Evolutionary Theory, Anti-Essentialist Consensus and the Roles of Different Notions of Essence

Edit Talpsepp

Department of Philosophy, University of Tartu

According to the consensus among philosophers of biology, essentialism in biology is wrong and inconsistent with evolutionary theory. However, most anti-essentialist arguments only apply to intrinsic shared-nature kind essentialism. There has been a number of attempts to rehabilitate essentialism by proposing "alternative"—relational, historical and teleological—notions of essence. Different authors who have proposed different notions of essentialism have different attitudes towards the anti-essentialist consensus. Relational essentialism was proposed in order to support this consensus, David Walsh's teleological essentialism as a demonstration that the consensus is wrong. Michael Devitt tries to refute the anti-essentialist consensus by arguing why relational essentialism is inadequate and why intrinsic biological essentialism holds after all. By giving my classification of the roles that are traditionally ascribed to essences, roughly distinguished into taxonomic (semantic and definitional) and explanatory (causally executive and causally constitutive) roles, I will analyse which properties, deemed as different sorts of essences, are capable of serving these roles, and why neither Devitt nor Walsh managed to refute the anti-essentialist consensus. Whereas some relational properties are capable of bearing at least some taxonomic and explanatory essence-roles while at the same time not being inconsistent with the anti-essentialist consensus, I will use my role-based analysis to provide the arguments for why we should not promote *any* kind of essentialist framework in the context of evolutionary theory, and for the explanations of why my biological anti-essentialism does not allow even alternative sorts of essentialism.

Keywords: biological essentialism, evolutionary anti-essentialist consensus, roles of essences, intrinsic biological essentialism, historical biological essentialism, relational essentialism, historical essentialism, teleological essentialism

Corresponding author's address: Edit Talpsepp, email: edit.talpsepp@ut.ee.

Studia Philosophica Estonica (2023) **16**, 14–46

Online ISSN: 1736–5899
www.spe.ut.ee
https://doi.org/10.12697/spe.2023.16.03

1. Introduction

What is usually meant by biological essentialism is the view that biological taxa have underlying intrinsic essential properties that are causally responsible for other, nonessential properties—such as typical appearance, behaviour and ecological preference of taxa members. This sort of essentialism is often ascribed to pre-Darwinian taxonomists, such as Linnaeus. According to Mayr (2004, 889), pre-Darwinian biological essentialism was influenced by the views of Plato, according to whom "the world consisted of a limited number of [fixed] classes of entities." Other authors, such as Amundson (2005), Müller-Wille (2007) and Winsor (2003) claim this view that they call "essentialism story" or "essentialism myth", created by thinkers like Hull (1965), Mayr, etc., not to reflect historical reality. Amundson (2005, 13) says that while most pre-Darwinian intellectuals [including Linnaeus] believed in species fixity indeed, it was "an empirically founded discovery of the mid-eighteenth century, not an ancient doctrine from Greek philosophy and Christian theology." Müller-Wille and Winsor claim that contrary to a common (mis)conception, pre-Darwinian taxonomic practice was actually not based on rigid essentialist definitions of taxa.

No matter whether the "pre-Darwinian essentialism" is a historically adequate notion or not—probably partly the essentialism story, partly the fact that biological species were used as examples of essentialist natural kinds in famous writings of Kripke (1980) and Putnam (1975) served as impulses of giving rise to a powerful anti-essentialist consensus among philosophers of biology. It is held by this consensus that biological essentialism is wrong, incompatible with Darwinism and needs to be overcome as the result of adopting evolutionary theory. Okasha (2002) gives two main arguments against the essentialist assumption that a species taxon is defined by a physical property or a set of properties that all and only the members of that taxon possess. Firstly, it is an empirical fact that usually there are no physical properties that all and only the members of a particular taxon possess (Okasha 2002, 196). According to his second, conceptual argument, even if it were the case that all the members of a species shared some trait, it would not make this trait essential to that species. It is because if a member of the species produced offspring that lacked this characteristic, say because of mutation, it would still very likely be classed as conspecific with its parents (Okasha 2002, 197). Essentialism concerning species taxa also leads to the assumption that these taxa have sharp boundaries, which in turn is inconsistent with the gradualness of evolutionary change (Hull 1965). Moreover, biological essentialism is criticized for leading to taxonomic monism that is inconsistent with the alleged need for taxonomic pluralism, posited by modern evolutionary biology (Walsh 2006, 431–432).

However, these arguments are targeted only against intrinsic shared-nature essentialism, according to which a kind essence is some physical property that is shared by all the members of the kind. Based on the fact that all the modern species concepts (biological, ecological, phylogenetic) are based on relational properties (interbreeding, ecological, phylogenetic relations, respectively) (see Okasha 2002, 192–202)—Okasha (2002), LaPorte (2004) et al. have proposed relational essentialism, according to which essences of species taxa can be given via the relationships between their members or between the members and their environment. LaPorte (2017), Griffiths (1999), Godman (2021), Papineau and Mallozzi (2020) have also proposed a certain kind of new relational essentialism—historical essentialism—according to which it is the common ancestor and the location on a genealogical nexus that form the essence of a taxon (although Griffiths claims that unlike in the case of higher taxa, there is more to the essence of a species than just that). Moreover, Walsh has proposed teleological essentialism[1] that he claims is not only compatible with, but even indispensable for understanding evolutionary biology. These suggestions concerning relational, historical and teleological essentialism seem to serve as the attempts to "rehabilitate essentialism" (to use Walsh's expression) in the context of modern "anti-essentialist biology."

Different authors have different attitudes towards the anti-essentialist consensus. Relational essentialism was proposed to support this consensus, Walsh's teleological essentialism as a demonstration that the consensus is wrong. Devitt (2008) tries to refute the anti-essentialist consensus by criticizing relational essentialism and aiming to show that intrinsic biological essentialism holds after all. In his later writings (most extensively in Devitt 2023), Devitt also stresses the importance of historical component of essences, proposing the sort of essentialism that he calls *historical biological essentialism*; however, according to him purely relational essentialism is explanatorily hopeless, and those explanations ultimately supervene on intrinsic properties.

The attempts to protect or disprove different notions of essentialism can be analysed by asking which roles that are typically ascribed to essences, the respective relevant essences can perform. In his defence of relational essentialism, Okasha (2002) claims that relational essences must have only some of these roles. Devitt's (2008; 2023) arguments against the anti-essentialist consensus are built on the demonstration of which roles (purely) relational essences cannot play, while intrinsic essences can. The proponents of historical essentialism support their position by claiming that historical essence

[1] An expression used by Lennox (1987, 340) but also accepted by Walsh who prefers the expression "Aristotelian essentialism" himself.

of a taxon, i.e. its members deriving from a common ancestor, explain the traits of taxa members (or according to Godman et al. (2020), correlations between these traits); Godman (2021) also claims that a common ancestor has both explanatory and identificatory role, whereas those two roles cannot really be distinguished from each other. Walsh tries to refute the anti-essentialist consensus by claiming that this consensus has become massively anti-individualistic which is inconsistent with roles that the purposive teleological properties of individuals play in evolutionary biology. When trying to refute or support the consensus, different authors shift certain roles from some properties to others.

The main aim of this article is to demonstrate why deeming some properties essentialist at the expense of others might be inadequate and/or give the impression that the purportedly essentialist traits have a primacy in taxonomic and explanatory activities while this might not be the case. For instance, Devitt's attempt to rehabilitate intrinsic essentialism by criticizing relational essentialism is not successful since taking intrinsic essences as necessary and sufficient criteria of species membership is inconsistent with actual "science-making", and because relational properties are not as "explanatorily hopeless" as Devitt has claimed. Relational properties might influence the intrinsic properties that are allegedly appealed to in *proximate* explanations of the traits of individuals, they are important factors in *distal* explanations of traits, and have a primary position in *causally constitutive* explanations which also hold an important place in evolutionary biology. However, role-based analysis demonstrates why some suggested "alternative" (historical and teleological) essences also fail to fulfil traditional *taxonomic* essence-roles, and hence do not help to rehabilitate biological essentialism.

The claim that essences can have different roles is not new, and different taxonomies of these roles have already been suggested (see for instance Wilkins 2013; Gelman and Hirschfeld 1999). However, by laying out and applying my taxonomy of essence-roles, I hope to demonstrate some unnoticed consequences of various debates concerning the roles of different forms of essences. The debates concerning pro and con different forms of essentialism usually regard 1) taxonomic roles of essences, 2) explanatory roles of essences. Whereas semantic, definitional, identificatory, etc. roles have often been reflected in some taxonomies of essences, the distinction between *semantic* and *definitional* roles is usually not explicitly brought out; I, however, take this distinction to be relevant especially for the debates concerning taxonomic roles of relational vs intrinsic essences.

