Referring to Species

(or: Metaphysics of Species for those Wary of Commitment)

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1. Introduction

Species are deeply embedded in both scientific investigation and everyday enthusiasm. *Our species* goes to considerable effort and expense to watch, document, count, breed, cultivate, hunt, and conserve other species. Scientists often report discovering new species, estimating that there are ten million distinct species presently on earth (and many more that have disappeared).

As such, reference to particular biological species is commonplace. Not only do we use species names as predicates (as in 'Gao Gao is a panda'), but we also use them as singular terms (as in 'The panda eats bamboo'). To what do such terms refer? Two main contenders have dominated the debate: that species are *sets* and that species are *individuals*. Unfortunately, neither has the resources to accommodate all of the uses to which we put species names. I shall have to be rather quick with the reasons for their failures — as they have to do with intricacies of metaphysics and biological practice whose scope considerably exceeds this paper. My main purpose in this paper is to make some headway in describing an alternative view of how reference to species works. I shall argue that species names are best understood as non-rigid plural referring expressions. The organisms to which a species name refers may yet be a natural kind in the sense of possessing the properties and relations that suit them for inferential and explanatory use in biological science and beyond.[1]

2. Species as Sets

At first glance, the most natural view of species reference is that species are sets. In his classic paper, "Species", Kitcher even notes this thesis "seems banal" (1984a, 310). Now there is certainly a sense in which Kitcher is correct that the claim is obvious: however one characterizes species, they are ultimately made up by a bunch of organisms. No one could reasonably deny this. What is less clear is whether this banal fact ought to translate into the claim that species are a certain kind of *abstract* object.

When Kitcher's paper came out, defenders of the species-as-individuals (SAI) thesis were already quite concerned about that damage this view would wreak on biology. Indeed, this concern comprised a large portion of their case *for* SAI. Much of this concern devolved from confusions. For instance, they imagined their opponents claiming that species were *classes* — a notion that Kitcher forcefully dispelled, charitably

[1] My particular view that many species are natural kinds will play only a slight role in what I have to say about the ontological category to which species belong; and I suspect that what I have to say about species would apply *mutatis mutandis* to other natural kinds, but I do not want to claim that the picture a paint here should be true of natural kind reference in general. Indeed, given that it seems that some natural kinds may possess essences (physicochemical kinds, perhaps) and some may not (species, I think), I am skeptical that we should be looking for a *general* theory of what natural kind terms refer to and how that reference is fixed.

interpreting Ghiselin and Hull as having in mind *sets* (Kitcher 1987, 185). They suggested that a "nominalistic species concept" would deny reality to species by identifying them with classes, which were not real (Ghiselin 1974, 542). Or if not nonexistence, they claimed that treating species as classes rather than individuals would foist upon biology a long outmoded typological view of species (Hull 1978, 336).[2]

Kitcher patiently explained how these worries were ill-founded (1984a, 1984b, 1987). But he himself anticipated a much more serious worry about SAS stemming from the abstractness of sets. As he put it: "Species evolve. Sets are atemporal entities. Hence sets cannot evolve. Therefore species are not sets" (1984a, 311). He did not see the problem as serious; many came to see this as overly optimistic.[3] In answering his own challenge, he wrote:

> Quite evidently, there is a fallacy here, the fallacy of incomplete translation. It would be futile to think that mathematicians need to revise their standard ontology because of the following argument: "Curves have tangents. Sets of triples of numbers are nonspatial entities. Hence sets of triples of real numbers cannot have tangents. Therefore curves are not sets of triples of real numbers." The correct response to the latter argument is to insist that, in the reduction of geometry to real arithmetic, the property of being a tangent is itself identified in arithmetical terms. Once the property has been so identified, it is possible to see how sets of triples of real numbers can have it. Only incomplete translation deludes us into thinking that sets of triples of real numbers cannot have tangents. An exactly parallel response is available in the case of species. (Kitcher 1984a, 311)

But it is not entirely clear what to make of the idea that the problem stems from an "incomplete translation". The analogy with mathematical objects seems non-conclusive. For 'curve' is ambiguous between lines in space (e.g., drawn on a physical thing) and abstract mathematical objects. It is only the former which is identical to sets of triples of real numbers. The latter may *describe* the former, but if you were to point to a line on a piece of paper and ask what that thing is — to what ontological category it belongs — the correct answer should not be that it is abstract. You're *pointing* at it, after all!

