Specious Intrinsicalism*

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Over the last 2,300 years or so, many philosophers have believed that species are individuated by essences that are at least in part intrinsic. Psychologists tell us most folks also believe this view. But most philosophers of biology have abandoned the view, in light of evolutionary conceptions of species. In defiance, Michael Devitt has attempted in this journal to resurrect a version of the view, which he calls Intrinsic Biological Essentialism. I show that his arguments for the resurrection fail, and I identify challenges that face anyone wishing to defend Intrinsic Biological Essentialism.

1. Introduction. You do not have to be interested in species, or even essentialism, to be interested in Michael Devitt's (2008) attempt to resurrect essentialism about species and other Linnaean taxa. Aside from species essentialism, he engages several issues in philosophy of science and metaphysics, including explanation, laws, causation, properties, and individuation. But species aficionados fear not, there is much of interest in Devitt's paper for you too. After all, Devitt argues for what he calls *Intrinsic Biological Essentialism*, the view that "Linnaean taxa, including species, have essences that are, at least partly, underlying intrinsic, mostly genetic, properties" (344). And if this view is right, then the vast majority of philosophers of biology are mistaken about the nature of species, and biologists' prevailing species concepts are incomplete and perhaps inadequate.[1] No doubt these are some of the reasons why even before pub-

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1. Devitt interprets definitions of species concepts in a way that suggests his view is compatible with them. My paper should show that his interpretation is wrong and the incompatibility real.

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lication, Devitt's paper generated over 100 pages of discussion with other philosophers (see his acknowledgments).

Despite having survived all this scrutiny, Devitt's view remains problematic. He supports his view with both a positive and a negative argument, but I will argue that neither succeeds. This will not establish that his view is indefensible, but it will illuminate difficulties that await further attempts to defend such a view. The chief problem concerns a part of Devitt's view that I call *Intrinsicalism*, according to which, for any species, intrinsic properties *must* be among the properties constitutive of belonging to that species. The problem is that we so far have been shown no compelling reason to believe this. To start, let me clarify Devitt's view and its opposition.

2. The View and the Opposition. Devitt defines "essential property," and then "essence," as follows: "a property P is *an essential property* of being an F *iff* anything is an F partly in virtue of having P. A property P is *the essence* of being an F *iff* anything is an F in virtue of having P. The essence of being F is the sum of its essential properties" (2008, 345). He also clarifies that he is concerned with Linnaean taxa, and thus he sets aside recent worries about whether the Linnaean taxonomy, or other similar hierarchical categorizations of organisms into taxa, can be defended. Let us also set aside these concerns and focus just on Linnaean *species*. Take these to be evolutionary units (see Barker 2007; Barker and Wilson 2010) that ideally rational Linnaean taxonomists would classify as species in the limit of inquiry. According to Devitt's essentialism, every species taxon so understood is associated with a distinct essence composed of essential properties, at least one of which must be intrinsic to taxon members.

Devitt documents his opposition as proponents of a broad consensus in the philosophy of biology that implies that his view is false. Supposing that properties essential for species membership are metaphysically necessary for species membership, some proponents of this consensus (e.g., Wilson, Barker, and Brigandt 2007) provide analyses of species individuation on which there need not be *any single* property essential to species membership. They do this because they worry about whether any particular properties are necessary for species membership (aside from uninteresting ones, like, perhaps, being corporeal). These are legitimate concerns, but let us bracket them and assume for sake of argument that recognizing that organisms divide into species just is to recognize that organisms have properties essential for belonging to their respective species. We will then speak interchangeably of these essential properties, and properties *constitutive* of species membership, and properties that help or in part *individuate* species taxa. Given this, the consensus in philosophy

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of biology is that all or most species are individuated only by relational properties, such as their reproductive and genealogical relations to other organisms. Devitt sees the consensus in this way but disagrees with it. He allows that, for each species, there may be relational properties among the properties that individuate it, but he insists that there must also be intrinsic ones.

Although Devitt provides a positive argument for his view before defending it from opponents with a negative argument, it will pay to address the negative argument first. This will acquaint us with literature on species concepts that will be useful when later turning to the positive argument.

3. Devitt's Negative Argument. Let F be any given species and both x and y be organisms belonging to F. We can then articulate three species problems that Devitt distinguishes (2008, 357, 364):

- The category problem: In virtue of what is F a species?
- The conspecificity problem: In virtue of what are x and y of the same species?
- The taxon problem: In virtue of what is x an F?

Devitt's essentialism primarily concerns the taxon problem. His view implies that for any organism x, an answer to the taxon problem may cite relational properties of x, but it must cite at least one intrinsic property of x.

Whatever the argument for this, most philosophers of biology see a worrisome conflict between it and the prevailing definitions of species concepts that taxonomists and systematists offer. And there is a presumption that such conflict should be resolved in favor of the taxonomists and systematists, whose definitions are motivated by widely confirmed evolutionary theories. As Devitt documents, the conflict is said to arise because all prevailing definitions of species concepts are interpreted as entailing or otherwise being associated with wholly relational answers to the taxon problem.