And whereas there are quite common references to what I call the *causally executive* role (both in its proximal and distal version) of an essence, even in the debate of this paper (Devitt 2008, Devitt 2023, Okasha 2002), and also

to *constitutive* role (it is similar to what I call *definitional* role, see for instance Tahko and Lowe 2025), I have not seen *causally constitutive* role been included in the taxonomies of essences. Whereas I take intrinsic properties to be capable of bearing causally executive (or even constitutive, the way I understand it) role, in *causally constitutive* explanations, underlying modern species concepts, relational properties are usually more prominent.[2]

All in all, after having introduced my taxonomy and characterization of different essence-roles, and having analyzed which kinds of properties are capable of bearing these roles, I will give my reasons for why I consider promoting *any* kind of essentialist framework in the context of evolutionary biology an unfruitful or even harmful strategy—hence my own support of anti-essentialism without the opportunity for rehabilitating even the suggested "new" "alternative" forms of essences.

2. Different Roles of Essences

2.1 The definitional role of an essence

My conception of the definitional role of an essence is based on the traditional account of definition, according to which "class terms[3] are defined by sets of traits which are severally necessary and jointly sufficient for the membership in the class" (Hull 1976, 178). Following this account, definition of a "kind" hence provides necessary and sufficient criteria for belonging to the kind, but also defines what the kind members are. For instance, belonging to the kind "triangle", i.e. being a triangle, is based on the definitional essence of the kind "triangle"—the property of being a plane figure with three straight sides and three angles. My notion of "definitional essentialism" overlaps with that of John Wilkins (2013, 404), but is also consistent with how Gelman and Hirschfeld (1999) characterize sortal essences: "the set of defining characteristics that all and only members of a category share" (Gelman 2003, 8).

In traditional metaphysical literature on natural kinds, atomic numbers are usually considered the essences of chemical kinds (Bird and Tobin 2017) and constitutive of their definition. In the context of evolutionary theory, however, the definitions of species taxa cannot be given via morphological (or other intrinsic) properties mostly because of the general arguments against traditional intrinsic essentialism concerning species taxa: the fact that modern species concepts are based on relational properties (see Intro-

[2] Note that I might have left out some other important roles of essences that are relevant for the essentialist—anti-essentialist debate, but I believe that the distinctions that I have made are sufficient and helpful for the discussion of the present paper.

[3] By "class", Hull basically means "natural kind." In the context of my paper, the term "kind" has a wider meaning than traditional "natural kind"—it is rather something like a "category" in a more general sense.

duction).[4] This has also prompted the attempts of seeing these properties as necessary and sufficient for membership in a species, and relational essentialism as a way of "rehabilitating" biological essentialism (see Ereshefsky 2022). However, one of Devitt's (2008) arguments against relational essentialism is namely its alleged inability to provide definitions of species taxa, and in order to fully understand his criticism and its implications for relational essentialism, I deem it necessary to make a distinction between definitional and semantic roles of essences.

2.2 The semantic role of an essence

By the semantic role of an essence, I mean its ability to give necessary and sufficient criteria for belonging to a kind, i.e. its extension. According to my interpretation, while the definitional role usually also serves the semantic role, the reverse does not always hold: the properties serving the semantic role might not give the definition of the kind.

In traditional metaphysical literature, the double role of the essence of chemical kinds is regarded quite straightforward: the atomic number of a chemical kind provides both its definition and determines its extension (see Putnam 1975). In the case of evolutionary biology, however, the story is somewhat different. Relational properties that underlie modern species concepts are at least in principle capable of giving the extension of biological species, i.e. serving a semantic function (Okasha 2002, 203–204). However, even if we really take these relational essences to function in semantic roles for biological taxa, I agree with those authors who claim that relational essences still might fail to *define* these taxa.

For instance, the Biological Species Concept (BSC) might determine the extension of the species Felis catus based on the interbreeding relations between its members. At the same time, this taxon cannot be defined by interbreeding relations—since there is nothing specific about the species Felis catus concerning this criterion that would not apply to other (sexually reproducing) species as well.

[4] Giving definitions of species taxa might also be a doubtful enterprise in the context of species-as-individuals ontology, famously suggested by Hull (1978) and Ghiselin (1974). According to this view, unlike natural kinds that can function in universally applicable scientific laws due to their samples being spatiotemporally unrestricted, species have spatiotemporally restricted existence between the events of speciation and extinction while their generations are causally related to each other (see Ereshefsky 2022). Hull (1976, 174) paraphrases Ghiselin (1974), according to whom if species are individuals, the names of particular species (like Gorilla gorilla) are proper names which, similarly to the names of particular organisms, can only be described, but not defined.

2.3 The causally executive role of an essence

The role that I call "causally executive" is traditionally considered one of the main roles of essences—the task of causally underlying or explaining the properties of a typical kind member (see also Okasha 2002). In my terminology I follow Barrett (2001, 6) who characterizes an "executive" or "central" cause as something "that is responsible for (some of) an object's properties [...]." "Ruled out by this concept are properties that are merely correlated with the object" (Robinson 2008, 120). What distinguishes the causally executive role from causally constitutive role in my taxonomy is that while the former is related to the kind-specific properties of kind members, the latter concerns the formation and cohesion of kinds (see the next subsection). Whereas the distinction is not so clear in the case of chemical kinds (see also subsection 2.4. and note 8), it is of bigger relevance in the case of biological kinds, and this is why I deem talking about the causally constitutive role of properties important in the context of evolutionary biology.[5]

Note that in the case of causally executive explanations there is a distinction between proximate and ultimate (distal) explanations[6] of the properties of species members. Mayr (1961) characterizes the former as concerned with proximate causation, i.e. "the mechanisms within members of a species that make a generalization true (regardless of the history)" and "part of 'functional biology'" (paraphrased by Devitt 2008, 353). The latter, on the other hand, are concerned with "distal" causation, i.e. "the evolutionary history that led to the mechanisms being present in the members of a species, and part of 'evolutionary biology'" (Mayr 1961, paraphrased in Devitt 2008, 353). As Devitt (2008) points out, his criticism only applies to relational properties' alleged inability to give proximate explanations, he does not deny the component of history in distal explanations.

[5] Quite often the causally executive role has been given to the properties that Locke (1975) characterizes as real essences and that are opposed to nominal essences. Locke takes the former to be "the submicroscopic constitutions which cause the observable qualities of substances" (Jones 2022), and the latter "the operational criteria which we use to decide whether a given object is a member of the kind or not" (Okasha 2002, 194). Note that these sorts of "causational" explanations might actually be just what Ylikoski calls "constitutive" explanations (see next subsection). When characterizing causally executive role of certain properties in the context of evolutionary biology, however, my focus is not on these properties' being microstructural or submicroscopic, but rather on their ability to cause other, kind-specific properties.

[6] Although the terms "ultimate" and "distal" are sometimes used intermittently, I prefer the latter for the same reason that Devitt has brought out: when characterizing the explanations of functional biology and evolutionary biology—"[t]he use of "ultimate" to describe the latter explanation seems like a gratuitous put-down of the former" (Devitt 2008, 535).

2.4 The causally constitutive role of an essence

By "causally constitutive" role of a kind's essence, I mean the essence's task to be causally responsible for the stability, cohesion and separateness of its kind. Quite a few authors (e.g. Okasha (2002, 209), Ereshefsky (2007), Mishler and Brandon (1987)) assume that species concepts are based on relations and accompanying evolutionary factors that are causally responsible for the formation and maintenance of species. Interbreeding relations and gene flow, supposedly underlying the BSC, and ecological relations (common selective pressures applying to the organisms occupying the same ecological niche) underlying the ecological species concept (ESC), are assumed by these authors to be among those causal factors.[7]

Causal explanations are sometimes seen as metaphysically distinct from constitutive explanations (see Ylikoski 2013). According to Ylikoski, "causal (or etiological) explanations are in the business of explaining events, that is, changes in the properties of an entity (or system)" (Ylikoski 2013, 281); "constitutive explanations are in the business of explaining causal capacities, meaning the properties of entities" (Ylikoski 2013, 281), by appealing to the parts and the organization of these entities (Ylikoski 2013, 278).[8] However, as Ylikoski himself admits, there also exist hybrid explanations that he calls "developmental explanations" (Ylikoski 2013, 292). According to Ylikoski, "a developmental explanation[9] involves both time and significant changes in the system's causal capacities. The aim of such explanations is to figure out the pathways by which the system's initial causal capacities are realized and transformed into new causal capacities that characterize the system's later phases" (Ylikoski 2013, 292–293).[10]

[7] Note that these evolutionary factors can be causally responsible only for the existence of species *taxa*; species *category* as a logical abstraction and not a "real" entity cannot be formed or maintained by physical processes or factors.

[8] When it comes to chemical kinds or some other non-living kinds, we might not need to distinguish between constitutive and causally constitutive explanations. Referring to the causes of individual traits might be sufficient for explaining the existence of kinds in the contexts where kinds are identified based on these traits, and where kinds' existence might not require causal relations between kind members.

[9] Ylikoski (2013, 293) mentions the account of the processes by which a fertilized egg would develop into an adult organism, and the account of language acquisition, as the examples of developmental explanations.

