits only three distinct species categories. One could claim that, in the past, biologists partially referred to these categories, or that their species concept was a conflation of the biospecies, phylopecies, and ecospecies concepts. However, such a position seems to be historically unlikely. It is a strong commitment to claim that no categories different from current ones were used in the past. Stanford (1995) argues that the reference of species concepts actually changed during the course of history. Whatever the truth of the matter, Ereshefsky does not address this historical issue. I suggest that we revisit the species concept and look for an account that gives a more favorable historical interpretation than the eliminativist approach, which admits the mere term 'species' and reference to species taxa, but does not acknowledge a general theoretically useful species concept.

My second critical question does not deal with the historical usage of the term 'species,' but rather with the current debate about species concepts. A crucial feature for Ereshefsky's position is his *pluralism* about species. But pluralism means that there are several species concepts, instead of only one legitimate species concept. Thus it might seem that

Ereshefsky has to give us an account of why the concepts he advances are in fact *species* concepts, rather than the three unrelated concepts ‘bio-species,’ ‘phylo-species,’ and ‘eco-species.’ He is not necessarily committed to do so. In any case, an answer to the question of why the different species concepts are in fact *species* concepts might reveal some commonality that could make the species concept theoretically more useful. Ereshefsky does not address this question. Dismissing the fact that we use the term ‘species’ for different species concepts as a “linguistic habit” without ontological import (1998, 115) does not give an explanation of this linguistic habit. In my view, it is interesting to take a closer look at this issue. To be sure, when a term fragments, it is a real question—depending on the concrete situation—whether the old term is useless and has to be replaced in favor of the new concept. My point stems from that the fact that the species concept figured in former theories that were able to offer adequate explanations, and from the fact that there is a real debate about the plurality of species concepts. This suggests that we should address the question of what makes a concept a species concept. Then we might uncover a more favorable interpretation of its historical usage and reveal that the concept is theoretically more important than Ereshefsky’s eliminativism admits.

4. Investigative-Kind Concepts. Ereshefsky’s argument against the species category has two steps. First he argues that the taxa defined by the three legitimate species concepts have no characteristic features in common because they are defined by means of different generative mechanisms and thus have different ontological structures. He then concludes that an alleged species category does not exist because any category needs a common feature. My reply does not reject outrightly either step of this argument. It largely accepts Ereshefsky’s argument for pluralism while suggesting a different conclusion. While Ereshefsky’s position is ontological, my approach is epistemic and is called the *investigative account*. In a nutshell, it provides the following picture of the species concept. While for Ereshefsky, the general species concept can be nothing more than a disjunction of the three concrete species concepts, the investigative account, on the other hand, maintains that the *general* species concept sets the standard for what counts as a good species concept. Namely, a *concrete* species concept should pick out species taxa and contribute to explaining the evolutionary and ecological behavior and properties of species. The investigative account thus addresses my second critical question.

In Ereshefsky 1998 eliminativism is called antirealism. However, in what follows I avoid framing my discussion in terms of realism vs. anti-realism because realism is a delicate concept used with several meanings.

Kitcher (1984) and Stanford (1995), for instance, have an understanding of species realism that appears to be different from Ereshefsky's. A complete discussion about the theoretical usefulness of the species concept should be based on an elaborated philosophical theory that gives a convincing account of scientific concepts and conceptual change in science. This paper is not the place to defend such a theory. For the present discussion it is sufficient to point out that any theory of concepts with the following features gives a philosophical foundation for my position on the species concept. These features seem to be plausible constraints on any theory of concepts. For example, an adequate theory of concepts takes a middle road between an approach that assumes that a concept fundamentally changes whenever scientific theories change (Kuhnian semantic incommensurability), and a purely causal theory of reference that assumes that a concept gets introduced and that our set of beliefs about the referent rather than the concept changes (the account of Putnam 1975). Concepts are dynamic entities, in a sense similar to theories, which change during the course of scientific investigation. They are historical entities. A current concept might be derived from a former variant, and may reflect some aspects of the former usage. A convincing theory of scientific concepts, therefore, has to take pragmatic and epistemic factors, as well as the theoretical and explanatory interests that are associated with having a specific concept, into account. Brigandt (n.d.a) and (n.d.b) work towards such an account.