To deflect this worry, Devitt provides what I am calling his negative argument. It takes the form of a dilemma. Either definitions of prevailing species concepts are (surprisingly) compatible with Intrinsic Biological Essentialism, because they are not, after all, associated with wholly relational answers to the taxon problem. Or the definitions are associated with such wholly relational answers, but these answers are inadequate and require appeal to intrinsic properties for their adequacy. Take the horns of this dilemma in turn.

3.1. First Horn. Devitt agrees that definitions of prevailing species concepts provide wholly relational answers to the category problem. Take,

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for example, one species concept Devitt dwells on, the (in)famous biological species concept (BSC). Authors have proposed several definitions of the BSC, but a representative one is the last of Mayr's, according to which species are "groups of interbreeding populations that are reproductively isolated from other such groups" (2000, 17). Devitt thinks that this straightforwardly is an attempted answer to the category problem: a group *F* is a species iff it is reproductively isolated and its members interbreed. Moreover, it is a *wholly relational* answer to that problem because it appeals to the relational properties of species members (interbreeding relations) and of groups (reproductive isolation). But Devitt argues that such wholly relational answers to the category problem imply *nothing at all* about the answer to the taxon problem and indeed are compatible with partly intrinsic answers to the taxon problem. For a flavor of the idea, consider an analogy he draws. A group of objects may *be tools* (rather than pets or toys) in virtue of relational properties of the objects or even relational properties of the group of objects (cf. the category problem). But any particular member of the group of tools may *be a hammer* (rather than a saw) partly in virtue of one or more of its intrinsic properties (cf. the taxon problem). Perhaps analogously, a group of organisms may *be a species* (rather than a genus or family) in virtue of relational properties of the organisms (interbreeding relations) or even relational properties of the group (reproductive isolation). But any member of the group may *be a tiger* (rather than a lion) partly in virtue of one or more of its intrinsic properties (having some particular gene).

Devitt *may* be right that answers to the category problem do not imply anything about answers to the taxon problem. But as interesting as this is, it is unfortunately irrelevant here because wholly relational answers to the conspecificity problem *do* entail wholly relational answers to the taxon problem, as Devitt himself argues (2008, 365). And all prevailing definitions of species concepts provide wholly relational answers to the conspecificity problem, not just to the category problem. Hence those definitions entail wholly relational answers to the taxon problem and are therefore incompatible with Devitt's view.

Put relationality and intrinsicality aside momentarily. Among species aficionados it is common knowledge that all prevailing definitions of species concepts propose *answers* to the conspecificity problem. Different lingo is used though. Each definition is said to provide both (species) ranking criteria and (species) grouping criteria.[2] Grouping criteria are most relevant here because they pick out the properties in virtue of which

2. Those who disavow the Linnaean hierarchy and prefer rank-free systematics do not require ranking criteria from definitions of species concepts.

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organisms are conspecific: those criteria identify the properties to which taxonomists and systematists appeal to answer the conspecificity problem.[3]

Now, all prevailing definitions of species concepts provide *wholly relational* grouping criteria, that is, criteria that pick out only relational properties of organisms. More precisely, on any one of these definitions organisms are conspecific in virtue of participating in certain causal processes; definitions are then distinguished by identifying distinct defining causal processes.[4] To conveniently see this we can group prevailing species concepts into three sorts, as Devitt does (355–356). These are reproductive concepts, ecological concepts, and phylogenetic concepts. Also like Devitt (356), to consider concepts of each sort we can harmlessly focus on concepts representative of each sort. For illustrative purposes we can dwell especially on the BSC as a representative of reproductive species concepts.

On definitions of reproductive species concepts, organisms are conspecific in virtue of partaking in reproductive processes, such that they stand in reproductive relations to each other, relations in which nonconspecifics do not stand to each other. The BSC is concerned with particular (sexual) reproductive relations: causally connected sequences of gene transmissions from parent to offspring. This is not obvious given typical statements of the BSC's definition, such as the above definition of Mayr's. Indeed, those statements appear to explicitly provide the following criteria:

> **Explicit BSC Ranking Criteria.** A group is a species iff it is reproductively isolated and its members interbreed.

> **Explicit BSC Grouping Criteria.** Organisms are conspecific iff they interbreed or can interbreed.

However, typical statements of the BSC's definition are shorthand for

3. One indication that most biologists *in fact* intend definitions of species concepts to be metaphysical theses about ranking *and* grouping is that those biologists who veer from this trend are often widely criticized for doing so. Consider pattern cladists and pheneticists. They are systematists of an atypically extreme empiricist stripe who do not wish to advance any theses about what makes for conspecificity. So they single out the definitions of their concepts as being unusually silent on these matters (Ereshefsky 2001). But they take much criticism for this silence as a result (Hull 1999, 38–44; Wheeler and Meier 2000).

4. For present purposes we can analyze these processes into relational properties of participating organisms. I will not provide a metaphysical analysis for this treatment, but others have provided something like it (see, e.g., Wilson 2004).