There are other mismatches. Consider Rumfitt's discussion of Burge's claim that phrases like 'The stars that presently make up the Pleiades galactic cluster' are semantically singular terms, referring to sets of stars (Burge 1977, 98). But now consider this sentence:

> (P) 'The stars that presently make up the Pleiades galactic cluster occupy an area that measures 700 cubic light years'

Rumfitt points out that if Burge is right about the reference of that term, a literal construal of (P) encounters an immediate difficulty: "In the ordinary sense of 'occupy', a set is not the sort of thing that occupies space" (Rumfitt 2005, 89). The same point applies to species: 'Tigers are generally found in Eastern Asia' is true, but the set containing all tigers is not to be "found" anywhere — it is an abstract object. Another mismatch involves modal differences between sets and the intuitive referents of species names. In a same-issue reply to Kitcher's (1984), Elliott Sober noted that the identity conditions of sets and species differ. Sets are defined by their extensions; species are not.

> Consider the set of organisms in *Homo sapiens*. I am one. If I did not exist, that set would not exist. Yet the species would. A population is not to be identified with the set of organisms in it. And the same holds

[2] Mayr (1975) had persuasively argued that modern evolutionary theory had moved away from thinking that species were ideal types and toward what he called "population thinking".

[3] I see his response rather as simply not directly answering the question of species ontological category — he should be a ready convert to my view.

> true of natural kinds; gold would still exist and be numerically the same natural kind, even if my wedding ring and the matter of which it is made had never existed. (Sober 1984, 337)

Now, it may be possible to sidestep such difficulties by devising translation schemes like those Kitcher has in mind (perhaps species are logical constructions of multiple, transworld sets); or we could, as Rumfitt notes, attempt to locate "an extraordinary sense in which a set may be said to occupy space" (2005, 90), or simply introduce a new predicate intended to capture the sense in which a set occupies space or tolerates the change of its members just in virtue of properties of its members. But it would be nice to avoid such baroque machinations.

Interestingly, Kitcher's commitment to SAS seems somewhat tentative. Notice how he states his thesis: that "Species *can be considered to be* sets of organisms, so that the relation between organism and species can be construed as the familiar relation of set-membership" (309; *my emphasis*). Though this language becomes simplified (and correspondingly less circumspect) later in the paper, there is evidence that Kitcher is not *really* attempting to say anything metaphysically significant about what species terms refer to. Indeed, three years later, he expressed a kind of ontological opportunism about the sets versus individuals debate, noting that "[f]ans of mereology will prefer mereological reconstructions and friends of set theory will opt for set-theoretic analyses. Understood properly, the species-as-individuals thesis is harmless. . . . Once the first-stage issue is clarified it should be obvious that the ontology is biologically neutral" (1987, 187). I suggest that the most well-known defender of SAS was not *really* interested in making strong claims about what the referents of species names are but instead is better understood as defending the view that set theory offers a convenient apparatus for couching talk about species for most intents and purposes.

3. Species as Individuals

Defenders of the Species-as-Individuals view are not nearly as ecumenical. SAI is a definite stand on species' ontological category: as Ghiselin trenchantly put it, "Species are individuals and they are real!" (1974, 536). More specifically, species are composite "concrete particular persisting objects" (Crane 2004, 160). Why accept this extraordinary claim? Aside from the negative reasons already mentioned above — the feeling that since species were not natural kinds or sets, then they *must* be individuals —, there was the feeling that biologists' claims about species straightforwardly committed them to treating species names as singular referring terms. Coleman and Wiley, for example, announce their intention to argue for the SAI thesis by examining "typical statements biologists make about species", revealing at least "how species are conceptualized, what they are thought to be" (2001, 500). They thus begin their argument by indicating how biological talk is prima facie committed the existence of species:

> Biological theory is replete with generalizations that seem to be about particular things called "species." The generalizations "There are species" and "Species are variable" appear to be statements that are truly or falsely said about species and not about the organisms that comprise a species. . . . Thus, one way to interpret discourse about species is to understand at least some of the expressions used to talk about particular species taxa as genuine singular terms (i.e., as terms referring to particular things rather than designating kinds of things). (*ibid.*)

Thus, insofar as our best theories quantify over particular entities called species, we have good reason to accept that species are individuals and genuine features of the world.