[10] Also, in the case of some explanations that we refer to as causal explanations, we are really talking about constitutive explanations in Ylikoski's terminology—for instance when explaining some of the observable properties of chemical kinds by referring to their microstructure. However, especially in the case of biological individuals, the factors "responsible" for the properties of these individuals quite often involve a causal element which makes the explanations of these properties more similar to developmental than constitu-

Even if Ylikoski has meant developmental explanations to account for somewhat different phenomena and in somewhat different ways than relational factors underlying different species concepts are performing their role in the formation and maintenance of the cohesion of species, his admittance of hybrid explanations has encouraged me to term the described role of those factors as causally constitutive. On the one hand, these relational factors are by definition a part of the constitution of a species, something based on which a species and its extension are identified. On the other hand, there are certain causal processes present in how these relational factors underlie the cohesiveness between the earlier and later stages of a species, and the members of a species are also causally connected to each other. Hence, causally constitutive role is different from a mere taxonomic role, as it must also characterize the causal forces underlying the formation and maintenance of the cohesion of species.[11]

3. Different Notions of "Essence" and Their Roles

As was said, the arguments against biological essentialism are usually targeted against physical intrinsic share-nature kind essentialism. There have been attempts by several authors to rehabilitate biological essentialism by offering some alternative notions of essentialism. In what follows, I will give a role-based analysis of these attempts, and Devitt's arguments for at least partly intrinsic essentialism. The discussion of *taxonomic* roles of essences illustrates why none of the forms of essentialism discussed, besides the one based on the contemporaneous relations (interbreeding, ecological, etc.,), and even that with qualifications, can fulfil the taxonomic roles that the anti-essentialist consensus has deprived intrinsic essentialism of. The discussion of *explanatory* roles illustrates why relational properties are not as explanatorily hopeless as Devitt claims them to be.

Before continuing, we should make a clear distinction between kind and individual essentialism. In the context of biological essentialism, the claims of individual essentialism are made about the essential properties of par-

tive explanations and justifies referring to the role of the relevant factors as causally executive.

[11] The reasons why I preserve the term "causally executive" for the role of accounting for the kind-typical properties of individuals and "causally constitutive" for the role of accounting for the formation and cohesion of species derive mostly from my personal linguistic preferences. Those preferences are partly based on Barrett's (2001) also referring to the causes present in former types of accounts as "executive", and partly on my intuition that the latter types of accounts serve as an illustration of my adjustment of "hybrid explanations" (involving both causal and constitutive elements) into the current context particularly well.

ticular organisms[12] and the claims of kind essentialism about the essential properties of biological kinds. (Devitt (2023) refers to these as the questions of *individual essentialism* and *taxon essentialism*, respectively). The claims of individual and kind essentialism may be logically independent of each other: we can say, for example, that a property p is the essential property of kind K, i.e. each organism belonging to a kind K must have the property p; at the same time we might not hold that the particular organism belonging to the kind K has the property or belongs to the kind K essentially (see also Okasha 2002, 192–194). As the anti-essentialist arguments that I am dealing with are targeted against kind essentialism, and the questions about the essence roles concern their roles for species taxa, not particular organisms, my analysis focusses on kind essentialism.

3.1 Intrinsic vs. relational essentialism

The main thing distinguishing intrinsic essences from relational ones is that intrinsic essences are "shared": every member has the trait that is necessary for belonging to the kind. According to relational essentialism, essences of kinds can only be constituted as relations, not via properties of single individuals. There are different kinds of those relations: 1) inter-organismic relations between the organisms existing in the same space-time (interbreeding or ecological relations); 2) at least partly historical relations: a) descendancy relations (between a parent organism and its descendants); b) genealogical relations[13] (the way organisms are situated in the phylogenetic tree[14] that illustrates the divergence of lineages during evolution). *Historical essentialism* seems to be the latter kind of subcategory of the relational essentialism characterized by historical relations.

Based on the empirical and conceptual arguments against shared-nature intrinsic essentialism in the context of evolutionary biology, and the fact that most modern species concepts are based on relational properties, Okasha

[12] Most forms of individual essentialism are not inconsistent with evolutionary theory: for instance, the claims of haeccesity (see Robertson and Atkins 2023) and origin essentialism (Robertson and Atkins 2023) do not depend on whether we believe in evolutionary theory or not. The analysis of how adopting evolutionary theory affects the claims of sortal essentialism (see Gelman 2003, 8–10) is given by Okasha (2002, 205–207).

[13] Note that contrary to my current terminological preference, the terms "descendancy" and "genealogy" are used synonymously by some authors.

[14] Sometimes it has been claimed that phylogenetic tree is a problematic model because of genetic tree discordance—i.e. the recognition that "evolutionary trees from different genes often have conflicting branching patterns" (Degnan and Rosenberg 2009, 332). However, I think talking about phylogenetic species concept is still justified in his context, as the phylogenetic relations between entities belonging to discording gene trees are still genealogical relations that have motivated the adoption of relational (esp. historical) essentialism.

(2002, 202) claims that "regarding contemporary species concepts as theories about the relational essences of taxa appears perfectly reasonable." According to him, relational essences could in principle replace the "hidden structure" that Kripke and Putnam regard as the true determinant of species membership (Okasha 2002, 202–203). There is a plethora of philosophers (esp. Devitt 2008; 2023), though, who have rejected relational essentialism because relational essences do not fulfil the roles traditionally ascribed to essences. Devitt (2008) has claimed that due to not answering certain questions (or playing certain roles, if we use the role-based interpretation), fully relational essentialism is not proper essentialism and should be abandoned in favour of intrinsic essentialism

It must be noted, though, that Devitt does not deny the *historical* component of the explanations of evolutionary biology. In his later work (the most comprehensive of which is Devitt 2023), he puts more explicit emphasis on this component, referring to his essentialism as partly historical and partly intrinsic. Hence, his arguments against the anti-essentialist consensus are targeted against the factor of the consensus relying on only relational properties and rejecting intrinsic essences. In what follows, I will give a role-based analysis of the main (mostly Devitt's earlier) arguments against relational essentialism.

3.1.1 Relational essentialism vs intrinsic essentialism: taxonomic roles and causally executive explanations

Devitt's two main arguments against relational essentialism are the following: 1) relational species concepts are incapable of specifying a species' identity, i.e. answering the question about in virtue of what an organism is a member of that species *in particular* ("the taxon question"); 2) relational accounts do not explain the properties of organisms, including the relational properties that are assumed to underlie species membership of those organisms (i.e. do not answer the "trait question" Devitt 2008, esp. 360–370).

His first counter-argument rests heavily on his claim that seeing relational properties as potential essences derives from conflating taxon problem with category problem and the mistaken assumption that species concepts tell us something about the former, whereas they are only capable of answering the latter. Devitt believes that these two problems are conflated by the authors who assume that "the route from a category answer to a taxon answer may be via an answer to the conspecificity problem" (Devitt 2008, 364), the problem of saying in virtue of what organisms belong to the same species (see also subsection 2.2.). He claims this move to be obvious in Wilson's (1999, 192–193) discussion, according to whom the BSC and P-CC [Phylogenetic-Cladistic concepts] [relational] answers to the category prob-

lem imply that the answers to the taxon problem are also relational: species membership [conspecificity with the co-members of that species] of a particular organism is based on relations with other organisms, not internal properties of that organism (paraphrased by Devitt 2008, 364).

For a start, leaving aside the possible methodological and empirical/practical problems with different relational species concepts, according to some authors they are at least *in principle*[15] supposed to provide the *definition(s)* of the species category. According to Ghiselin's interpretation of the work of Mayr, the "father" of the BSC, "[a] species [concept] is a definition of "species" [category] and provides the properties that are necessary and sufficient for an entity to be a species [taxon]" (Ghiselin 2004, 110). Whereas Devitt is correct about the fact that appealing to co-membership does not help to define a particular species (claiming that two lions can interbreed with each other does not say what it is to be lion), this ambition does not even derive from Mayr's statement, neither was it probably the aim of the proponents of relational essentialism. Instead of ascribing relational essences the role of determining the definition of taxa, relational essentialists usually only talk about the semantic role of relational essences, as can be illustrated by a passage by Okasha (2002, 199):

> on the most popular accounts of the species concept found in contemporary evolutionary biology, organisms are assigned to species on the basis of relational properties. These accounts do answer the question "in virtue of what is my pet dog Rover a member of Canis familiaris?"

If Devitt criticizes relational essentialism on the basis that it aims to define species taxa, he is fighting a strawman and making a conflation (between semantic and definitional roles) himself. As the bearers of a semantic role, relational properties are doing their job fine: identification of a taxon can mean merely giving its extension, not provide its definition.

If we require essences to bear the definitional role (á la LaPorte 2017, 185, according to whom "[w]hatever essence is supposed to be, [...] very roughly you could think of essence as what "defines" the item. This is the main thing essence is supposed to be all about.") for taxa, relational properties would fail indeed.[16] However, so would intrinsic essences, as species simply are not defined based on those properties. Hence, in this respect Devitt has not managed to rehabilitate intrinsic essentialism, and when pushing to do so, he would be acting against the real practice of evolutionary biology.

[15] For the problems related to essentialism concerning the species category, see (Talpsepp 2013).

[16] Whether they *would have to* serve as essences is another matter and I will come back to this is in section 4.