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something like the following implicit and more precise ranking and grouping criteria:[5]

> **Implicit BSC Ranking Criteria.** A group is a species iff *a network of (sexual) gene transmissions causally connects its members and these transmissions do not extend beyond group members*.[6]

> **Implicit BSC Grouping Criteria.** Organisms *x* and *y* are conspecific iff *they are causally connected through the same network of (sexual) gene transmissions, the inception of which is marked by the event where some organism(s) last became reproductively isolated from shared ancestors of* x *and* y.[7]

Put simply, on the BSC, all that makes two organisms conspecific (in the right environment) is their being appropriately connected by gene transmissions. This implies that there are no intrinsic properties among the properties that individuate species; all properties essential for species membership are relational.

With the general point made, consider definitions of ecological and phylogenetic species concepts more briefly. On one hand, the definitions of ecological concepts typically provide grouping criteria that appeal to organisms' shared relations with particular selection regimes, habitats, niches, and/or "adaptive zones." For example, on Van Valen's representative ecological species concept (ESC), a species is a "lineage," a mono-

5. It is not obvious that the following criteria are implicit in the BSC's definition and are the criteria actually proposed. But species aficionados widely appreciate the implicitness, even if they seldom bring attention to it. Douglas Futuyma brings attention to it in his introductory text (2005, 363), noting that although structural similarities can help in "diagnosing" conspecificity, conspecificity is implicitly "defined" on the BSC by "gene exchange" that causally connects organisms. The genealogical condition that I have expressed in the implicit grouping criteria has been increasingly understood as implicit in the BSC's definition, as systematists have attempted to reduce tensions between the BSC and phylogenetics. Like the BSC, other explicit definitions of species concepts often are only convenient shorthand for implicit grouping and ranking criteria. But the criteria are nonetheless widely recognized and understood to spring from the theories motivating the definition in question.

6. These criteria are notoriously deficient for objectively determining species boundaries across time, and Devitt flags this in his paper. However, the problem is irrelevant here. Any essentialism about intrinsic properties that allows for evolution will suffer the same problem and so cannot be required to solve a problem that the BSC (and other species concepts) cannot solve.

7. These formulations of the criteria reflect recent attempts to wed the BSC to certain principles of phylogenetic taxonomy. Like the BSC's ranking criteria, these grouping criteria face known difficulties, but these are irrelevant to our discussion. See the previous note.

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phyletic group,[8] that occupies an "adaptive zone minimally different from that of any other lineage in its range and which evolves separately from all lineages outside its range" ([1976] 1992, 70). Here, organisms are conspecific in virtue of descending from a common ancestor and partaking in shared ways with certain ecological processes and selection regimes. These wholly relational grouping criteria ensure that the ESC is inconsistent with Devitt's view. On the other hand, definitions of phylogenetic species concepts (PSCs) vary widely. Minimally, all of them imply that organisms are conspecific at least partly in virtue of being genealogically related in ways that nonconspecifics are not. Additionally, all PSCs associated with the idea that species are evolutionary units (e.g., Wiley 1981; Mishler and Brandon 1987; and see concepts in Wheeler and Meier 2000) also appeal to nongenealogical relations, such as reproductive and ecological relations, that are shared only by conspecifics. These PSCs' definitions differ from each other primarily by appealing to different relations or combinations of relations additional to genealogical relations. Mishler and Brandon's (1987) PSC (MB-PSC) is a representative concept here because it is both genealogical and pluralistic: like all other PSCs, its definition implies that certain genealogical relations are necessary for conspecificity, and then which other relations also contribute to the making of conspecificity depends on the species in question. It also is representative because, like other PSCs, its grouping criteria are wholly relational. It is at odds with Devitt's view. Assuming as Devitt does that the BSC, ESC, and PSC are jointly representative of all prevailing definitions of species concepts, all those definitions are incompatible with Devitt's view.

Having dulled or at least evaded the first horn of the dilemma that is Devitt's negative argument, let us move to the other horn.

3.2. Second Horn. Devitt suggests that if definitions of prevailing species concepts are interpreted as (in part) answers to the conspecificity problem, they are metaphysically hopeless answers to that problem. To argue for this he identifies wholly relational grouping criteria that he thinks may be or have been associated with definitions of prevailing species concepts. He then argues that *those* criteria are "*metaphysically hopeless*" (2008, 362).

There are two problems with this. First, Devitt considers the wrong grouping criteria. They are not the ones that taxonomists and systematists propose in light of evolutionary theory, the ones that I identified above as typically residing implicitly, but widely recognized, within definitions of species concepts. For instance, he considers two candidate metaphysical

8. That is, a group comprising all and only descendents of a particular ancestor or ancestors.

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BSC grouping criteria. On one of these, two organisms are of the same species iff their parents are of *that* species; on the other, organisms are of the same species iff they are each members of the interbreeding group that contains the type specimen for the species. Devitt claims that these are metaphysically hopeless criteria and that, therefore, it is most charitable to interpret them as epistemic theses about what *tells* you whether two organisms are conspecific, rather than metaphysical theses about what *makes* them so. This may or may not be right about *those* grouping criteria but in any case misses the target. To adequately address the BSC, Devitt needs to take up its actual, implicit grouping criteria that appeal to causal processes of gene transmissions that connect conspecifics.[9]

