Philosophy of Science (2026), **00**, 1–10
doi:10.1017/psa.2026.10224

PSA PHILOSOPHY OF SCIENCE ASSOCIATION

PHILOSOPHY OF SCIENCE

CONTRIBUTED PAPER

Explanatory Individuals

Mark A. Bedau

Philosophy, Reed College, USA
Email: mab@reed.edu

(Received 06 April 2026 UTC; revised 13 May 2026 UTC; accepted 18 May 2026 UTC)

Abstract

Metaphysics traditionally presumes a fundamental distinction between kinds (properties, classes, abstract universals) and particulars (concrete individuals). Whereas kinds and classes have members, for example, individuals have parts. This article contrasts the kind/individual distinction with a different but equally fundamental distinction between explainers and nonexplainers. It is often presumed that kinds are explainers and individuals are nonexplainers. This article defends a contrary thesis—explanatory individualism—according to which some explainers are concrete individuals, and it explores how this thesis is connected to the thesis of biological species individualism, according to which biological species are concrete individuals rather than kinds or classes.

1. Introduction

Metaphysics traditionally presumes a fundamental distinction between kinds (properties, classes, abstract universals) and particulars (concrete individuals). One reflection of this distinction is that kinds or classes have members whereas individuals have parts. This article contrasts the kind/individual distinction with a different but equally fundamental distinction between explainers and nonexplainers. It is often presumed that these two distinctions line up, with kinds being explainers and individuals not being explainers. This article defends the contrary explanatory individualism thesis, according to which some actual explainers are concrete individuals, so explanatory individuals exist.

Contemporary philosophy of biology contains a widespread discussion of a different but related individualism thesis specifically concerning biological species. Known as species individualism, this view holds that species are concrete individuals. Species individualism puts species in a distinct metaphysical category from kinds or classes. If species are concrete individuals rather than kinds or classes, then the traditional view that species are natural kinds might look like a category mistake (Hull 1978; Dupré 2001; Lewens 2012; Khalidi 2013). For this reason, many species individualists deny that biological species are natural kinds. Haber (2016) points out that species individualism can be interpreted as denying that species are natural

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https://doi.org/10.1017/psa.2026.10224 Published online by Cambridge University Press

kinds to resolve the inconsistency of the three propositions that species are natural kinds, that natural kinds are defined by essential properties, and that species do not have essential properties (as species).

In contemporary biology a species is thought of as a lineage of causally connected organisms that all originated from the same ancestors (Hull 1978; Ereshefsky 2001). David Hull, an early influential advocate of species individualism, puts it this way: "Just as a heart, kidneys, and lungs are included in the same organism because they are part of the same ontogenetic whole, parents and their progeny are included in the same species because they are part of the same genealogical nexus, no matter how much they might differ phenotypically. The part/whole relation does not require similarity" (Hull 1978, 352). A lineage is a concrete (though scattered) individual rather than an abstract kind or class, so the contemporary view of species fits with species individualism. Each species has a contingent history, starting when it first emerges and ending when it goes extinct. Many species change and evolve over time, in response to processes such as natural selection and neutral genetic drift, among others. The genealogical connections among the members of a species cause the members to share a distinctive cluster of characteristic properties. The cluster may have vague boundaries and borderline cases, and maybe no member of the species has all the species' characteristic properties. The organisms within a species exhibit a diversity of traits, and closely related species may be separated by nothing more than a continuous variation of forms.

Species individualists typically deny that species are natural kinds because they contrast concrete individuals with any sort of kind or class, including natural kinds. Nevertheless, there is widespread agreement that species are explanatory. Each species exhibits a cluster of traits, and those traits and their consequences may be predicted for all or most of the members of the species. Like a natural kind, a species is associated with a cluster of characteristic properties that can be projected across its members and support inductive predictions and explanations about those members and related things.

If species are explanatory, then species individualism is part of the following simple and direct argument for explanatory individualism: Biological species are explanatory, and biological species are concrete individuals, so biological species are explanatory individuals. And biological species exist. So, it follows that explanatory individuals exist. Because species are explanatory, species individualism directly supports explanatory individualism.

The central point of this article is to promote this argument for explanatory individualism. The explanatory individualism thesis is not completely new; similar theses have been defended by Slater (2013, 2015) and Casetta and Vecchi (2019) and can be traced back to Boyd (1999b). This article explains what explanatory individualism is, documents how widely it applies, and notes some of its consequences for species individualism and for metaphysics and epistemology more generally.