One main motivation for Devitt to reject relational essentialism and rehabilitate intrinsic essences is that according to him, taxa must be formed so as to provide explanatory generalizations. About "proximate" (á la Mayr) or "structural" explanations, Devitt (2023, 90) writes that

> The biological generalizations about the phenotypic properties of species and other taxa [...] have explanations that advert to an intrinsic underlying, probably largely genetic, property that is part of the essence of the taxon. [...] They [proximate explanations] concern the underlying developmental mechanisms in members of a taxon that make the generalizations true.

According to him, relational accounts are explanatorily hopeless in this respect. As he claims that intrinsic properties causally explain the traits of organisms, including the relational traits underlying their species membership (Devitt 2008, 365), he suggests that an organism belongs to its species in virtue of its structural intrinsic properties, not relations (Devitt 2008, 348). Concerning causally executive proximate explanations about why an organism has the morphological traits that it has, Okasha (2002, 204) admits that those do cite its genotype and developmental environment, not its ability to breed with certain other organisms. On the other hand, he has also famously said that there is no *a priori* reason why relational properties should play both semantic and causal-explanatory roles.

However, talking about proximate explanations as appealing mainly to intrinsic properties might be problematic from the start. First, some proximate factors might not be intrinsic, but also extrinsic to organisms (factors related to epigenetics and niche construction for instance), as was claimed by Godman et al. (2020, S3053).[17] Second, think about the possibility of phenomena such as emergent properties, which occur as the result of the combination and interaction of the parts of the system, but are yet not reducible to the behaviour of these parts.[18] Emergent properties are sometimes characterized by two-directional causation, meaning that not only are macrolevel events affected by microlevel events, but also vice versa. When giving proximate explanations of organismal traits in populations, there might not be a sharp distinction between the explanations that appeal solely to intrinsic properties and those that involve emergent forces which occur on some "higher" level (and might even include inter-organismic relations). Those "higher" level forces might influence intrinsic properties that underlie the

[17] For Godman, the explanandum of causal explanations is correlations of properties instead of single properties of particular organisms, but I believe her claim about proximate external factors applies to the latter as well.

[18] One of the most important emergent phenomena, occurring in certain complex systems but not reducible to the parts of these systems, is life itself.

"macro" level traits of organisms; hence it is dubious to downplay the factor of relational properties even in proximate causally executive explanations.

3.1.2 The causally constitutive role of relational vs intrinsic essences

It is clear that *causally executive distal* (which Mayr calls "ultimate" and Devitt, following Kitcher, "historical") explanations for why certain organismic traits have been preserved in populations require taking relational, including genealogical relations, into account, and Devitt has not argued against it. In fact, he admits the role of relational properties in the evolutionary explanations of not only the organismal traits present in populations, but also of the existence of the taxa possessing these traits. Devitt (2023, 90) says that historical relations "tell us how there came to be that taxon in the first place, how it evolved. What *led* to there being taxa with the phenotypic properties that are the subjects of the generalizations?" The focus of the debate between the proponents of relational essentialism vs Devitt lies rather in the relative importance of intrinsic properties (of organisms) vs relational-historical properties (of the whole taxa). Devitt's claim that essences of kinds must be at least partly intrinsic is based on his assumptions that in both proximate and distal explanations, relational properties have to "hinge" on something, that is, intrinsic properties in this case.

However, when we talk about the causally *constitutive* role of an essence, that is its ability to characterize causal forces that are responsible for the formation and cohesion of a taxon, the relational properties underlying modern species concepts with their accompanying causal forces seem to fulfil this role quite successfully. On the one hand, it is obvious that to some extent, relational properties do supervene on the properties of organisms, and the properties of organisms in turn on their internal structure (although the direction of influence can be reverse, i.e. bottom-up as well). And when studying genealogical and phylogenetic relationships and evolutionary history of taxa, researchers do pay attention to genetic markers, developmental mechanisms, structural features of organisms, etc. Devitt (2023, 98–99) also correctly notes that without reference to internal properties, we would not be able to distinguish between two taxa and make the decisions about when splitting of lineages has occurred. Indeed, when making taxonomic decisions about taxon membership of organisms or phylogenetic position of newly encountered taxa, correcting previous taxonomic decisions, etc., biologists very often do rely on morphological features, genetic markers and so on.

However, all this still does not justify deeming intrinsic properties *essential*, as those physical properties still only act as *indicators* of the relations underlying species concepts, which are accompanied by certain causal forces serving as the basic core in the formation and cohesion of species. In taxonomic decisions, conceptual prevalence is still given to those relations, and not physical properties indicative of them. The ways that we see genetic similarities, genetic markers forming clusters, and other intrinsic properties that help us to make decisions about taxonomic relations, are guided by the assumptions about certain relational properties of taxa, in a similar vein as theories are guiding observations, data interpretations, etc.

3.1.3 The roles of historical essences

Historical essentialism is a subcategory of relational essentialisms, as historical relations are also relational properties characterizing taxa. However, as the arguments supporting it are sometimes somewhat different than those supporting relational essentialism in general, and as it has been deemed new, different sort of essentialism by its proponents, I am dedicating a whole separate section for analysing the roles of historical relations as potential essences of taxa.

Godman, Mallozzi and Papineau (2020) use the term "historical essentialism" drawing on the work of Ruth Millikan (1999), who has coined the term "Historical kinds", contrasting them with "Eternal kinds." According to Millikan, the shared properties of the members of the former are "due to their instances all being copied from some common source" (paraphrased in Godman et al. 2020), whereas the shared properties of the members of the latter "are explained by the instances having some common *intrinsic* physical property" (Godman et al. 2020).[19] Contra Devitt, Godman et al. claim biological taxa to be historical, not eternal, the common ancestor, not intrinsic properties being the *super-explanatory* "common-cause explanation of the multiple correlations between the many characteristic phenotypic features of biological genera" (Godman et al. 2020).

When discussing the potential roles of historical essences, first it must be noted that in this case it is quite difficult to detangle taxonomic roles from explanatory ones. This is because, as several proponents of historical essentialism suggest, while taxa are identified or classified based on their ancestral relationships and their location on the phylogenetic nexus, these aspects also have some explanatory element. Godman explicitly states that "it is hard to see how one could provide the identity and call something the

[19] They do admit that "[t]he term "Eternal" is perhaps not ideal, given that instances of Eternal Kinds can be in flux and short-lived (supernovae, decaying elements)" (Godman et al. 2020).

essential nature of a Kind, if it did not also have some special explanatory import or power vis-a-vis other properties that belong to a Kind" (Godman 2021, S3046). Her second argument, "from the other direction", is that "to explain a Kind's multiple projectability one seems to rely on some individuation condition in the first place" (Godman 2021, S3046). She illustrates this interdependence of the roles by claiming that "Linnaean binomial nomenclature attained some inductive success by organizing organisms into species within nested categories" (Godman 2021, S3046), and that after Darwin "the right individuation conditions behind the intuitive biological taxonomic categories were uncovered by gradually revealing a causal explanatory basis for it—or, in short, one has to do with discovering the essential natures of species" (Godman 2021, S3047).

And counter to Goodwin, Webster and other process structuralists, according to whom "categories based on evolutionary homology do not have an underlying "nature" suitable for scientific investigation because evolutionary homologies do not have traditional, microstructural essences" (paraphrased in Griffiths 1999, 221), Griffiths states that "categories based on evolutionary homology will provide a natural taxonomy with which to investigate morphological and physiological characters" (Griffiths 1999, 221). This, according to him, is explained by *phylogenetic inertia*: principle of heredity acting "as a sort of inertial force, maintaining organisms in their existing form until some adaptive force acts to change that form" (Griffiths 1999, 220). Griffiths claims that this inertia "licences induction and explanation of a wide range of properties—morphological, physiological, and behavioural—using kinds defined purely by common ancestry" (Griffiths 1999, 220). Related to this are also Darwin's famous statements that all organic beings have been formed on two great laws—Unity of Type and the Conditions of Existence—and that unity of type is explained by unity of descent (Darwin 1859, 206, referred to in Griffiths 1999, 220).

When it comes to *causal* roles more specifically, Godman states that "although many—but not all—of the causal propensities of the individual/object do in fact supervene on members' intrinsic features, it is nevertheless the historical essences of species that offer causal explanations of the Kind's inductive unity or multiple projectability" (Godman 2021, S3051). She claims that scepticism by some authors about historical explanations probably derives from the fact that these explanations "do not conform to a Hempel-style covering law model of explanation or a Salmon-style causal model of explanation, which require that an initial condition and an inference-maker (a law or causal generalization) are cited" (Godman 2021, S3052). However, according to Godman this does not mean that at least some historical explanations cannot qualify as causal explanations: they are narratives which

integrate an event into an organized whole, and they are path-dependent in the sense that they include "all relevant causal factors and their order relevant to the explanandum" (Godman 2021, S3052).

I find this account of explanatory ability of historical relations quite convincing. However, before getting even more specific, it must be noted that at least some proponents of historical essentialism are not interested in proximate and ultimate explanations of traits. Godman says that "talk of essences earns its keep when we need to explain a body of generalizations of Kinds such as different species, rather than single traits of a Kind" (Godman 2021, S3053). And LaPorte (2017, 188) writes that

> [c]lusters of theoretically important properties are sometimes supposed to arise by nomological necessity from essence. Laws governing a species or other lineage might necessitate its child-rearing practices, metabolism, camouflage, social interaction, communication, culture, or other higher functions of intelligence, and so on.