This line of argument is surprisingly weak. Over and over again, we have been reminded of the opacity of the existential idiom. Quine writes:

> Ordinary discourse is indeed seldom meticulous about ontology, and consequently an assessment based on the relative pronouns of ordinary discourse is apt to bespeak a pretty untidy world; but ontological clarity and economy can be promoted by paraphrase, if one so desires. . . . (1983, 500)

There's scant reason for thinking biological discourse, though certainly more systematic, to be much more ontologically meticulous. Most biologists I know are not keen to join such metaphysical issues, no matter how much we philosophers think they ought to. In short, surface grammar is a poor a guide to ontological commitment (in biology as elsewhere) — even when that grammar evinces not the slightest hint of ambiguity. Solemnly intoning phrases like 'There are holes' need not commit desert landscape enthusiasts who doubt the existence of immaterial entities. As before, the question is not just whether surface grammar inclines us to treat species names as singular terms, but whether a particular picture of the *referents* of those terms stands up to philosophical scrutiny.

I think the answer to this question is *no*. As with SAS, the SAI metaphysic is out of step with they way biologists think of species (even if they do not recognize this). I shall describe two reasons here. (I explore these in much more detail in my [reference suppressed]), so I shall be brief.) The first problem stems from the transitivity of parthood. In general, if A is a part of B, and B is a part of C, then A is a part of C. One very natural interpretation of SAI involves recasting locutions about *membership* into the language of *parthood* as a way of conferring objectivity on our ordinary notion of species membership. My humanity, on this approach, inheres not in my possessing some intrinsic essential property, but in my bearing the parthood relation with some "species-individual", some object composed of all the humans — an object for which we might make a statuesque representation simply by making statues of every human. Call this object '*Homo sapiens*'. But I have parts; and by transitivity of parthood, *Homo sapiens* has them too. So in addition to particular humans, *Homo sapiens* has as parts spleens, kidneys, pacemakers, titanium screws, cells, atoms, and whatever else any human has as parts. But while my spleen happens to be a human spleen, it is not itself a human![4]

The second problem involves the fact that speciations are not always sharply defined events. Every conception of what divides species from one another — and thus when a species comes to be — admits of vagueness. If this vagueness is genuine (in the sense of being a non-linguistic, non-epistemic, so-called "ontic" feature of the world), then SAI-ists must countenance ontically-indeterminate parthood and potentially *indeterminate existence*. That is too tough a pill for me to swallow. Quoth Lewis: "What is this thing such that it sort of is so, and sort of isn't, that there is any such thing?" (Lewis 1986, 212). But since neither the semantic or epistemic approaches to vagueness adequately handles the vagueness of species-parthood, SAI is stuck either admitting the possibility of ontic vague existence (a view that is at best deeply controversial) or denying that contemporary species concepts admit of vagueness (which seems undeniable). I conclude that SAI is in deep trouble.

I have not said *why* I think the semantic and epistemic approaches to species are unable to handle species, so I don't expect you to believe me about this.[5] But perhaps I could gain your assent to move forward by pointing out that on either approach, we will quite probably have to meddle considerably with

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[4] There are obvious responses to this argument. To wit, an SAI-ist might deny that parthood should be understood literally or unqualifiedly, deny that transitivity is generally true of parthood, or just bite the bullet and admit that my spleen *is* a part of *Homo sapiens*. I argue in [suppressed] that none of these responses work.

[5] Again, I must refer you to my [currently unnamed paper] for a full defense of these claims.