2. Minimal species individualism

We noted earlier that a biological species is a lineage of concrete individual organisms. The organisms in the lineage are scattered across space and time, but they are all connected either directly or indirectly through the reproduction process.

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Furthermore, the reproductive process causes them to share many objective properties. Each organism in a species was produced by a causal process involving its parent or parents. Each individual organism grows and develops during its lifetime (perhaps metamorphizing from larva to adult), and it eventually dies. The species persists as long as enough of the organisms in the lineage continue to exist and reproduce.

The species individualism thesis does not specify what an individual is, but Ereshefsky has distinguished different conceptions of individuals and different corresponding variants of the species individualism thesis. "Sometimes the thesis that species are individuals amounts to nothing more than the claim that the organisms of a species must be genealogically connected. Other times it means something more—for example, that species form cohesive wholes or that the parts of a species causally interact" (Ereshefsky 2001, 112). At issue in this article is the variant of species individualism that Ereshefsky calls minimal species individualism, which requires merely that a species is a concrete individual. Minimal species individualism would be true if species are lineages of genealogically connected organisms—which they are. As Ereshefsky puts it, the genealogical connections within a species make it "a spatiotemporally restricted entity . . . . Its parts cannot be scattered anywhere in space and time but must occupy a particular spatiotemporal region" (ibid., 113). There is no analogous spatiotemporal restriction for an abstract kind or class, for these can be instantiated at any number of different times and places.

Some variants of species individualism have critics (e.g., Slater 2013), but the minimal form of species individualism is comparatively uncontroversial. One reason for this is that species are like typical concrete individuals and unlike abstract kinds or sets in two important ways. First, biological species are concrete physical objects, not abstract objects like sets and classes. Second, species are historical entities; they come into existence and persist for a while, perhaps change and evolve, and eventually go out of existence. Unlike unchanging and eternal sets and kinds, biological species are transitory.

Ereshefsky summarizes the case for minimal species individualism in the following passage:

> A species forms a genealogical entity when its various members are connected by appropriate hereditary relations. Such hereditary relations require that the organisms of a species form a continuous spatiotemporal entity: each organisms of a species must come into contact with another member or its genetic material. This requirement places a restriction on the spatiotemporal location of a species' organisms. Given that species are genealogical entities, species are individuals on . . . [this minimal] account of individuality. (2001, 113)

Ereshefsky is pointing out that Darwinian evolutionary explanations of the traits of a species presume that the species is a certain kind of historical individual—specifically, a lineage of reproducing organisms that have similar inherited traits. Similar traits characterize the species because the species is a lineage of organisms that have acquired those traits from their ancestors and transmitted the traits to their descendants. Of course, species evolve and so the similarity of the traits of the organisms in a species is not perfect, but it also nonnegligible.

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3. Three sufficient conditions for explanatory individuals

The explanation of why biological species are explanatory can be generalized and summarized in three sufficient conditions on explanatory individuals. The conditions presume that we already know what an individual is and specify conditions that would enable an individual to be explanatory. The conditions are not necessary; they permit other forms of explanatory individuals that meet somewhat different conditions. But the conditions are sufficient to make an individual explanatory; they describe one kind of explanatory individual. Specifically, an individual is explanatory if it meets the following three conditions:

1. The individual has "natural proper parts." An individual is explanatory if it is a "one over many" and the many under the one (the individual) are its natural proper parts. The adjective "natural" is attached to parts of an explanatory individual to remind us of their explanatory role as the many that fall under an explanatory individual; for this reason they could be called "explanatory" parts. For example, the individual organisms in a biological species are natural parts by virtue of being many that fall under one explanatory individual. Any parts that make an individual into a one-over-many explainer count as its natural parts.
2. The natural proper parts of the individual are nonaccidentally similar in certain respects; they share certain "hallmarks" or characteristic properties. The characteristic properties might be shared not universally but only with high probability, and the properties might form only a loose cluster that lacks strict necessary and sufficient conditions; but the similarity is not accidental. For example, the organisms in a given biological species typically nonaccidentally share at least a cluster of characteristic properties.
3. The characteristic properties of the natural proper parts of the individual can be projected (predicted, explained) across all its natural proper parts. The properties support induction and figure in the content of scientific laws and theories. The explanatory power of an explanatory individual derives from the similarity of its natural proper parts because that similarity is neither accidental nor arbitrary; it has a unifying underlying explanation. Different kinds of explanatory individuals may have different kinds of underlying explanations for the similarity of their natural proper parts. For example, the similarity of the organisms in a species is caused by all the traits inherited through the reproductive interactions that connect the organisms into a lineage.