Is there any indication that Devitt's charges of metaphysical hopelessness would transfer easily to any one *or combination* of the grouping criteria I identified? Certainly biologists motivated by evolutionary theory have implied that the answer is no. The burden is on Devitt to evaluate their reasons and show otherwise, since these criteria entail wholly relational answers to the taxon problem. It is difficult to assess his chances of discharging this burden because of the second problem for the second horn of his dilemma: he does not argue for a *necessary* condition for a property's or set of properties' being *fully* constitutive of conspecificity.[10] Such an argument is needed, so that he can persuasively show that the proposed necessary condition is not met by any one *or combination* of the properties picked out by prevailing grouping criteria. Not only that, but Devitt must show that to meet the condition, grouping criteria *must* appeal to intrinsic properties—that wholly relational criteria *could not* work. Because he does not argue for the needed necessary condition, even his charge of metaphysical hopelessness about the *wrong* grouping criteria is difficult to assess. In short, his argument for the second horn of the dilemma he proposes is not only off the mark but also incomplete.

Prima facie, there seems nothing metaphysically hopeless about the grouping criteria I identified. Take the BSC grouping criteria. These face problems, including empirical counterexamples that ensure they do not apply for all recognized species. But there seems nothing obviously metaphysically hopeless about them. There seems nothing metaphysically

9. Devitt's discussion of grouping criteria lumps the BSC with the ESC. Consequently, he considers no detailed ecological niche concept's grouping criteria. And he considers a singular PSC grouping criterion (2008, 366ff.) that does not reflect the fact that most PSCs relevant to our discussion are pluralistic as I described above.

10. At least he does not provide any illuminating or useful necessary condition. Given his definition of "essence," he might say that for a property or set of properties to be fully constitutive of conspecificity, it must be one "in virtue of which" organisms are conspecific. This does not illuminate the notion of constitutivity.

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hopeless about the idea that (in the right environment) what makes you and me conspecific is that we are causally connected by a network of gene transmissions that have distributed certain genes, dampened the effects of others, and reached reproductive barriers that separate these processes and us from nonhumans. Why think metaphysics demands that *being* human involves something more than appropriately participating in these processes? *And*, why must the something more include an intrinsic property of ours? Any proponent of Intrinsic Biological Essentialism must answer such questions to defend their view. More pointedly, they must argue for a necessary condition for a set of properties' being fully constitutive of conspecificity, then show that the condition is met by no combination of properties picked out by the wholly relational grouping criteria that definitions of species concepts furnish and could be met only if the criteria appealed also to intrinsic properties.

4. Devitt's Positive Argument. Devitt's positive argument is an argument from explanation. Although evolutionary theory points to the importance of *variation* among conspecifics, Devitt notes that biologists retain interest in conspecific *similarities* too. They continue to seek and discover true generalizations about one or some combination of the morphological, physiological, and/or behavioral properties that conspecifics share (2008, 351). For convenience, call these properties *structural properties* (of species members) and the corresponding generalizations *structural generalizations*. Structural generalizations are the stuff of popular nature programs and field guides. All Indian rhinos have a single horn.[11] All platypuses have a ducklike bill. And so on. Devitt claims that there are true generalizations of this sort not just for species but also for Linnaean taxa more generally. Because we are focusing on species though, by "structural generalization" I will mean just those generalizations that quantify over conspecifics and are of the form 'all *F*'s are *P*', where *F* is a species, *F*'s are species members, and *P* is a structural property of organisms.

Having singled out structural generalizations, Devitt then argues as follows:

> Generalizations of this kind demand an explanation. *Why are they so*? . . . Such questions could, of course, be seeking an explanation of the evolutionary history that *led to* the generalization being true. . . . The questions could also be seeking an explanation of *what*

11. You might think that such generalizations are false. After all, for each of the generalizations Devitt cites, biologists would happily admit—even insist—that there could be or are exceptions. Devitt addresses this briefly at the end of his paper by appeal to lawlikeness, which I discuss below.

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> *makes* the generalization true. Regardless of the history of its coming to be true, in virtue of what is it now true? What are the mechanisms? The truth of these generalizations cannot be brute facts about the world and so must be explained. Explanations will make some appeal to the environment, . . . but they cannot appeal only to that. There has to be something about the very nature of the group—a group that appears to be a species or taxon of some other sort—that, given its environment, determines the truth of the generalization. That something is an intrinsic underlying, probably largely genetic, property that is part of the essence of the group. Indeed, what else could it be? (352)

This argument appears simple but is not. It will pay to clarify it.