"common sense". Briefly: Semantic approaches to vagueness require multiple reference candidates — thus, they are typically favored by those who espouse profligate principles of composition (e.g., Universalism, à la Lewis 1991). On the other hand, Epistemicism, the view of vagueness "popularized" and developed by Sorensen (1988, 2001) and Williamson (1994) is frequently met with incredulous stares because of its dutiful adherence to there being a fact of the matter for every predicate about whether it applies to a given object or not.

4. What Else, Pray Tell, Might Species Be?

As I say, I do not expect the foregoing considerations to be convincing. But hopefully you agree that there are sufficiently many doubts and difficulties to make it worth looking for an alternative. If we can answer the question of what species names refer to without recourse to heavy-duty metaphysics or semantics, then I suppose that we ought to. In the balance of this paper, I shall explore the suggestion that many, if not all, uses of species names are best understood as plural referring expressions.[6] Let us return briefly to the considerations raised by Ghiselin, Coleman, and Wiley in support of SAI. It often seemed that Ghiselin's examples of individuals were somewhat ill-chosen, but perhaps they can reveal something important after all.

Ghiselin wrote that species are "as real as American Motors, Chrysler, Ford and General Motors" (1974, 537). Or consider his later description of individuals:

> Individuals are single things, including compound objects made up of parts — such as ourselves, and also every cell and atom in our bodies. Such parts need not be physically connected — a baseball team is an individual made up of players. Individuals each have a definite location in space and time. In general they are designated by proper names — such as "Ernst Mayr" or "Canada." (1987, 128)

It's worth pursuing this analogy to organizations, corporations, and teams a bit. Even if such things are picked out by singular terms — 'Google', 'the Chicago Cubs', 'The Supreme Court' —, it scarcely seems *obvious* that what those things pick out are individual *things* (in any but a weak sense).

Granted, so long as we abjure baroque translation schemes, the view that those names refer to sets — the set of people who work for, play for and coach, or serve on (respectively) Google, the Chicago Cubs, and the Supreme Court is in even worse shape. We have already mentioned the reasons: sets have the different persistence conditions through time and possible worlds than these things and they are not located in spacetime (except parasitically). But these reasons also seem to apply to the thesis that these things are, for example, mereological fusions. Unless we are to take corporate law as dictating how parthood works, then it would seem to be a strange coincidence that some people scattered about space, working on computers, who happen to receive a paycheck from Google, should somehow compose an object that we call 'Google'. Or perhaps composition is automatic and no matter *what* people we have in mind (no matter who signs their checks), those people compose something. In that case, while there is a *thing* we might refer to when we use the name 'Google', this thing has the wrong identity conditions (cf. Uzquiano 2004, 136). When someone

[6] This proposal need not be seen as a "metaphysics of species"; it is rather a proposal about the semantic value of words like 'tiger' in sentences like 'The tiger is a top carnivore', one onto which a metaphysics of species might be grafted. One way of construing this proposal is as "nihilistic" (and thus apparently revisionary): that there is nothing — no single thing — to which 'tiger' refers. This is in fact what I want to say, but I won't press the point here. Absent this further denial, the view that species names are (often) plural referring expressions is, I think, congenial to those who would opt for a more substantial metaphysics of species (like SAS or SAI). Nevertheless, I do not think that it is *necessary* to adopt one of these metaphysics (or any metaphysics of that general ilk) in order to uphold the intuition that species are real.

is fired, this affects their employment at Google, but has zero impact on whether they are part of the aforementioned mereological sum. To capture these corporate goings on, we would need a time-indexed *series* of mereological sums to "do duty for" Google. Such constructions are, of course, more familiar as so-called four-dimensional objects (Sider 2001).

While I realize that Four-Dimensionalism (otherwise known as the Doctrine of Temporal Parts or the Theory of Spacetime Salamis) is a popular solution to familiar problems of identity over time, this seems a remarkably facile answer to the question of what 'Google' or 'the tigers' refer to: for reference candidates are everywhere ready to hand. And yet it strikes me again as rather a lot to swallow. As van Inwagen put it concerning Universalism (a common partner-in-crime of Four-Dimensionalism), "it does not seem to force itself upon the mind as true" (1990, 74). That's an understatement. It would be nice if we could come up with another reference candidate for names like 'Google', 'the Chicago Cubs', and 'the Supreme Court' without committing ourselves either to untold legions of arbitrary fusions across spacetime and possible worlds.