A special type of concept that is of interest for the present case is what I call an *investigative-kind concept*. An investigative kind is a group of things that are presumed to belong together due to some underlying mechanism or a structural property. The idea that these entities belong to a kind might be due to some interesting similarities. Scientists perceive a certain pattern in nature. However, these similarities are not deemed to be what characterizes this kind. Instead, an investigative kind is specified by some nontrivial underlying feature or process that is presumed to account for the observed similarities. An investigative-kind concept thus originates when a certain pattern among a class of objects is observed and it is assumed to be founded on some theoretically important, but yet unknown relevant mechanism that generates this pattern. An investigative-kind concept is associated with a search for the basis of this kind. A specific hypothesis about the nature of this basis might exist and motivate the introduction of an investigative kind concept and guide scientific research. A full theoretical account of the investigative kind can only be given after appropriate empirical study and might reveal a variety of complications. An investigative-kind concept may change its reference throughout scientific investigation. In addition, the study might reveal that the group of entities cannot be considered an investigative kind at all, in which case the concept is likely to be abandoned. Objects originally assumed to belong to

the extension may prove not to be members of the kind. If it becomes clear that there are several relevant mechanisms that account to some extent for the observed pattern that was important for the introduction of the term, the concept may split. In any case, an investigative-kind concept goes together with a scientific search, which might be open-ended.

The (general) species concept is an investigative-kind concept. The origin of the species concept is a certain perceived pattern among organisms. Despite individual differences and similarities across large groups of organisms, there seem to be groups of organisms that have very conspicuous similarities and form some kind of biological unit. Independent of having some definition of species, we are able to recognize species taxa to a sufficient degree of intersubjectivity. The members of a species taxon are morphologically and behaviorally very similar in comparison to other species, and species have typical ecological relationships. There is a good deal of agreement over species taxa even in a cross-cultural context (Atran 1990). It is fundamental to realize that biologists address something that might be called the “species phenomenon.” The fact that the species concept is an investigative-kind concept means that we need a theoretical account of the mechanisms or features that bring about the perceived pattern among organisms.¹ Indeed, considering something as an investigative kind triggers the search for these underlying factors. It is not obvious that species are investigative kinds, because it is not clear in advance that there are biologically interesting and acceptable features that define groups of organisms that largely coincide with the taxa considered as species and account for the properties that motivated the introduction of the investigative-kind concept. (It was an open question for Buffon and Lamarck whether such features exist.)

Throughout biological investigation the understanding of species and the concrete grouping of organisms into species taxa may change. For instance, empirical investigation reveals that the situation is not as simple as originally assumed. Species hybridize and the boundary between species and higher taxa is sometimes not very sharp. In addition, different concrete biological features that might overlap and intergrade might be candidates for a theoretical account of species. This is one reason why we have different species concepts. Some researchers focus on common descent, others on gene exchange, still others on ecological competition, while all of these factors have an influence on producing the units we call species. My account of investigative-kind concepts is perfectly compatible

1. Boyd (1999), Griffiths (1999), and Wilson (1999) make some similar points. The crucial feature of my account, however, is to stress the fact that the species concept as an investigative-kind concept may be subject to conceptual change based on empirical findings. Investigative-kind concepts exhibit the open-endedness of scientific search.

with this situation. Different species definitions are instantiations of the same scientific search. Despite distinct perceived patterns and motivations to search for an underlying basis, different theoretical accounts might be equally plausible and important to give some understanding of the situation. Viewing the species concept as an investigative-kind concept addresses my first critical questions. The investigative-kind concept approach does not preclude a favorable and realistic interpretation of the history of the species concept. Even though the theoretical understanding of an investigative kind concept may change, this does not mean that in the past there was no such concept or that it was theoretically useless.