These three conditions are enough to make an individual into something that is explanatory. We have already seen that the concrete lineage of organisms that makes up a given biological species fits each condition. (1) The organisms in the lineage are its natural proper parts (the "many" under the "one" species). Of course, the lineage has other proper parts that are *not* organisms. For example, a branch of the lineage is a proper part of it but it is not an organism (though it contains many organisms), and the cells in the organisms are also parts of the lineage. Given the right circumstances those cells could also be natural parts of the species. (2) The organisms in the lineage generally share certain distinctive characteristic properties. (3) The characteristic properties can be projected across the members of the species because there is a

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unified causal explanation for why the members have those properties. That explanation involves a number of details involving genetics, heredity, natural selection, genetic drift, among other things.

Some individuals that could be called explanatory are not explanatory individuals as described in the preceding text. For example, Ereshefsky (2010, 678) distinguishes "two distinct ways in which scientists classify things" and terms them "kind thinking" and "individual thinking." He stresses that the parts of a given individual need not be similar to one another but they "must be appropriately causally related." So, while Ereshefsky's individuals figure in scientific explanations, they are not the explanatory individuals identified here. As a more homespun example, consider explaining why my dog is barking by pointing out that she sees the UPS truck. The truck is an individual that could be said to explain her behavior because seeing it causes her to bark. By contrast, rather than involving an individual's causal effects, an explanatory individual involves the projectability of its similar parts.

An explanatory individual is explanatory similar to the way that a natural kind is explanatory. For a natural kind fits three conditions that are analogous to the three conditions listed in the preceding text for explanatory individuals:

i. It is a one over many, and the many are its instances or members;
ii. Its instances share a cluster of characteristic properties; and
iii. The characteristic properties can be projected (predicted, explained) across its instances.

Conditions (i)–(iii) enable natural kinds to fulfill their characteristic explanatory role of supporting induction (prediction, explanation) and providing the content in scientific theories and laws. Aside for globally swapping "instances" and "natural proper parts," (1)–(3) and (i)–(iii) are the same. Both sets of conditions enable something to be an explanatory entity (individual or kind) by supporting induction and providing content to scientific theories and laws.

While conditions (1)–(3) might not be necessary conditions on all explanatory individuals, the conditions do characterize one especially simple kind of explanatory individual. This suffices to establish and explain the existence of explanatory individuals. But simple explanatory individuals are not the whole story. There are also other more complicated explanatory individuals, such as historical individuals that change their characteristic properties in systematic and predictable ways over their lifetimes. Thus, it's not just the *similarity* of the parts of an individual that can be predictable and projectible, but also the *variation* of those characteristics. That kind of projectable and predictable variation over time is a hallmark of a more complex kind of explanatory individual. Because of space limitations, this article focuses on describing and illustrating only simple explanatory individuals, explaining why they exist and noting some consequences.

4. More examples of explanatory individuals

Biological species are the tip of an unnoticed iceberg of explanatory individuals. It might seem that explanatory individuals are esoteric and rare; but once you know to look for conditions (1)–(3) it is easy to identify further varieties of explanatory

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individual. We can start to appreciate the diversity of explanatory individuals by considering a few more examples.

Another biological example of an explanatory individual is the Hela cell line. Hela cells are kept alive and used in biomedical research in laboratories scattered across the world because they have a number of useful properties, such as how durable and prolific they are, and they divide indefinitely in cell culture plates under proper laboratory conditions (Landry et al. 2013). Somewhat like a biological species, this cell line is an specific historical individual that is scattered in space and time, produced by a process involving biological reproduction, inheritance of genetic material, as well as a consistent laboratory environment created by conscious human effort. While the natural proper parts of a species are the organisms in it, the natural proper parts of the Hela cell line are the individual cells in that line.

It is easy to verify that the Hela call line meets the three sufficient conditions for explanatory individuals: (1) The Hela cell line is a one over many, with natural proper parts (the cells). (2) It's natural proper parts (the cells) have a cluster of characteristic properties; for example, they are durable, prolific, and divide indefinitely in cell culture plates under laboratory conditions. (3) The characteristic properties can be projected across all or at least most of the cells in the line. The characteristic properties are projectable across the cells because the cells all inherit those properties when they are produced by the cellular division of a parent Hela cell.