Although the argument appears to turn on an inference to the best explanation, Devitt later supplements the argument (377–378) in a way that suggests it turns on a second, similar inference as well.[12] The first inference begins from the claim that each structural generalization demands an explanation. Call this the *truth burden*. To discharge this burden for a given generalization, Devitt implies in the passage above that we need to cite the conditions that make it "now true" (352). And he thinks that those conditions include intrinsic properties (in the right environment) of the conspecifics over which the generalization quantifies. The idea is that instances of the structural properties that feature in structural generalizations owe causally,[13] at least in part, to instances of intrinsic properties of the organisms whose structural features are in question. For instance, Devitt avers quite plausibly that intrinsic properties of Indian rhinos *will be* among the properties that causally explain why all Indian rhinos have a single horn. Then, by inference to the best explanation, structural generalizations imply the existence of intrinsic properties (of conspecifics) that are among the conditions that make the generalizations true.

It is natural to summarize this first inference in terms of explanatory *adequacy*. For any species F and property P of F's, where all F's have P, we require an adequate explanation of all F's having P. *Some or perhaps all* (Devitt is ambiguous on this point) adequate explanations will be adequate *partly in virtue* of adverting to *intrinsic* properties of F's that are causes of their being P. If we say that all and only these properties

12. Which is a good thing, since without separating out the second inference later in the paper, Devitt may argue circularly.

13. Devitt may well think that explanations other than causal explanations will suffice to discharge the truth burden. But he limits his discussion to causal explanations, and thus I do as well.

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form the set *S*, Devitt's argument implies that this set is nonempty: for each structural generalization there is at least one property in *S*.[14]

But this is only to claim that intrinsic properties will be among the explanatory causes of structural properties that conspecifics share. To make the long step to the additional claim that at least some of these intrinsic causes will also be essential to species membership, Devitt makes his second inference. This begins with the claim that the true structural generalizations of concern are *lawlike*. For Devitt, to say that all *F*'s are *P* is lawlike is to say "anything that *would be* determinately an *F* would be *P*" (378). He then asks, "but now, in virtue of what is this the case?" (378). I understand this as insistence that the lawlikeness, not just truth, of each such generalization requires explanation. Call this the *lawlikeness burden*. Devitt implies that *any* serious explanation (378) of the lawlikeness of a structural generalization of the form all *F*'s are *P* will do two things. First, it will claim that there is at least one intrinsic property, say *G*, that all *F*'s share and that is among the causes of their being *P*. Second, it will claim that "anything that would be an *F* would have *G*" (378).[15]

Given this, in the set *S* of intrinsic properties that cause *P* in *F*'s there must be at least one intrinsic property *G* that all conspecifics share and that is a cause of their being *P and* that any organism *would have were it an F*. On Devitt's definition of "essential property," this thesis implies the essentiality of *G*: any property that a thing would have were it an *F* just is an essential property of *F*'s. Thus to discharge the lawlikeness burden for a given structural generalization, we must assume that some property or properties intrinsic to the members of the species over which that generalization quantifies are essential for membership in that species. Then, by inference to the best explanation, the lawlikeness of true structural generalizations implies the essentiality of intrinsic properties of species members. We have arrived at Intrinsic Biological Essentialism, or so Devitt would have it.

Putting the second inference in terms of explanatory adequacy (as we did the first) clarifies that no ambiguity of the sort that arose for the first inference arises for the second. Devitt is clearly committed to the claim that *all*, not merely some, adequate explanations of the lawlikeness of a true structural generalization will be adequate *partly in virtue* of adverting to the essentiality of at least one intrinsic property of *F*'s. To claim oth-

14. So far there is no claim that for a given structural generalization all conspecifics must have *all* properties in *S*. Multiple realizability is still a live possibility.

15. On my reading Devitt has now ruled out multiple realizability or at least ruled out the intrinsic part of *P*'s realization base being wholly distinct for any two *F*'s. But even if he has not ruled out multiple realizability and he is open to the intrinsic parts of essences being disjunctive, all my objections still apply.

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erwise is to allow that we could account for the lawlikeness of at least some true structural generalizations about species without appealing to intrinsic essential properties. This would be to give up the only route to Intrinsic Biological Essentialism that Devitt offers.

Given the above definitions of "essential property," "essence," and "structural property," here is a summary of Devitt's argument:

(1) Biologists discover structural generalizations, each of which quantifies over conspecifics and is of the form 'all *F*'s are *P*' (where *F* is the species, *F*'s are species members, and *P* is a structural property of organisms).
(2) *Lawlikeness Thesis*: These (or at least some of these) structural generalizations are true *and* lawlike; say that they and only they are members in the set *K*.
(3) Both the *truth* and *lawlikeness* of each member in *K* demand explanation.
(4) For each generalization in *K*, some or all adequate explanations of that generalization's *truth* will be adequate partly in virtue of adverting to a property or properties in the nonempty set *S*, where this set consists of all and only properties that are intrinsic to members of the species over which the generalization quantifies and which are among the causes of the structural property the generalization concerns.
(5) *Intrinsicalism Thesis*: For each generalization in *K*, all adequate explanations of that generalization's lawlikeness will be adequate partly in virtue of adverting to at least one property in *S**, which is a proper subset of *S* and includes all and only those properties that meet the conditions for membership in *S and* which anything would have were it one of the conspecifics over which the generalization quantifies.
(6) Therefore, Intrinsic Biological Essentialism is true.