Does giving up on these two options not put us in an awkward position? For surely, Ghiselin might say, 'the Chicago Cubs' refers to *something* and that something is not a *set*. Thus it is an individual! This is subtle issue. It's uncontroversial that 'The Chicago Cubs' typically functions not as a predicate, but as a singular term to which other properties and activities are predicated; as in: 'The Cubs are a baseball team', 'The Cubs lack a competent pitcher', 'The Cubs play in Wrigley Field', 'The Cubs are going to win this year', and so on. What *is* controversial is whether there is really any such thing — a composite object — as the Chicago Cubs.

Now we philosophers know to express such doubts carefully (especially to Cubs fans) lest we be treated to righteous retorts like "Well who exactly were we watching last night in Wrigley Field?!" This sort of speech in reply should by now sound familiar: *Denying the existence of the Cubs doesn't mean that we can't go to their games any more than denying the existence of holes means that we don't have to watch where we step. Of course we went to a Cubs game last night, and before that we bought a six pack of beers. But do you think that there is any such object as a six pack? Granted there were six individual bottles of beer. But did those bottles compose a concrete, persisting object — or is the phrase 'six pack of beer' instead a convenient way of speaking about some bottles of beer?* If that analogy does work, we can swap in talk of dining sets, corporations, archipelagos, galaxies, and so forth — examples to which many will likely resist granting genuine, concrete, composite-object-status.

Suppose we convince our Cubs fan of the dubious ontological standing of her favored team (perhaps by rehearsing pointed questions about when, in general, some objects compose a further thing). She accepts that her favorite team is perhaps not among the "furniture of the world" in the same sense in which this rock or tree is. She recognizes equivocal uses of 'part'.[7] She gets the hang of the distinctions which allow us to avoid postulating collective hallucination about the previous night.[8] It seems that we can still agree that her team is an individual. For in this context, this amounts to a claim about the grammatical role of the name — hardly

[7] Notice that 'Sosa is part of the Cubs' rings somewhat awkwardly — better, ironically, to say that he *is* a Cub (or is a *member* or *one of* the Cubs), thus putting that name into a predicative position.

[8] Context helps us distinguish between assertions like 'I saw Bigfoot' and 'I saw the Cubs' — where both might be, in the parlance of our times, strictly and philosophically false, while the latter "says something true" (see van Inwagen 1990).

a substantive thesis about the metaphysics of species![9] Establishing that species are individuals in some robust sense as these would seem to require more than shallow investigation into what statements biologists make in the course of their work or whether species terms function as "proper names". After all, the semantic mark of being designated by a proper name is arguably parasitic upon an estimation of whether something *is* an individual (this is, after all, what pushed Russell to his theory of descriptions: a lack of suitable referents). But nor is the SAI thesis, as Ruse puts it, a straightforward empirical claim (as in "Look! There's an individual!"): "rather, it is more the conceptual claim, whose plausibility must be argued for. Consider a chessboard. You can think of this as an individual, made up of 64 parts, or as a class of 64 squares. It depends on your perspective as to which makes more sense.… *The crux of the [SAI] thesis, therefore, is whether modern evolutionary biology inclines one to treat species more as individuals, or more as classes, as natural kinds*" (Ruse 1987, 230–231).

Though I'm sympathetic to Ruse's criticism, this is a false dichotomy. Defenders of the SAI and SAS alike tend to take a myopic view of our options for constructing a metaphysics of species, often seeing the other as the only alternative and arguing by way of disjunctive syllogism.[10] Here is a third alternative: strictly-speaking, there *are* no species (cf. Stanford 1995) conceived of as single things, and thus that there is no debate about what ontological category species fall into.