At the same time he doubts that [particular] properties supporting generalizations can be tightly associated with species in this way. That is the reason why Godman, Laporte and other supporters of historical essentialism focus on the explanations of correlations or multiple projectability of traits, rather than explanations of the intrinsic developmental mechanisms or evolutionary trajectory of single traits.

This is also the basis of the counterargument by Godman to Devitt (2023, 101), according to whom merely being descended from a certain population does not give causal explanations of the developmental facts about why an organism has evolved to possess its phenotypic properties. He suggests that instead, genetic variability, necessary for natural selection to work, is in the intrinsic underlying natures in the series of taxa carrying features with slight modification. Godman et al. (2020) respond to this by stating that they are looking for some common-cause explanations of the multiple correlations between the phenotypic features of biological genera, and that "the genomic material common to the members of a taxon will typically not be suited to play this role." According to her, this is because instead of "*one* intrinsic property acting as a common cause for many phenotypic properties", different phenotypic features are normally explained by *conjunctions* of different genetic properties. "And this thus leaves us once more with an unexplained multiple correlation", including those between different intrinsic genetic properties (Godman et al. 2020). Devitt (2023, 92) admits this but still grants the status of *essential* properties to the shared intrinsic properties, the correlations of which common ancestor and evolutionary history help to explain; however, inconsistency between intrinsic essentialism and evolutionary theory has been repeatedly explained above.

It also must be noted that whereas the proponents of "new" historical essentialism are not per se interested in proximate and ultimate versions of causally executive explanations, Godman (2021, S3053) does mention the importance of the proximate mechanisms, namely when giving the explanations of which causal interactions forge the reproductive bonds of Kinds with historical essences. According to her, these proximate mechanisms are important in "the production of new members and the retention (and systematic variation) of traits amongst particular species taxon members." Beyond intrinsic properties, causal mechanisms "extrinsic yet proximate", such as related to epigenetic factors or niche construction, "can also contribute to the stability of many traits, either by being a condition for successful reproduction of traits, reproducing traits on their own, or by weeding out deleterious mutations" (Godman 2021, S3053). However, according to Godman, these proximate mechanisms are not essential to the Kind, especially as they can vary amongst individuals and over the course of a species' lineage.

Historical essence of species is characterized by Godman (2021, S3047) as the particular historical relation that units the species members via their common spatial-temporal location in the tree of life. When it comes to their *taxonomic role*, Godman (2021, S3047–3048) states that as lineages cannot be directly observed, they are primarily

> established with the use of cladistic and phylogenetic methods: [...] phylogenies are constructed based on different methods of producing data, either on morphological evidence or, more commonly, molecular evidence of DNA and RNA sequences. [...] Individuals are then grouped together into monophyletic groups at particular nodes, either by a speciation event (typically branching) or a terminal node.

(Note also that LaPorte (2004) supports historical essentialism namely for the reason that cladism, one of the main classification systems, defines taxa in terms of common ancestry. NB! This applies only to process cladism, not pattern cladism.)

Relying on the indicators like DNA or morphological features does not in itself mean that historical relations cannot serve the taxonomic role: the question is whether it is conceptually possible. According to Godman, identifying a biological group as a species as such depends on whether we identify speciation by relying on reproductive isolation, hybridization barriers, relevant adaptation, or asexual equivalent mechanism, such as competition for living spaces. She further claims, referring to De Queiroz's (2007) *general lineage concept of species*, that the necessary property of a species taxon is nevertheless its historical essence, and that reproductive isolation can be un-

derstood as evidence of species differentiation rather than a necessary property for species membership.[20]

Both Devitt and Okasha suggest that in addition to historical relations, some other criteria are necessary for individuating the kind, although the criteria each refers to are obviously different. Devitt suggests that this should be decided upon intrinsic properties of organisms, Okasha (2002, 201) states that phylogenetic species concept [intimately related to historical essentialism] "will have to rely on a concept of one of the other types to yield an account of speciation events, i.e. of one lineage splitting into two."[21] Godman et al. (2020, S3050) claim that in addition to a unique spatial-temporal relation, historical essence involves a path-dependent process which might also constitute speciation, but I do not think it salvages the ability of historical relations alone to provide the criteria for identifying a species taxon, i.e. to have an independent taxonomic role: there are still some additional criteria needed in order to identify the parts of this process together as speciation.

The causally constitutive role of historical essences might be related to the question whether historical relations involve actual *causal* processes that contribute to the formation and cohesion of lineages, and are not only constitutive of these lineages. This potential causal component can be found in Godman's (2021, S3052) claim that "in order to access the historical pattern [underlying the so-called historical essence] one also has to incorporate

[20] Whether we could say that interbreeding relations can be understood as evidence and not the necessary property for species membership depends on whether we accept the plurality of species concepts and the resulting taxonomies. Species *monists* who claim that it is the ultimate necessary property of a species to be defined by its historical relations, common ancestor, etc., might indeed say that interbreeding relations count merely as diagnostic criterion of species membership; there might be other diagnostic criteria (ecological relations, etc.). Ereshefsky (2007) (see also Talpsepp 2013), on the other hand, has demonstrated the need for the *plurality* of species concepts, each reflecting different causal factors that are relevant in evolutionary processes. According to pluralists like him, in certain contexts classification based on non-historical relations is necessary or useful. In that case, we could say that interbreeding, ecological, etc. species concepts serve as necessary for species membership and not merely diagnostic tool for some "more general" species concept.

[21] Contrary to those accounts of species monism and species pluralism that lead to clashes between different species concepts, (Okasha 2002, 201) claims that phylogenetic concepts are not necessarily incompatible with interbreeding and ecological species concepts as they serve different functions: the former are intended to apply over evolutionary time, while the latter "are meant to apply to contemporaneous organisms." My personal claim (see Talpsepp 2013) is that in many instances, in addition to phylogenetic relations, also ecological species concept is used together with interbreeding criteria for taxonomic purposes. In any case, I think that historical relations are not capable of serving taxonomic roles even to the extent that interbreeding relations are (even though the latter also have their problems in that respect Talpsepp 2013).

causal evidence (e.g. evidence of homologous rather than analogous traits and evidence of reproductive isolation)." From the perspective of path dependent explanations, according to Godman (2021, S3052–S3053) it could be said be said that "[t]he pattern of spatially-temporally ordered members of a species taxon do not come about through some pre-established harmony; the pattern comes about through a range of causally connected events." These events, I believe, can at least partly constitute the causal components that contribute to the formation and cohesion of species lineages.

To summarize the roles of historical essences, we can say the following. The proponents of historical essentialism are not interested in giving causally executive proximate and distal explanations of single traits, but they claim historical relations to explain multiple projectability and the correlations of traits. Historical essences are also intended to have an identificatory component, but without the assistance of other species concepts, they are not actually capable of carrying the taxonomic roles (involving *both* necessary *and* sufficient criteria of species membership) that are usually assumed from essences. However, similarly to the relations underlying other "modern" species concepts, historical relations are also capable of bearing a causally constitutive role.

3.2 The roles of teleological essences and Walsh's arguments against the anti-essentialist consensus

In addition to Devitt's defence of intrinsic essentialism to save essentialism in biology, one well-known attempt to do the same, although from a completely different perspective, has been positing teleological essentialism.

According to Aristotle's teleological essentialism, the nature of an individual organism is its goal-directed disposition to produce and maintain a living thing capable of fulfilling its vital functions in the ways characteristic of its kind (see for instance Ereshefsky 2007, 18–19). In recent times, the most well-known proponent of teleological essentialism is Denish Walsh, according to whom Aristotle's essentialism is—"against the prevailing orthodoxy"—indispensable for evolutionary biology. My goal is not to dispute the indispensability of what Walsh considers the teleological essences of organisms to be. Instead, I want to use his account as a subject of the role-based analysis of yet another "alternative" notion of essentialism. I will also use Walsh's arguments against the anti-essentialist consensus as another illustration of how the analysis of these arguments actually lends support *for* my anti-essentialist arguments (see section 4).

Walsh (2006) firstly claims that Aristotle's essentialism is resistant against both taxonomic and explanatory arguments of the anti-essentialist consensus. By "taxonomic arguments" he means the anti-essentialists' claim that

there is no fixed unchanging set of properties defining a particular species and constituting the essence of its members. Walsh claims that Aristotle's "genos" and "eidos" (Aristotle's central classificatory concepts, quite often read as the modern "genus" and "species") do not correspond to any fixed level on [Linnaean] hierarchy; rather, they are relative concepts (Walsh 2006, 428–429). Genos (a shared nature) groups together organisms that "discharge their vital functions in similar ways" and "does not determine any specific features of what we now call "phenotype" (or, for that matter, genotype)" (Walsh 2006, 429). Hence, according to Walsh, the anti-essentialist taxonomic arguments do not apply to Aristotelian essentialism.