Biological species and the Heli cell line are both biological examples of explanatory individuals. Artifacts constructed by humans for idiosyncratic human purposes provide a rather different kind of explanatory individual. For example, consider a roll of pennies. A roll of pennies is carefully manufactured to so that all the pennies conform to certain design and manufacture specifications, so they all share many properties (size, shape, mass, material composition, electrical conduction, etc.). It is easy to see that a roll of pennies fits each of the sufficient conditions for explanatory individuals: (1) The roll is a one over many, and the individual pennies in the roll are its natural proper parts. (2) The pennies in the roll share certain characteristic properties; they all have the same shape, size, weight, material composition, and they all have the same chemical and electrical properties. (3) The characteristic properties can be projected across all the pennies in the roll because they have a unified underlying explanation: the uniform mechanical process by which the pennies are produced and the common standards to which they are manufactured. (The characteristic properties of the pennies in one roll can also be projected across the pennies in all the other rolls that are produced by the same standardized mechanical process.) The characteristic properties of the pennies is due to the uniformity of the process that created each penny.

The Mississippi River is another explanatory individual. This river is a physical object that is extended in space and persists through time. For simplicity, let us focus on just the water in the river, and ignore the river's other features, such as its banks, sources, and watershed. (1) The spatiotemporally connected quantities or "samples" of the water in the river can be thought of as its natural proper parts. The samples of water come into the river and become part of it, flowing downstream for a while, and eventually they leave the river and cease being part of it. Note that the quantities of water can overlap. There are lots of different ways of dividing the water in the river into quantities; no single division into quantities deserves preferential treatment.

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(2) The natural proper parts of the river share a set of characteristic properties (the water might have a variety of distinctive and characteristic features, a certain taste and smell and feel and appearance, a certain profile of microbiota, a characteristic distribution of minerals picked up from the materials in its banks, a characteristic distribution of chemicals that have leached into the water from runoff from nearby sprayed agricultural lands). (3) This river is also explanatory; it's members have a set of objective explanatory properties. We can imagine, for example, that a specific turbidity and taste can be projected for all (or most) of the quantities of water in the river. Once you know the characteristic properties of one quantity, you can project them to the other quantities in the river.

This description of the Mississippi River is somewhat simplified. The characteristics of its water certainly vary somewhat over its vast course, but its water samples probably also share enough distinctive characteristics for the river to qualify as a simple explanatory individual. Of course, some of the characteristics of its natural parts no doubt vary widely over the river's vast course. And if some of that characteristic variation is systematic, predictable and projectable, then the river would still qualify as the sort of *complex* explanatory individual mentioned in section 3.

We have noted a diverse range of explanatory individuals: biological species, cell lineages, rolls of pennies, and rivers. Many further examples can be identified. The upshot of all these examples is that explanatory individuals are numerous, varied, and widespread.

5. Implications for minimal species individualism

Explanatory individualism and species individualism lend credence to each other. Because explanatory individuals are widespread, many concrete individuals have explanatory significance. Biological species are just one example of this larger pattern, and the pattern lends credence to the thesis that species are concrete individuals. In this way, explanatory individualism supports species individualism. Explanatory individualism does not entail species individualism, but it opens the door for it. Similarly, species individualism lends credence to explanatory individualism. Because species are explanatory, species individualism entails that explanatory individuals exist, that is, it entails that the thesis of explanatory individualism is true. In the same way, any other example of an explanatory individual would verify explanatory individualism. If one denies explanatory individualism but accepts species individualism, then it is hard to explain why species are explanatory. But this problem evaporates once explanatory individualism is accepted and it is recognized that concrete individuals can be explanatory.

6. Implications for natural kinds

Species individualism has implications for natural kinds. Biological species are traditional paradigm cases of natural kinds. Today many think that the members of a natural kind all share at least a cluster of typical properties or hallmarks and those hallmarks can be projected (predicted, explained) across the members of the kind. Various forms of this view have been developed by Boyd (1999a), Magnus (2012),

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Khalidi (2013), and Slater (2015), among many others. And biological species fit this bill perfectly; the members of a species share a cluster of projectable properties.

Today, many also presume that the objective explanatory hallmarks tied to a natural kind are fixed, static, unchanging, and eternal; in other words, the explanatory properties of a given natural kind are fixed forever. However, this presumption has been called into question. For example, in a presentation at PSA 2020/2021 I argued that the hallmarks of some natural kinds are dynamic and can change over time. Furthermore, I argued that a dynamic natural kinds is not necessarily eternal; it might come into existence with certain hallmarks, change some of those hallmarks over time, and eventually go out of existence forever. This argument entails that there is a contingent life history of the explanatory impact of some natural kinds.