In certain cases it is legitimate to say that the fragmentation of a concept (or conceptual change in general) leads to the elimination of the original concept, or makes it at least theoretically problematic. Unlike Ereshefsky, I do not use ontological criteria, but *epistemic* conditions to determine the usefulness of a concept. An investigative-kind concept needs to be eliminated if two (related) conditions obtain. First, elimination of the original concept occurs if it cannot figure in theoretical generalizations as it was believed to be able. The term 'species' is used in different theoretical contexts throughout biology. However, the *general* species concept might in fact not be able to be part of theoretical generalizations and explanations across different branches. Instead, we might need different concrete species concepts for different groups of organisms or different branches or theoretical approaches in biology. For instance, talking about 'species' in the context of ecology might actually have to be a shorthand for 'ecospecies'—the general species concept and no other concrete species concept is able to yield the explanations and generalizations that are characteristic for ecological theorizing. Second, elimination of the original concept occurs if the theoretical motivation for the original species concept proves to be inadequate due to empirical findings, and the different new concepts focus on independent motivations. The theoretical role that the original concept played for biology might have to be largely abandoned and the theoretical roles of new and more adequate concepts may have hardly anything in common with the original concept. In the case of species, current concepts might be adequate for addressing and accounting for species-related issues in systematics, evolutionary biology, and ecology. But if they do not retain features of the function of the original concept or legitimize this concept to some extent, there is no longer any real or substantial question about whether a current or proposed concept is in fact a species concept.

Let me give a concrete example to illustrate my criteria. Elimination of the general species concept would clearly be required if all concrete species concepts violated its presuppositions as radically as the phenetic species concept (which defines base operational taxonomic units). Numerical taxonomy criticized and abandoned several features of the traditional

understanding of species. Species were not considered as kinds with a specific (historical) basis, and phenetic approaches accepted some items of the theoretical role of the species concept for classification, while trying to keep their taxonomic concepts independent of evolutionary theory. If several species concepts were the product of a critique of the traditional role of the species concept and focused on independent issues (one species concept might address ecology alone, another only evolutionary theory) then the original concept would in fact be theoretically useless.

5. A Defense of the Species Concept. The situation under which an investigative-kind concept needs to be eliminated does not obtain for the species concept. Taking a closer look at Ereshefsky's account reveals why this is the case. Ereshefsky proposes three species concepts based on three different generative mechanisms. However, this is an oversimplification of current accounts and definitions of species. Several *distinct* current species concepts belong to each of Ereshefsky's mechanisms. Within the interbreeding approach, for instance, we have the biological species concept, the genetic species concept, the Hennigian species concept, and the recognition species concept (using the terminology and classification of Mayden 1997). Ereshefsky does not tell us why he ignores the variety of extant species concepts rather than eliminating the terms 'biospecies,' 'phylo-species,' and 'ecospecies' in favor of the most prominent species concepts existing in the biological literature. A much more important point is that there is also overlap with respect to the mechanisms that bring about the units called species. Often common descent and ecological selection, as well as interbreeding are important for maintaining the coherence of a species. And because of this overlap and continuous transition between different evolutionary mechanisms, it is not obvious what counts as a unique and separate factor. A crucial assumption of Ereshefsky's ontological account is that there are three (at least several) mechanisms. He argues for elimination because these mechanisms are assumed to be distinct and independent. This does not fit with current species concepts. Templeton's cohesion concept or Waples's evolutionary significant-unit concept both include interbreeding and ecological competition. It is the case for many species concepts that they combine elements that Ereshefsky treats as independent mechanisms. Different generative factors partially overlap and reinforce each other. This is a problem for Ereshefsky's ontological account—but not for my investigative account.

The same point can be discussed at the level of biological fields rather than at the level of species concepts. Ecological selection is important for ecology. However, ecology cannot ignore other mechanisms such as phylogeny and interbreeding. This is due to the fact that all these mechanisms shape the biological units—species—studied by ecology. Ecological pro-

cesses are influenced by the effects of phylogeny and interbreeding. These mechanisms have an impact on the structure and ecological behavior of populations. For these reasons, it is not the case that a concrete species concept can only be used for one branch of biology—the ecological concept (or Ereshefsky's ecospecies concept) is not just of concern for ecology. This shows that my epistemic elimination conditions are not met in the case of the species concept. Due to the overlap and reinforcement of the mechanisms generating species, the extension of different species definitions shows a good deal of overlap. The general species concept figures in theoretical generalizations and explanations across different branches of biology. In systematics, species are characterized by the fact that they are basal taxa. Species play an important role in evolutionary theory. Several biologists think that species are important in a sense that higher taxa are not (e.g., they are the first irreversible step in phylogenetic branching). Species are considered to react as a unit in evolution (Ghiselin 1987, Mayr 1970, Simpson 1961, Wiley 1981). They are not only brought about and modified in the course of evolution, but they also influence the way evolution proceeds. In addition, species are important theoretical entities for ecological theorizing and conservation biology nowadays. The species concept is a vital theoretical tool in studying ecological competition and biodiversity. Usually, the general species concept has an application to all these tasks and theories. This is a crucial argument for the importance of the species concept. If the different concrete concepts applied only to distinct parts of biological theory, Ereshefsky would have a reason for separating them. However, it is not the case that assessing biodiversity in conservation biology can be done only with, say, the ecological species concepts and that theories of speciation can only mean 'species' in the sense of the biological species concept. Instead, many biological theories and branches can live with using the term 'species' without concrete specification of a definition of species.