What Walsh means by the "explanatory arguments" of the anti-essentialist consensus are the allegedly "anti-individualistic" claims, which according to him are inconsistent with the view of individual organisms having Aristotelian natures. As an example of this anti-individualism of "the explanatory apparatus of the modern synthesis", Walsh (2006, 433) refers to Morrison (2000, 215), according to whom "…one needed only general statistical laws about the interactions among individuals [or as similar views paraphrased by Walsh, in particular "only variation in the rates of increase of the gene or trait types"], rather than specific knowledge of the individuals themselves, in order to determine the effects of evolutionary mechanisms." Walsh (2006, 425) himself claims that contrary to those arguments, recent evolutionary developmental biology "shows that one must appeal to the capacities of organisms to explain what makes adaptive evolution adaptive", and moreover, that "the specific capacities in question are precisely those that, according to Aristotle, constitute the nature of an organism." Walsh (2006, 439) claims it to be the plasticity of individual organisms that has consequences for adaptive evolution: this plasticity "allows organisms to accommodate to the features of their environment (and their genomes) in ways that preserve their well-functioning, by making subtle compensatory adjustments to their phenotypes."

In the case of the explanatory roles of teleological essences, I must begin by characterizing the relationship between the individual essences of organisms that Walsh draws attention to, and kind essentialism that the anti-essentialist consensus and this paper are focused on. Namely, Walsh's claims about essences concern functional features that organisms fulfil in the way that is characteristic of their kind. Hence, Walsh seems to make claims of kind essentialism about the essential properties shared by kind members, rather than claims of individual essentialism concerning the identity, "thisness", etc. of individual organisms.[22] We can give evolutionary explanations

[22] See the beginning of section 3 about the distinction between individual vs. kind essentialism.

of how the functional traits of an individual organism to preserve oneself influence the kind-specific ways that organisms preserve themselves and their kind. According to this explanation, the more successfully an individual organism fulfils its function of self-perseverance, the more likely it is that this organism passes on its genes, and fulfilling that function in this organism's way becomes prevalent in its population.

Coming to the role-based analysis of teleological essences, I have to say that functions or functional dispositions are not capable of taxonomic, i.e. definitional and semantic, roles of essences. The ways that the properties of taxa members perform their functions are studied *after* these taxa have been identified based on some other properties. However, by causing organisms to make "subtle compensatory adjustments in their phenotypes" (á la Walsh, see above) and hence being responsible for the presence of certain features in the populations, the functional purposeful properties can play causally executive *distal* roles. In the causally executive *proximate* explanations, functions and other teleological properties are probably relevant to the extent that the features that are appealed to in these explanations are the *instantiations* of these purposive tendencies—mere functions cannot be appealed to in proximate explanations. However, the actualizations of the dispositions that can potentially function to preserve the whole species (via reproduction, etc.) could also appear in *causally constitutive* explanations, although unlike some relational properties, not in the sense that these functions could also help to identify or define the taxa that they help to causally constitute.

4. Arguments against biological essentialism

After having given my role-based analysis of several accounts of essentialism, I hope to have demonstrated that only some relational properties, especially those uniting contemporaneous organisms (interbreeding and ecological[23]), are in principle conceptually capable of carrying the taxonomic roles that are usually ascribed to essences, i.e. give necessary and sufficient criteria for belonging to a biological group. Relational essences are also not as explanatorily hopeless as Devitt attempted to claim—in fact, in causally executive distal explanations and causally constitutive explanations probably even more relevant than intrinsic properties. However, below I will give my reasons for why I think rehabilitating even relational essentialism in the context of evolutionary biology is not a worthwhile practice.

[23] And in taxonomic practice, even ecological relations are quite often used together with interbreeding relations (Talpsepp 2013).

I will classify my arguments concerning this matter as conceptual/terminological[24] and practical/methodological. The conceptual/terminological arguments concern the conceptual confusions related to the notions of "essentialism" and "essence"; the methodological/practical arguments refer to the actual practice of biological science and the role of essentialist reasoning models within or reflecting this practice. As one could guess, those arguments are intertwined with each other: conceptual confusions can lead to practical and methodological flaws, and flawed practices and methodologies might lead to flawed conceptual analyses or premises of those analyses.

4.1 Conceptual/terminological arguments against biological essentialism

I agree with Wilkins (2013) about there being a misleading variety of meanings of the term "essentialism." However, as an alternative to his suggestion to abandon this term, I suggest preserving some conservatism about it. This is also my conceptual/terminological argument against promoting alternative notions of essences. The notion's becoming too liberal can bring along conflations which result in losing common grounds for the debates concerning "pre-Darwinian essentialism", "anti-essentialist consensus", etc., and fighting strawmen instead.

Before continuing, I will give a brief overview of one of the possibly biggest confusions when it comes to the issues related to biological essentialism: the essentialism myth or the essentialism story (as characterized by Müller-Wille (2007) and Winsor (2003), among others), held by many proponents of the anti-essentialist consensus. According to this myth, pre-Darwinian taxonomists were essentialists whose essentialism was refuted by the advent of the Darwinian revolution. And even Devitt suggested that pre-Darwinian taxonomists were probably not concerned with historical explanations, but picked out the taxa based on intrinsic properties and had "the same interest in structural explanations as current biologists" (Devitt 2023, 102–103).

However, first, there have been indications[25] that even pre-Darwinian taxonomists (the most famous of whom was Carl Linnaeus) identified species on the basis of relational properties (most likely reproductive relations or reproductive isolation), even though these relations did not mean historical relations as shaped by Darwinian evolution. Müller-Wille (2007, 544) states that Linnaeus thought of species as "reproductively connected groups of individuals, occupying concrete geographic spaces, and propagating them-

[24] Not to be confused with the conceptual argument of the anti-essentialist consensus against intrinsic essentialism (see Introduction).

[25] This has been demonstrated by Wilkins (2011) for instance.

selves on a historic time scale", or "composed of individuals connected by reproductive, or more precisely, genealogical relations that were governed by "'laws of generation'." According to Müller-Wille, Linnaeus' species concept instituted the precedence of the laws of generation over formal similarities—this is also what made the constancy of species characters an empirical issue that "could be addressed by taking account of how similarities correlated with the reproductive relations constitutive of species" (Müller-Wille 2007, 545).

Secondly, even if Linnaeus identified genera on the basis of reproductive properties of plants, and species on the basis of plants' fructification organs, and referred to those as "essences of flowers" (in English translation) (see Linnaeus 1736, referred to in Müller-Wille 2007), he probably means those in diagnostic, not definitional sense. Wilkins (2013) claims that Linnaeus did not proceed by definitional analysis, but that his system was "an empirical definition based on types, and it served a largely diagnostic role." And thirdly, Linnaeus might not have been essentialist even in a diagnostic sense. According to Winsor (2003) for instance, instead of assuming that all the organisms belonging to a certain species or genus had to possess certain (diagnostic) property or sets of properties, Linnaeus used the "method of exemplars", based on which Linnaeus chose certain specimens as characteristic of species or genera, and assigned organisms into these taxa on the basis of comparison of similarity with these "exemplars."

We can see that pre-Darwinian taxonomists, often targeted by the anti-essentialist consensus, might not even have been essentialists, at least not in the way they are usually depicted. Moreover, some famous essentialists, such as Aristotle, whose essentialism is at times also targeted by the named consensus, did not actually posit intrinsic or structural essences to biological kinds, but teleological ones (see also section 3.2).

On the one hand, the essentialism story might have been a construct resulting from the wish to say something philosophically interesting or revolutionary by creating an essentialism-strawman to fight with. On the other hand, it might have also been the result of conflating different notions of essentialism (such as intrinsic essentialism and Aristotle's teleological essentialism). Thirdly, it might have resulted from mixing up the reasoning patterns usually associated with "essentialist thinking." From one pattern of reasoning, the assumptions about other might be forcefully drawn. For instance, from at least some pre-Darwinian taxonomists' holding the belief that species are immutable, as they are created by God, it might be derived that those taxonomists also held the "essentialist" classification principles—based on definitional models involving morphological features, etc. How-

ever, the first reasoning pattern does not logically imply the second one and those reasoning patterns might also be held independently of each other.

Conceptual confusion related to the notions of essences, deriving from calling relational properties essential and being expressed as the conflation of different roles of essences, might have given rise to Devitt's argument that as those relations are not capable of defining taxa, we should consider rehabilitating intrinsic essentialism. Deeming both intrinsic and relational properties "essential" might have made Devitt falsely assume that like in the case of intrinsic properties, ascribing semantic role to relational properties implies the ambition of ascribing them definitional role as well, which is not the case.

My conceptual/terminological arguments against being too liberal about the notion of "essentialism" also apply against Devitt's intrinsic essentialism. The empirical arguments of the anti-essentialist consensus about there not being intrinsic properties that all and only the members of a particular species possess (see Introduction) remain convincing. Devitt seems to acknowledge this difficulty and tries to brush it off by saying that intrinsic essences do not have to be "neat and tidy": instead of shared essences, species taxa are distinguished by clusters of co-varying chromosomal and genetic traits (Devitt 2008, 371). However, by claiming this he too lets the criteria for qualifying as "essential" properties overly loose, so that they stop being the sorts of essences that the anti-essentialist consensus denies biological taxa to have.[26] Hence, we are back in the beginning with the anti-essentialists who claim that biological species do not have intrinsic essences that would define those species (agreeing with Devitt that taxa members have clustered intrinsic properties that have explanatory role is not inconsistent with anti-essentialism).