Put this way, the view seems radical. Wouldn't we be better off just accepting MU or that species are sets or kinds? How, after all, can we deny the evident reality of species? In much the same way, I answer, that we make sense of the obvious fact that we went to a Cubs game last night while denying that there is any such object as the Cubs. We speak truthfully when we say that there is a team we just saw that was entirely located in Wrigley Field, whose pitcher is incompetent, but that nevertheless won the game. But it is not because the name 'the Cubs' refers to some particular object (or to some set); rather it is *a plural referring expression*. 'The Cubs' refers not to some particular entity, but collectively to *many* entities. This is *not*, I hasten to add, covert reference to a set of Cubs players. Boolos long campaigned for plural reference as an alternative to set theory:

> One might doubt, for example, that there is such a thing as the set of Cheerios in the (other) bowl on the table. There are, of course, quite a lot of Cheerios in that bowl, well over two hundred of them. But is there, in addition to the Cheerios, also a set of them all? And what about the $>10^{60}$ subsets of that set? (And don't forget about the sets of sets of the Cheerios in the bowl.) It is haywire to think that when you have some Cheerios, you are eating a *set* — what you are doing is: eating THE CHEERIOS.…[N]either the use of plurals and second-order logic commits us to the existence of extra items beyond those to which are already committed. (Boolos 1984, 448–449)

I suggest that we say something similar about species. Suppose that, strictly and literally speaking, there *are* organisms. Many of these organisms bear interesting properties to one another. Must they thus — in order to be of theoretical interest to some *other* organisms (us, for instance) — be united into *objects* or *sets*? I do

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[9] Coleman and Wiley appear to agree, noting that the "question of the reality of species is distinct from the question of the ontological status of species taxa. Both a nominalist and a realist can either accept or reject the notion of species as individuals" (2001, 499). If I understand them correctly, they would seem to represent an exception among SAI-ists, however.

[10] Ghiselin and Hull base many of their arguments on what they take to be the failure of the view that species are natural kinds (and therefore, they think, sets). Imaginative failures occur on the other side of the aisle as well. Arthur Caplan, in his paper defending Species-as-Classes, writes that "the matter at issue is whether biological species are best viewed as individuals or as classes of individuals" (1981, 131). Likewise, the second section of Kitcher (1984a) is entitled "Sets versus Individuals" (310).

not see why. For we can still pick out those organisms in our discourse by means of plural quantification and plural referring terms.

Consider the sentence 'The lion is disappearing from the Serengeti Plain' (Wolf 2002, 82). Notice that treating 'the lion' (or even 'lions') as referring to a single object or a set would require a pretty radical reinterpretation of the predicate 'is disappearing from the Serengeti Plain' if it is to express a truth. Likewise, traditional quantificational approaches present difficulties. Suppose we try to symbolize the sentence as 'For all *x*, if *x* is a lion, then *x* is disappearing from the Serengeti Plain': this clearly misrepresents its logical form. We do not wish to say of each lion that *it* is disappearing, but that the *population* is shrinking. A traditional existential approach faces similar problems.[11] It does not seem that we want to say of a particular, *x*, *y*, and *z*, that they are declining in number.

In my view, while 'the lion' *appears* to be a singular referring term (like 'the President'), it is in fact a plural referring term. When we predicate various properties to lions (or relations to lions and to other things or places), we employ what are variously known as "variably" or "indefinitely" polyadic predicates (see discussion in van Inwagen 1990, 23–28). Often, these predicates will have a collective, rather than distributive, connotation. So long as technical questions about the logic of plural reference and quantification can be answered,[12] it strikes me that the language of plural reference carries certain advantages over even plural quantificational approaches.

Here is one: biologists spend much time characterizing species in such a way as to equip statements about a particular organism's species membership to carry inferential weight. Suppose I tell you that Gao Gao is a panda (that he is one of *the pandas*). You are now entitled (on the basis of your background knowledge about Pandas) to infer that Gao Gao eats bamboo (or perhaps you now have an explanation for why your prized bamboo plantings are in such disrepair!) Treating such predications even in terms of plural quantification involves challenges similar to those mentioned above in connection to singular quantification. Suppose (following van Inwagen 1990, 26–7) we use the phrase 'the *x*s' as a plural variable which can be bound in the usual way by the quantifiers. So,

> For some *x*s, the *x*s eat bamboo,

is true just in case there are some things which eat bamboo. It is not enough, however, to gain the meaning of 'The Panda eats bamboo' to add the claim that those *x*s are pandas; for this merely says that *some* pandas eat bamboo. At this point, a straightforward universal quantification looks tempting, *viz.*:

> For all *x*, if *x* is a panda, then *x* eats bamboo.