If this argument is sound, then intrinsic properties are among the properties essential for species membership. And, if sound, it is entailed that intrinsic properties are among the properties in virtue of which any two conspecifics are conspecific. Following on from our discussion of species concepts, I want to probe Devitt's commitments here through focus on conspecificity.

Consider species *F* and the structural generalization 'all *F*'s are *P*'. Devitt claims that this is lawlike if anything that *would be F* would be *P*. Now suppose he is right to suggest that this generalization is lawlike *and* "that *the* explanatory intrinsic property is *G*" (378; my italics). Premise (5), his Intrinsicalism Thesis, implies that this is sufficient for *G*'s being partly constitutive of conspecificity with respect to *F*. In effect he has

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proposed a *sufficient* condition for a property's being *partly* constitutive of conspecificity, or what I will call *Intrinsicalism's Partly Constitutive Principle*. We can understand this conditional principle to feature as the first premise in the following inference:

(i) *Intrinsicalism's Partly Constitutive Principle*: If all *F*'s are *P* in lawlike fashion and *G* is the explanatory intrinsic cause of *F*'s being *P*, then *G* is partly constitutive of conspecificity with respect to *F*'s.
(ii) For each species there is at least one true lawlike structural generalization of the form 'all *F*'s are *P*' and at least one intrinsic property *G* that is the explanatory cause of *F*'s being *P*.
(iii) Therefore, for each species at least one intrinsic property is partly constitutive of conspecificity.

Premise (ii) is implied by (2), the Lawlikeness Thesis, from the argument above. Evaluating first (ii) then (i), we will see that both are problematic and that therefore (5) and (2) are problematic as well.

4.1. Problems with (ii). It is highly controversial that there are any structural generalizations of the form 'all *F*'s are *P*' that are lawlike, let alone at least one such generalization for each species. Biologists do describe structural generalizations that quantify over conspecifics. But the generalizations are notoriously exception-prone. Perhaps it is because of this that Devitt resists calling the generalizations *laws* and instead settles for just *lawlike*. One problem with this is that he says little about what it is for a generalization to be lawlike. He briefly notes that such generalizations have counterfactual force, but this needs to be filled in. More problematic is that he gives no reason to think structural generalizations *are* lawlike. He merely points to Cartwrightian reasons for thinking they *could* be lawlike despite exceptions to them (377). So even if he can provide a more complete discussion of the conditions for a generalization's being lawlike and can show that structural generalization *could* satisfy these conditions, the broad skepticism there is about these generalizations being laws ensures that he must give reasons for thinking these generalizations *are* indeed lawlike. Without doing so his argument is incomplete.

4.2. Problems with (i). Set aside the problems concerning lawlikeness and suppose that (ii) is true. This does not help Devitt unless (i), Intrinsicalism's Partly Constitutive Principle, is true. His argument for the condition is that its truth is the *best answer* to the question of why lawlike structural generalizations are lawlike. As he puts it in the case in which *G* is the explanatory intrinsic property with respect to all *F*'s being *P*, we need to know why all *F*'s are *P in lawlike fashion*. And aside from invoking (i) to infer that *G* is partly constitutive of *F*-hood, he wonders, "what

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other answer could we seriously entertain given that having *G* explains why all actual *F*'s are *P*?" (378). But this argument is incomplete at best and question begging at worst. The problem gets its footing in the distinction between what I earlier called the truth burden and the lawlikeness burden, that is, between saying why all *F*'s *are P* and saying why they are *P* in *lawlike fashion*. Here is a superficial first pass at expressing the problem. Suppose that *all* tigers have stripes in part because each tiger has gene *G*. Why does that show that gene *G* is essential for being a tiger? Just because we cannot imagine other explanations of the lawlikeness, or even lawfulness, of the stripe sharing? That is not very satisfying. The problem is deeper though. Biologists *have* imagined other explanations and have supported them with evolutionary theories and data. An appreciation of explanatory pluralism in biology shows this.

There are multiple explanatory contexts in biology in which the truth burden gets discharged in distinct yet simultaneously adequate ways. In the context of, say, developmental biology, appeal to *G* may be "the" adequate causal explanation of why all *F*'s are *P*. Yet in the context of evolutionary biology, appeal to some set *R* of relational properties will typically be thought adequate to causally explain why all *F*'s are *P*. We thus have an intrinsic explanation for why it is now true that all *F*'s are *P* and a relational one. Perhaps appealing to *R* would *add* to the intrinsic explanation and appealing to *G* would add to the relational explanation; indeed, there are such mixed explanations (e.g., in evo-devo). Even so, without the additions, both intrinsic and relational explanations are widely deemed *adequate* in their respective contexts. Taxonomists and systematists think that in some explanatory contexts the appeal to *G* is "an" and perhaps even "the" adequate *causal* explanation for all *F*'s being *P*, while in other contexts they will think appeal to *R* is an adequate *causal* explanation for all *F*'s being *P*. Were they then to accept the additional burden of saying why 'all *F*'s are *P*' is lawlike and to appeal, as Devitt in effect does, to properties *constitutive* of conspecificity to discharge this burden, their definitions of species concepts indicate that they would appeal only to *R*, not to *G*. And they would do this while still recognizing that both appeals to *R* and those to *G* are, in their respective contexts, adequate causal explanations of why 'all *F*'s are *P*' is now true. Once moving to the lawlikeness burden, why would they privilege relational properties over the intrinsic ones? We will see that the reason is that species concept definitions are underpinned by evolutionary theories that suggest it is properties in *R*, not *G*, that are most important for specieshood and conspecificity.