Note that biological species are also dynamic in precisely these ways. A species is a lineage of organisms, and the organisms in the lineage share a specific cluster of projectable properties. The species persists while its individual members come into existence and go out of existence. And at a larger time scale, the individual species come into existence, perhaps change and evolve a bit, and eventually go out of existence. A species also has a contingent life history. In fact, the contingent life history of a species it is precisely what motivates the thesis of species individualism.

Defenders of species individualism often stress the ontological distinction between kinds or classes and their members, on the one hand, and concrete individuals and their proper parts, on the other hand (e.g., Hull 1978; Dupré 2001; Ereshefsky 2010; Lewens 2012; Khalidi 2013). From this perspective, if we accept species individualism then species cannot be natural kinds because they are not kinds of any sort, and it is a category mistake to think otherwise. However, if we consider all objective explanatory kinds to be natural kinds, and if explanatory individuals are objective and explanatory, we could allow any kind of explanatory entity to be viewed as a natural kind by curtesy. Boyd (1999b), Okasha (2002), and LaPorte (2004), among others, express similar skepticism about a sharp distinction between kinds and individuals.

Explanatory individualism fits with the dynamical natural kinds thesis. That thesis implies that biological species are natural kinds that are dynamic because they have a contingent life history during which they change and evolve. Instead of individuals and kinds being mutually exclusive, they become consistent if "kinds" can have either instances or natural proper parts. Given these terms, a biological species is both an individual and a kind. The species is an individual because it is an historical entity with a birth, life history, and death, and it is a kind because its member organisms are natural proper parts that share a cluster of characteristic properties. Recognition of the widespread existence of explanatory individuals normalizes dynamical natural kinds and makes them to be expected. It quiets the worry that natural kinds cannot be dynamic on the grounds that dynamic entities must be individuals and not kinds. The resulting picture is that explanatory individualism in conjunction with species individualism and dynamical natural kinds form an interlocking and mutually reinforcing triad of theses.

7. Implications for metaphysics and epistemology

Widespread explanatory individuals also have consequences for metaphysics and epistemology more generally. By definition, explanatory entities can fulfill the central

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epistemic function of providing explanations, and any entity that is explanatory will fall into some metaphysical category, such as a concrete individual or an abstract category or kind. One consequence of explanatory individualism is to underscore that explanatory entities can fall into different metaphysical categories; some can be abstract kinds or classes but others can be concrete individuals. So, the fundamental metaphysical distinction between individual and kind is crosscut by another fundamental metaphysical distinction between explainers and nonexplainers, that is, entities (whether individuals or kinds) that are explanatory and entities that are not.

Note that some explanatory entities have very little explanatory power while others have quite a lot. Also, note that explanations come in various modes or forms; think of Aristotle's four causes and their contemporary descendants, of synchronic versus diachronic explanations, of material versus functional explanations, and so forth. These considerations show that another broad consequence of explanatory individualism is that the distinction between explainers and nonexplainers is not a dichotomy but a matter of mode and degree. Analogous conclusions have been drawn about natural kinds by Slater (2013, 2015) and Khalidi (2013). There are different modes of explanatory entities, and there is no sharp line separating explainers from nonexplainers. The degrees might be coarse-grained (none, very little, a moderate amount, a great deal) or fine-grained (such as specific probabilities). Although the explanatory power of any actual explanatory individual is nonnegligible, no nonarbitrary sharp line demarks exactly how little explanatory power an explanatory individual must have. As a consequence of this, there might be no definitive answer to whether or not some actual individual is explanatory.

Some might worry that the lack of a dichotomy is a flaw in the concept of an explanatory individual. If the explanatory power or mode of some individual is sufficiently marginal, it might be an ineliminable borderline case of an explanatory individual. The borderline case was not due to any epistemic shortcoming on our part, and it could not be prevented by acquiring more information about the individual. Rather, the explanatory quality of the individual might simply be marginal. So, the concepts of explanatory individual and explanatory entity open the door to borderline explainers. However, this is not a defect but an attraction of the concepts. We need concepts that allows for degrees of explanatory power and borderline cases because such things seem to exist.

Acknowledgments. I am grateful for helpful comments on earlier drafts of this paper from Matt Haber, John Huss, Emily Parke, Matthew Slater, and the audiences at the 2022 Australasian Association of Philosophy Conference, the 2023 meeting of the Pacific Division of the APA, and the 2024 meeting of the Philosophy of Science Association.

Funding Information. None to declare.

Declaration of Competing Interests. None to declare.

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Cite this article: Bedau, Mark A. 2026. "Explanatory Individuals." *Philosophy of Science*. https://doi.org/10.1017/psa.2026.10224

https://doi.org/10.1017/psa.2026.10224 Published online by Cambridge University Press