And unlike our previous example with the declining lions, the 'eats bamboo' predicate easily succumbs to a distributive reading. However, it is probably not true that *every* panda eats bamboo — genetic variation has a habit of ruining universal generalizations. Marc Lange notes that this problem might be alleviated to some extent by treating the above quantification as implicitly prefixed by a *ceteris paribus* proviso. He takes the fact

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[11] As Wolf points out, other less obvious surrogates (e.g., 'The number of lions alive on the Serengeti Plain is approaching zero') are possible. But there does not seem to be any general pattern to generating such surrogates (2002, 82–3).

[12] I cannot here address Boolos's (1984) contention that locutions involving plurals and plural quantification may be successfully cast in the language of *second-order logic*. For a critical discussion of plural quantification's philosophical credentials, see Uzquiano (2003).

that the biological literature typically employs predicative statements of the form 'The S is T' over 'All Ss are T' as evidence of this (1995, 437).

Of course, not everyone is as fond as Lange is of ceteris paribus clauses (for recent discussion, see Earman and Roberts 1999; Lange 2002; Mitchell 2002). The plural reference route may offer a more desirable alternative. It seems clear that familiar uses of plural referring terms tolerate exceptions. This seems especially compelling in the case of demonstrative plurals, as when I gesture to a group of people, saying 'those demonstrators are loud'. I could have said something true even if there are some silent sign-holders among those demonstrators. One might reply that the intuition on which I'm drawing stems from an ambiguity between a collective and a distributive reading of 'are loud': read collectively, those demonstrators might be loud only in virtue of several very loud individuals among them. Perhaps so, but even in cases where the predicates are evidently distributive (as in 'those demonstrators are lazy'), it seems that what I'm saying is that, for the most part, people in that group are lazy.

Your intuitions may differ from mine. I certainly have not produced a robust semantics for plural attributions, as I suspect that this would be a monumental undertaking and I am lazy too. At the very least, though, it seems that a claim like 'those demonstrators are lazy' ought to *defeasibly* (or inductively) entail that if someone is among those demonstrators, then they are lazy. In different contexts, though, different standards for the security of such inferences may presumably be in force. And subtle modifications of the predications (saying that those demonstrators are *each* lazy) can clearly affect the stringency of the sentence's truth-conditions.

It also seems possible to treat plural referring expressions as only *vaguely* referring to some individuals. Indeed, perhaps it could be indeterminate whether some terms refer to anything at all. This indeterminacy, being a semantic matter, need not give us nearly the pause that does the ontic vagueness I contend SAI-ists need. I leave further exploration of this matter to another time.

What about the question of rigidity? Here too I must be brief, as this is complicated territory that needs further exploration, but it seems to me that plural referring expressions can at least *sometimes* be treated as non-rigid. Rumfitt describes several cases in which he is initially tempted to read the plural expression in this way. Case (1) is: "A possible world in which all the Channel Islands save a smaller one — let it be Herm — are in their actual locations, but in which Herm lies fifty miles to the west of the rest of the archipelago" (2005, 120). At first glance, though Herm is *actually* one of the Channel Islands, it might not have been — and likewise, that if Herm had not been one of the Channel Islands, the Channel Islands would still exist. The same apparently applies to plural demonstratives (*those demonstrators* would still have been loud had one of them decided to sleep in). But on reflection, Rumfitt decides that each of his cases of apparent non-rigidity should be understood differently: perhaps "it is essential to a geographical item such as an island that it should be, more or less, in its actual location"; perhaps 'the Channel Islands' is really a covert definite description "rather than a genuine plural term" (121). I do not find his discussion of these cases very convincing. Rumfitt himself is quite tentative, offering the thesis that plural referring expressions are rigid "as a plausible conjecture which has yet to be refuted" (122). But in the case of species, it seems

clear that we should *not* want our plural referring terms to be counted as rigid.[13] Consider again Sober's example: He is among the *Homo sapiens*, but might not have been. If 'The *Homo sapiens*' refers rigidly to all us *actual* humans, then it does not survive modal changes that it clearly should survive. If treating species names in a (pluralized) Russellian manner is the only way of achieving this affect, then so be it. But that's another story.