Relational explanations for structural generalizations (like 'all *F*'s are *P*') often stem from evolutionary theories of how groups of organisms are homogenized with respect to structural properties. These theories cite

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processes that comprise group members as participants, processes that homogenize the members with respect to their structural properties. Examples of such processes are transmission of genetic material between and within populations (Mayr 1970, 168–169, 298, 300; cf. BSC and MB-PSC grouping criteria); forms of natural selection such as stabilizing selection and directional selection (see Futuyma 1998) that push groups onto narrow adaptive peaks (Futuyma 1998; Hellberg et al. 2002; cf. ESC and MB-PSC grouping criteria); past evolutionary processes whose outcomes in ancestors constrain the evolutionary trajectories of descendant groups such that particular structural homogeneities are promoted (Gould and Lewontin 1979; Hansen 1997; Blomberg and Garland 2002; and see Sober 2008; cf. various PSCs); and other historical events and processes, such as colonization and genetic drift (Hellberg et al. 2002, 276–277; cf. various PSCs). If we assume, as we did above, that an organism's participation in any one of these processes can be analyzed in terms of a relational property it has, then this list of processes indicates the sort of relational properties that feature in *R*. Adequate evolutionary causal explanations for why all *F*'s are *P* will typically appeal to these properties and abstract from intrinsic ones.[16]

Now move from causation to constitutivity (or essentiality). Unsurprisingly, the properties in *R* are the very ones that definitions of species concepts pick out as (independently or in certain conjunctions) *fully* constitutive of conspecificity—the parenthetical references to particular species concepts in the above paragraph indicate this. The reason is that the processes of gene transmission, selection, and so forth are the factors

16. Devitt may not agree. While recognizing the sorts of evolutionary processes I just listed, he implies that these might have "led" to 'all *F*'s are *P*' being true, but he insists (2008, 352–354) that it is the intrinsic properties (in the right environment) that "make" the generalization true. His led/make distinction may allow us to understand "led" and "make" as merely causal concepts. Indeed, he partially explicates the distinction by appeal to Mayr's distinction between "ultimate causes" and "proximate causes," and on p. 352 he implies that some instances of 'all *F*'s are *P*' are made "now true" in virtue of mechanisms intrinsic to *F*'s causing them to be *P*. But given that intrinsic mechanisms, e.g., *G*, and historical evolutionary relations, e.g., *R*, are both among the causes of all *F*'s being *P*, it is unclear what is *special* about the intrinsic mechanisms. Why do they "make" 'all *F*'s are *P*' true, while the relations merely "led" to this being true? On the other hand, Devitt may not intend "make" to be merely a causal concept. Perhaps we are to understand properties that make 'all *F*'s are *P*' true to be properties among the causes of *P and* that are constitutive, or part of "the nature," of *F*'s. But without defending his "metaphysically hopeless" claim, Devitt would then beg the question when he says that intrinsic mechanisms make 'all *F*'s are *P*' true while historical evolutionary relations merely led to this being true. On either interpretation, my discussion will show that Devitt's distinction flies without sufficient argument in the face of species theorists' appeals to the evolutionary theories I just described.

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deemed most important for *homogenizing groups so that over evolutionary time their organisms respond to evolutionary pressures with the sort of uniformity distinctive of species*. It is with this claim that taxonomists and systematists move from mere causal properties to constitutive ones. This is just the claim we should expect given the common assumption that species are evolutionary units: being *of* a particular one of these units, say *F*, consists in participating appropriately in the causal processes most important for *F*'s having the evolutionary unity that *makes* it a species. It is because taxonomists and systematists deem these processes the crucial ones for evolutionary unity and conspecificity that I say species concept definitions are *underpinned by* the above-listed evolutionary theories of group homogenization—the theories in which relational explanations of structural generalizations also have their source.

Species concept definitions remain *consistent* with *intrinsic* explanations of the truth of structural generalizations, but why not *underpinned* by them as well? For example, why are not genes also deemed crucial factors in creating evolutionary unity and conspecificity? One reason is that evolutionary theories that underpin the definitions of species concepts suggest a radically different picture of conspecificity than that handed down through our readings of Aristotle. On the Aristotelian view, species naturally exhibit structural homogeneities because conspecifics necessarily share intrinsic natures that lead to these homogeneities; variation between conspecifics is aberration from a natural norm and can be *explained away*. Alternatively, according to evolutionary theories, species members' variation is perfectly natural and helps *cause and explain* evolutionary trajectories of species; it is not aberration that can be explained away (Sober 1980). Facts and theories about genetic recombination during meiosis, random mutation, divisive selection, and migration of organisms, gametes, and zygotes between populations (see Futuyma 1998) suggest that intrinsic similarities among conspecifics are contingent and dependent on processes in which conspecifics participate. For example, any sharing of intrinsic properties across all and only organisms in a (sexually reproducing) species may be lost for extended evolutionary time when the germ cell DNA of one of those species members mutates before that member successfully breeds with other species members (which do not undergo the mutation) during the next reproductive season. When any structural homogeneity persists, it does so *despite* natural tendencies to variation (Sober 1980).[17] The contingent homogeneity may fade and give way to other homoge-