De Queiroz already defended the general species concept by pointing out that all concrete concepts assume that "species are segments of population-level lineages" (1999, 53). This characterization is his general lineage concept of species, and other concrete concepts and definitions are viewed as variants of this concept. Unlike de Queiroz, I emphasize the unifying effect of the *theoretical role* of the species concept. In virtue of figuring in different biological theories, the *general* species concept sets the standards of what counts as an adequate concrete concept or species definition. A good species concept needs to pick out species taxa, to account for the perceived pattern in nature, and to fulfill its role as a species concept in taxonomic, evolutionary, and ecological theorizing. The investigative approach to the species concept helps reveal the relation between the different concrete concepts, on why they are species concepts, and on

what makes them adequate species concepts. Given the general role of the species concept as an investigative-kind concept, I have an account of why we now have better species concepts, rather than just different concepts. In addition, my approach allows for historical continuity. Both former (e.g., idealistic) and current (e.g., phylogenetic) accounts are proposed species concepts because they try to broadly account for the same thing. But former accounts were revealed to be empirically inadequate to do this job. In my view, it is important to realize that the different current species concepts are not independent creations. If one does not take into account that a general species concept motivates these definitions, one is unlikely to understand why they are advanced and whether they are adequate. The debate about various species concepts does not boil down to a situation where some authors do not like it when other scientists use the term 'species' for a different concept than they do. It is a debate about the nature of species. There is (still) a real question of whether, for instance, the ecological concept can really fulfill the role of a species concept. An ecological account may not be able to define discrete kinds, which a good species concept should do. The phenetic understanding of species was largely rejected because it disagreed with several issues that are still considered to be important for a species concept. This does not mean, however, that there can be only one legitimate account of species. The empirical situation might be such that the common theoretical role of the species concept can be played equally well by distinct concrete definitions. The ongoing debate about the adequacy of proposed species concepts shows that we need a general species concept.

6. Conclusion. I argue against Ereshefsky's tenet that the species concept is theoretically useless and that it does not denote a kind. While not questioning pluralism and Ereshefsky's main arguments for it, I defend the species concept from a perspective that uses different criteria for when a concept is useful. I argue that the general species concept is an investigative-kind concept, motivated by a perceived pattern and characterized by the search for the underlying mechanisms of this pattern. The species concept figures in theories across different biological branches and in this manner sets the standards for what counts as an adequate concrete species concept. I outline the conditions in which the fragmentation of a concept suggests the elimination of the original concept. However, these criteria do not apply to the species concept. The use of the term 'species concept' for one of the concrete concepts is not just a linguistic habit that has no conceptually and theoretically interesting explanation. Instead, it is still a real question as to whether a concept is a species concept. The species concept is important for motivating concrete definitions of species and understanding their theoretical role. Besides this, the general species concept can

figure in many theoretical accounts, as biological theories do not work with only one concrete concept. Different mechanisms that shape the origin and coherence of species overlap and reinforce each other and thus are of concern for all branches of biology. In my view, this is reason enough for taking seriously the species concept as a theoretical concept. We are not forced to accept Ereshefsky's radical conclusion and eliminate the species concept in favor of several independent ones. Ereshefsky's strong ontological requirement that a concept is theoretically useful only insofar as it is a category in his sense, is overly restrictive. This account is not sensitive to the theoretical role that some concepts play or how concepts such as investigative-kind concepts actually behave. I hope that my approach tentatively provides a way of looking at the species concept that goes beyond asking whether pluralism about species is adequate, or whether species are real.

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