5. So, Are Species Real?

What we wanted at the get-go was a way of making sense of the claim that species are real — in particular, that species names have referents. The usual ways of thinking about species as *single* things — be them individuals or sets — introduces unneeded complications and carries spurious implications that are not a genuine part of biological science. The problem is common. Gabriel Uzquiano (2004) has argued in a similar spirit that the question of reference arises for all manner of familiar "things" (like orchestras, committees, and battalions). He offers the following suggestion for dealing with them:

> There is, I would like to argue, a category of objects, which I will call *groups*, which like the Supreme Court, are somehow composed of members, but which unlike sets, survive changes in membership.... I would like to argue that the persistence conditions of objects like the Supreme Court are in effect similar to the persistence conditions of artifacts. (2004, 137–8)

Though I find myself tempted by this suggestion, I side with van Inwagen in resisting it. He confessed at the beginning of *Material Beings*:

> I do not like substantives like 'aggregate' and 'plurality'. I do not like them because they are, after all, substantives — and substantives…represent themselves as naming substances….If we use nouns like 'plurality', 'aggregate', and 'multiplicity', we shall be tempted to ask what the properties of pluralities or aggregates or multiplicities are and how these things achieve their perhaps rather minimal degree of unity and what their identity conditions are. We may even be tempted to ask questions like these: What is the relationship between the aggregate and the tree. (1990, 22)

Even if these questions turn out not to be *bad*, I suspect that they will be *boring* — for they are largely idle. What can be said by recourse to such substantives can be said without them. The real action is with the *grouped things* and their properties. What about them confers the privilege of a collective referent? How are the many referents of plural referring terms *fixed*?

This question is the elephant in the room. I've said nothing about reference fixing or natural kinds. Isn't the thesis that species are natural kinds the proper alternative to the thesis that species are individuals? As I have tried to encourage, thinking about the debate in this way conceals more productive and parsimonious options. Debates over the nature of substance continue. Biologists and philosophers of biology would do well to steer clear of them until things settle down some (if then!).

Increasingly, philosophers are coming to realize that a natural kind is not an ontological category (Boyd 1999; LaPorte 2004; Chakravartty 2007). Natural kinds can in fact *crosscut* ontological categories like sets, individuals, properties, relations, events, processes, and so on. I suggest here that species are collections of organisms (where, I must stress, 'collection' is understood as mere grammatical device) which bear those

[13] Perhaps there are some situations when we'd want species name 'S' to refer rigidly to the actual Ss. I can't think of one, though. More importantly, I would be surprised if such a context arose in the context of biological discussion. Of course, even if the plural terms I have in mind are standardly non-rigid and rigidity is desired, it can be achieved by adding words like 'the actual' to form sentences like the above.

properties and relations which suffice to make them the particular kinds of things they are. *Which* properties and relations? This is obviously a big question. I haven't the space to share my specific opinions about this, except to suggest that scientific practice should figure prominently (if not exclusively) in how this question should be answered. Species will be real to the extent that there are some organisms that satisfy the relevant biological criteria in such a ways to figure prominently in our inductive and explanatory practices (see Boyd 1991, 139).

Consider another analogy: If you ask me whether galaxies or galactic superclusters are real, I should say yes. But I do not think that there is anything further which our star (and perhaps ourselves) compose with the help of *billions and billions* (emphasis Sagan's) of other stars in our vicinity. What is true is that there are some stars arranged in a certain way, associated by their mutual gravitational attraction, and that stars so arranged are galaxies. In either case, whether we have stars or galaxies is given to us by the norms of the scientific discipline where those terms are embedded.

In short, species need not be "reified" in order to robustly accommodate the intuitions that they are real. Now clearly this stance needs quite a bit more explication and defense. But I do not think that it can be dismissed out of hand. Thus, at the very least, the simple "natural kinds or individuals" dilemma that underlies so much of the discussion about the metaphysics of species deserves reevaluation.

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