17. Although this theory suggests that there is no one intrinsic property that is strictly shared by all and only species members, this may not entail that the theory is, on its own, in conflict with Devitt's view. Devitt attempts to block this sort of entailment in his discussion of "monsters" (2008, 375–376).

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neities while the relational conditions for conspecificity with respect to the species remain the same. Relational properties are constitutive of conspecificity. Granted, to instantiate the conspecificity relation, they need *some* background of intrinsic properties, but according to contemporary evolutionary views, no particular intrinsic property is itself (even partly) constitutive of conspecificity in any interesting way. (Again, uninteresting properties like being corporeal may be necessary.)

Let us summarize all this in terms of (i), Intrinsicalism's Partly Constitutive Principle. According to taxonomists and systematists, if *G* is "the" explanatory intrinsic property with respect to all *F*'s being *P* and 'all *F*'s are *P*' is lawlike and we are to say *why*, then the best answers will abstract from *G*; properties in *R* also adequately explain all *F*'s being *P*, and the appeals to some one or combination of these relational properties' being *fully* constitutive of conspecificity with respect to *F* will *best answer* the lawlikeness burden. If this is right, Devitt loses his reason for thinking (i) is true, and we have been given no good reason to think (5) in the argument from explanation is true. To complete his argument he must say why (i) is the best explanation for the lawlikeness of 'all *F*'s are *P*'. Until then he begs the question against taxonomists and systematists, who give the different answer I just described, one inconsistent with Intrinsic Biological Essentialism.

It is interesting to note how this outstanding challenge differs from and relates to the challenge I identified at the end of Section 3. There, the resulting challenge was to provide a *necessary* condition for a property's being *fully* constitutive of conspecificity, then show two things. First, show that the necessary condition is unmet by any property or combination of properties picked out by the wholly relational grouping criteria that prevailing definitions of species concepts provide. Second, show that the only fix for this, the only way for this necessary condition to be met by the grouping criteria, is to revise those criteria so that they pick out intrinsic properties in addition to or rather than relational ones.

In contrast, in this section the resulting challenge for someone making the sort of positive argument Devitt forms is to provide a *sufficient* condition for a property's being at least *partly* constitutive of conspecificity, then do three things. First, give a convincing argument for thinking that structural generalizations are lawlike, not just that they could be. Second, acknowledge that evolutionary biologists propose or imply widely accepted wholly relational explanations of what *makes* structural generalizations true (rather than just explanations of what *led* to their being true); then, show why taxonomists and systematists would be wrong to explain the lawlikeness of those generalizations by appealing to only evolutionary considerations. That is, show that they would be wrong to claim that only the relational causal properties picked out by the wholly relational ex-

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planations of the truth of structural generalizations are (in the right environments, including the right genetic makeup of conspecifics) constitutive of organisms being of the same species—the same *evolutionary* unit. Third, as part of the argument for the taxonomists and systematists being wrong, show that something about certain intrinsic properties among the *causes* of structural properties shared by conspecifics is sufficient for those properties to also be *partly constitutive* of conspecificity, so that they help explain the lawlikeness of corresponding structural generalizations.

Clearly, meeting the challenges to emerge from this section and the last would involve engaging taxonomists and systematists and their evolutionary reasons for understanding species as they do. In principle, however, one could form a relative of Devitt's positive argument, one that shows that species members have intrinsic properties that meet some sufficient condition for being at least partly constitutive of conspecificity or species membership, without directly engaging taxonomists and systematists. If one did this successfully, we, as critics, would be in the awkward predicament of saying whether Intrinsic Biological Essentialism had been established even though we had not been given an explanation of where prevailing relational wisdom had gone wrong. Fortunately we are not in that predicament at the moment.

A final and methodological point. My appeals to prevailing wisdom in biology should not suggest that I see no role for the critical philosopher here. Quite the contrary. We have been discussing disputes about modal claims. And there are strong reasons for thinking that we cannot settle the truth values of modal claims by empirical means alone. Imagination, and attempts to isolate and clarify the intuitions in which imagination traffics, play crucial roles in matters modal, such as determining which (if any) properties that species members have are had by them essentially (see Sidelle 1989). But empirical data, theories, and patterns of explanation are crucial tools too. And it is precisely by bringing *all* these crucial tools together that species theorists have arrived at prevailing, wholly relational conceptions of conspecificity and species membership. Proponents of Intrinsic Biological Essentialism need to show where species theorists have gone wrong with at least one of these tools.

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