The confusions deriving from a too loose notion of "essence" can be illustrated by Walsh's supposed "anti-essentialist" arguments as well. Walsh's criticism that the anti-essentialist consensus does not acknowledge the importance of causal powers of individual organisms does not hit the most common version of this consensus, i.e. the view that denies biological *taxa* to have intrinsic physical essences. Organism's dispositions can have several different physical instantiations (see Ereshefsky 2007, 19) and the consensus is consistent with ascribing explanatorily primary roles to causal powers of organisms. If Walsh claims causal properties of individuals to have certain explanatory roles that intrinsic roles fail to carry in the context of evolu-

[26] The same criticism also holds against deeming Richard Boyd's Homeostatic Property Cluster (HPC) theory (see for instance Boyd 1999) essentialist. According to this theory, HPC kinds "contain "homeostatic causal mechanisms" that are responsible for the similarities found among the members of a kind" (Ereshefsky 2022).

tionary biology, this is an argument for the anti-essentialist consensus, not against it.

From the perspective of the attempts to rehabilitate biological essentialism, the role-based analysis of different notions of essence seems to suggest that the properties that are capable of carrying at least some (but not all) taxonomic and explanatory essence-roles and hence could serve as alternative notions of essence that would also be consistent with the anti-essentialist consensus are probably some sorts of relational properties (esp. between contemporaneous organisms). However, I have already given my conceptual/terminological arguments against being too liberal with the concept of "essentialism", and in the next subsection I will also give my practical/methodological arguments against deeming any biological properties of organisms and taxa "essentialist" in the context of evolutionary theory.

4.2 Practical/methodological arguments against biological essentialism

My main practical/methodological argument against rehabilitating biological essentialism is that from the perspective of scientific practice, essentialist thinking is either misguiding, unnecessary or does not reflect the actual activity of biological scientists.

First, there is some sort of normativity related to framing something as essential, and it might have flawed methodological consequences or give us a misguided picture of what is really going on in modern biology. If we deem some property essential, it gives precedence to those taxonomic principles or explanatory layers where it occurs. It ignores the variety of the biological world, and the consensual and pluralistic components of science-making.

For instance, when we deem a certain kind of property essential, it seems as if it is the primary or the only basis underlying classificatory decisions. Devitt deems intrinsic properties essential as he claims people to turn to these properties when making decisions about taxa membership and corrections of these decisions, whereas intrinsic properties are just indicators of the relationships underlying the identification of species. Essentialist framework might also make some authors assume that biological taxonomies are only meaningful when allowing us to make those generalizations about taxa (members) which mainly appeal to intrinsic properties, and this assumption might make us doubt the functionality of relation-based taxonomies.[27]

However, taxonomies based on relational properties might support explanations involving causal factors accompanying reproductive relations, (non-evolutionary) ancestral genealogical relations, etc., which *do* play a

[27] See (Okasha 2002, 207–210) and (Griffiths 1999, 22) for instance.

causal (causally constitutive, but to some extent also causally executive) role in the formation and cohesion of species. It is the matter of interpretational and theoretical context what we take as the focus of our explanations—whether we refer to relational properties in order to explain the division of the clusters of intrinsic features across a population, or whether we want to reduce everything "to bits" by appealing to the intrinsic mechanisms and microstructure of organisms—explanatory primacy is not always granted to the latter.

We must also keep in mind that in taxonomic practice, generalizations about the properties, behaviours or ecological preferences of taxa members are not always a priority, especially when it comes to taxa on levels higher than species. There is a plurality of taxonomic principles and systematics, the most prominent of them being evolutionary taxonomy and cladistics. Cladistics is based on phylogenetic relations between taxa; evolutionary taxonomy tries to find a compromise between phylogenetic relations and the evolutionary distance (i.e. the measure of how "far" (morphologically distinct) different taxa have evolved from each other in the course of evolution).[28] Cladistics has been promoted on the basis that "most real" (monophyletic) groups are formed on the basis of cladistic principles; however, when it comes to generalizations about taxa members, sometimes cladistic groups, containing many quite different taxa, might be inductively relatively poorer compared to the taxa which are formed partly on the basis of morphological, etc. similarities. However, despite being in some ways explanatorily less fertile, cladistics is still gaining popularity, and this demonstrates that in biological classification, relational properties are sometimes prioritized over the sort of explanatory fertility which hinges on the morphological similarity between taxa.

Moving on to the next unappealing consequence of essentialism in this context, let's consider Devitt's reaction to Sober's claim that "evolutionary theory has removed the need for providing species with constituent definitions" and hence with intrinsic essences (Sober 1992, 255, referred to in Devitt 2008, 354). In (Devitt 2008, 354), Devitt says that "this sort of focus on evolution, hence on historical rather than structural explanations, has misled biologists and philosophers of biology about essentialism." His claim makes it sound as if biological essentialism should exist independently of what is going on in real biology, or as if we should adjust science-making to essentialist framework. Another example of similar distortion of real

[28] Due to this evolutionary distance, evolutionary taxonomy (the principles of which also underlie our basic taxonomy that we call Linnaean, despite it having changed quite a lot since Linnaeus' time) excludes birds from the class Reptiles, as in the course of evolution, birds have striven morphologically "too far" away from the other taxa in this group.

science-making in order to promote (intrinsic) essentialism is Devitt's argument concerning "monsters" (offspring that differs greatly from their parents): "[i]f the mutations are gross enough, we [as Essentialists] should indeed say that the offspring is not of the same species as its parents" (Devitt 2008, 376).

Essentialism-related normativity can also be found in Godman's reasoning as she explains that she is not interested in proximate and ultimate explanations because "talk of essences earns its keep when we need to explain a body of generalizations of Kinds such as different species, rather than single traits of a Kind" (Godman 2021, S3053, see also subsection 3.1.3 of this paper). This creates an illusion as if the explanations of the first sort are more important than the explanations of the latter. Also, when seeing the historical relations that involve common ancestry, underlie general lineage concept, etc. as essential, there is a danger of ignoring the situations where classifying based on other relations (such as interbreeding relations) is more relevant.

Even in the case of those relational properties that underlie biological and ecological species concepts and are at least *conceptually* meant to be serving as necessary and sufficient criteria of species membership, deeming them essentialist might undermine the legitimacy of some "real-life" situations where in the case of taxonomic decisions morphological/genetic, etc. markers *are* given precedence over relational properties such as reproductive isolation. This might be the case for instance with heavily interbreeding species, with the population where reproductive isolation is still in the process of evolving, etc. Those situations are not deviant or rare, but common in the biological world and yet again demonstrate that deeming some criteria essential might not be in accordance with real scientific practice.

When discussing the reasonableness of promoting biological essentialism, we must also keep in mind the discrepancy between the goals of biologists and philosophers of biology. Biologists are trying to make sense of biological diversity and irregularities as best as they can by trying to find optimal pragmatic solutions based on taxonomic and theoretical considerations. Philosophers (or biologists doing philosophy), on the other hand, are commonly after definitions, generalizations, logical relations, etc. The biological world is often too varied and irregular—full of exceptions, vagueness, gradualness, etc.—for meeting the orderly standards of the descriptions and explanations that philosophy is trying to achieve. Practising biologists are somewhat less bothered about giving universal definitions of the species category, distinguishing between defining and identifying species, labelling their taxonomic practice under a certain well-defined species concept, and so on. As Wilkins says when criticizing the naïveté of Kripke and

Putnam, who used biological groups like "cats", "the tiger", etc. as examples of essence-based "natural kinds", "knowledge of intraspecific variation, problems with dichotomous key diagnosis or genus membership are apparently beneath the purity of philosophical reflective equilibrium" (Wilkins 2003, ix).

Sometimes even the philosophers arguing *against* essentialism suffer from some sort of essentialist bias that has no place in biology and that leads them to somewhat flawed results. For instance, based on the difficulties related to giving a clean-cut essentialist definition of the species category based on a single species concept, some philosophers of biology have claimed that the species category does not exist at all. Their anti-essentialism, which I claim to be a sort of *reverse-essentialism* (see Talpsepp 2013), is still based on the tendency to look for universally applying essentialist definitions: the assumption that in order to exist, the species category must consist of members that possess necessary and sufficient conditions for belonging to that category; the assumption that if we cannot give necessary and sufficient theoretical properties of the species category, species taxa cannot be formed on the basis of theoretical considerations (see Dupre 2001), etc. It is true that usually in biology essentialist definitions of concepts and categories do not work, but inferring the inapplicability or non-existence of these categories and concepts from this is a too hasty move, a flawed result of reverse-essentialism.

Finally, besides potentially harmful, misleading, etc., I find essentialism simply *unnecessary* for biology. I agree with Ereshefsky, according to whom "[b]iologists explain the traits of organisms and provide the identity conditions of taxa without positing taxon essences" (Ereshefsky 2010, 683). And here I also agree with Wilkins, who (in a slightly different context) states that "the prescriptive elements of the philosophy of science must rest upon the actual historical development of the concepts, theories and issues of the science under review" (Wilkins 2003, xi). Following the principle of Occam's razor, considering the impracticality of essentialism in the context of evolutionary biology, or its potential dangers of bringing along conceptual confusion or distortion of the (depiction of) real practice of evolutionary biology, I suggest giving up (the attempts to revive) the essentialist framework in this context.

5. Conclusion

In this paper I gave an overview of the various arguments pro and con the anti-essentialist consensus in philosophy of biology, according to which essentialism is inconsistent with evolutionary theory. Whereas the anti-essentialist consensus targets intrinsic shared-nature essentialism, there have been

several attempts to rehabilitate biological essentialism by different authors who have suggested alternative—relational, historical and teleological—notions of essences that are not inconsistent with this consensus. Devitt aims to rehabilitate intrinsic essentialism by criticizing relational essentialism for failing to define biological taxa and being explanatorily hopeless.

I have analysed different proposed notions of essentialism based on asking which roles, traditionally ascribed to essences, different properties suggested as essential properties by different parties of the debate, can fulfil. In order to do that, I proposed my classification of essences, which is roughly distinguished into taxonomic (semantic and definitional) and explanatory (causally executive and causally constitutive) roles. I demonstrated that relational essences could bear some taxonomic (semantic) roles in classification, and play a pivotal role in causally executive distal and causally constitutive explanations. Historical and teleological properties can play some explanatory roles, but not taxonomic ones without the assistance from other properties. Intrinsic properties usually play an indicative role in classifications, and are appealed to in many kinds of explanations, but in evolutionary biology do not serve as the main sole focus of these explanations. Hence Devitt's attempts to rehabilitate intrinsic essentialism at the expense of admitting certain roles of relational properties fail.

In the end of the paper I gave my reasons, also partly revealed by the role-based analysis, against promoting any kind of essentialism in the context of evolutionary biology. First are the conceptual reasons, wary of the confusions potentially accompanying the term "essence", which might lead to unwanted fights with strawmen (including the famous essentialism story). Second are the practical/methodological reasons, the main one being that deeming some properties "essential" might give the impression that they hold taxonomic or explanatory primacy, which is quite often not the case and might make us undermine the importance of other factors in these research situations.

Bibliography

Amundson, R. (2005). *The Changing Role of the Embryo in Evolutionary Thought: Roots of Evo-Devo*, Cambridge University Press.

Barrett, H. C. (2001). On the functional origins of essentialism, *Mind & Society* **2**: 1–30.

Bird, A. and Tobin, E. (2017). Natural kinds, *in* E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, spring 2018 edn.
URL: *https://plato.stanford.edu/archives/spr2018/entries/natural-kinds/*

Boyd, R. (1999). Homeostasis, species and higher taxa, *in* Wilson (ed.), *A Species: New Interdisciplinary Essays*, Cambridge University Press, pp. 141–185.

De Queiroz, K. (2007). Species concepts and species delimitation, *Systematic Biology* **56**: 879–866.

Degnan, J. H. and Rosenberg, N. A. (2009). Gene tree discordance, phylogenetic inference and the multispecies coalescent, *Trends in Ecology and Evolution* **24**: 332–340.

Devitt, M. (2008). Resurrecting biological essentialism, *Philosophy of Science* **7**: 344–382.

Devitt, M. (2023). *Biological Essentialism*, Oxford University Press.

Dupre, J. (2001). In defence of classification, *Studies in the History and Philosophy of the Biological and Biomedical Sciences* **32**: 203–219.

Ereshefsky, M. (2007). *The Poverty of the Linnaean Hierarchy: A Philosophical Study of Biological Taxonomy*, Cambridge University Press.

Ereshefsky, M. (2010). What's wrong with new biological essentialism, *Philosophy of Science* **77**: 674–685.

Ereshefsky, M. (2022). Species, *in* E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, summer 2022 edn.
URL: *https://plato.stanford.edu/archives/sum2022/entries/species/*

Gelman, S. A. (2003). *The Essential Child: Origins of Essentialism in Everyday Thought*, Oxford University Press.

Gelman, S. A. and Hirschfeld, l. (1999). How biological is essentialism?, *in* D. L. Medin and S. Atran (eds), *Folkbiology*, MIT Press, pp. 403–446.

Ghiselin, M. T. (1974). A radical solution to the species problem, *Systematic Zoology* **23**: 536–544.

Ghiselin, M. T. (2004). Mayr on species concepts, categories and taxa, *Ludus Vitalis* **12**: 109–114.

Godman, M. (2021). Scientific realism with historical essences: The case of species, *Synthese* **198**: 3041–3057.

Godman, M., Mallozzi, A. and Papineau, D. (2020). Essential properties are super-explanatory: Taming metaphysical modality, *Journal of the Americal Philosophy Association* **6**: 316–334.

Griffiths, P. (1999). Squaring the circle: Natural kinds with historical essences, *in* R. A. Wilson (ed.), *Species: New Interdisciplinary Essays*, pp. 209–228.

Hull, D. (1965). The effect of essentialism on taxonomy – two thousand years of stasis (i), *The British Journal for the Philosophy of Science* **15**: 314–326.

Hull, D. (1976). Are species really individuals?, *Systematic Biology* **25**: 174–91.

Hull, D. (1978). A matter of individuality, *Philosophy of Science* **45**: 335–60.

Jones, J.-E. (2022). Locke on real essence, *in* E. N. Z. . U. Nodelman (ed.), *The Stanford Encyclopedia of Philosophy*, summer 2022 edn.
URL: *https://plato.stanford.edu/archives/spr2020/entries/real-essence/*

Kripke, S. (1980). *Naming and Necessity*, Harvard University Press.

LaPorte, J. (2004). *Natural Kinds and Conceptual Change*, Cambridge University Press.

LaPorte, J. (2017). Modern essentialism for species and its animadversions, *in* R. Joyce (ed.), *The Routledge Handbook of Evolution and Philosophy*, Routledge, pp. 182–193.

Lennox, J. (1987). Kinds, forms of kinds and the more and the less in aristotle's biology, *in* A. Gotthelf and J. Lennox (eds), *Philosophical Issues in Aristotle's Biology*, Cambridge University Press, pp. 339–359.

Locke, J. (1975). *An Essay Concerning Human Understanding*, Oxford University Press. Nidditch, P. (ed).

Mayr, E. (2004). *What Makes Biology Unique?: Considerations on the anatomy of a scientific discipline*, Cambridge University Press.

Millikan, R. (1999). Historical kinds and the special sciences, *Philosophical Studies* **95**: 45–65.

Mishler, B. D. and Brandon, R. A. (1987). Individuality, pluralism, and the phylogenetic species concept, *Biology and Philosophy* **2**: 397–414.

Morrison, M. (2000). *Unifying Scientific Theories*, Cambridge University Press.

Müller-Wille, S. (2007). Collection and collation: theory and practice of linnaean botany, *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences* **38**: 541–562.

Okasha, S. (2002). Darwinian metaphysics: Species and the question of essentialism, *Synthese* **131**: 191–213.

Putnam, H. (1975). *Mind, Language and Reality*, Cambridge University Press.

Robertson, I. T. and Atkins, P. (2023). Essential vs. accidental properties, *in* E. N. Z. . U. Nodelman (ed.), *The Stanford Encyclopedia of Philosophy*, spring 2023 edn.
URL: *https://plato.stanford.edu/archives/spr2023/entries/essential-accidental/*

Robinson, D. N. (2008). *Consciousness and Mental Life*, Columbia University Press.

Sober, E. (1992). Evolution, population thinking and essentialism, *in* M. Ereshefsky (ed.), *The Units of Evolution: Essays on the Nature of Species*, MIT Press, pp. 247–278.

Tahko, T. E. and Lowe, J. E. (2025). Ontological dependence, *in* E. N. Z. . U. Nodelman (ed.), *The Stanford Encyclopedia of Philosophy*, summer 2025 edn.
URL: *https://plato.stanford.edu/archives/sum2025/entries/dependence-ontological/*

Talpsepp, E. (2013). Biological essentialism concerning the species category, *in* U. Mäki, I. Votsis, S. Ruphy and G. Schurz (eds), *Recent Developments in the Philosophy of Science: EPSA 13*, Springer, Helsinki, pp. 369–380.

Walsh, D. M. (2006). Evolutionary essentialism, *British Journal for the Philosophy of Science* **57**: 425–448.

Wilkins, J. S. (2003). *The Origins of Species Concepts*, PhD thesis.

Wilkins, J. S. (2011). *Species: A History of the Idea*, University of California Press, Berkley.

Wilkins, J. S. (2013). Essentialism in biology, *in* K. Kampourakis (ed.), *The Philosophy of Biology: A Companion for Educators*, Springer, pp. 395–420.

Wilson, R. A. (1999). Realism, essence, and kind: Resuscitating species essentialism?, *in* R. A. Wilson (ed.), *Species: New Interdisciplinary Essays*, Cambridge University Press, pp. 187–207.

Winsor, M. (2003). Non-essentialist methods in pre-darwinian taxonomy, *Biology and Philosophy* **18**: 387–400.

Ylikoski, P. (2013). Causal and constitutive explanation compared, *Erkenntnis* **78**: 277–297.