

Individualist Biocentrism vs. Holism Revisited

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Résumé de l'article

Quoique les perspectives holistes telles que l'écocentrisme exercent un attrait intuitif considérable, affirmer la considérabilité morale des tous écologiques comme des écosystèmes s'est avéré une tâche très difficile. Dans la littérature en éthique de l'environnement, certains biocentristes individualistes ont argumenté de manière persuasive qu'un organisme individuel, mais pas un tout écologique, peut correctement être considéré comme possédant son propre bien. Dans le présent article, nous réexaminons ces arguments et soutenons qu'ils sont voués à l'échec. Ce travail est divisé en cinq parties. Premièrement, nous nous penchons sur certains des problèmes que pose le changement climatique pour les stratégies de conservation de l'environnement et affirmons que ces problèmes fournissent de bonnes raisons pragmatiques pour lesquelles chercher une meilleure compréhension du bien-être des tous écologiques. Deuxièmement, nous décrivons les a priori théoriques de l'éthique normative qui sous-tendent les arguments contre l'holisme. Troisièmement, nous réexaminons les arguments de biocentristes individualistes appuyant l'individualisme et rejetant l'holisme. Quatrièmement, nous explorons de récents travaux en philosophie de la biologie sur le problème de l'unité de sélection du biome humain en médecine et des éléments épigénétiques et viraux endogènes en biologie évolutionniste. Nous montrons en quoi ces conceptions minent à la fois les arguments individualistes susmentionnés et la distinction entre l'individu et le tout tel que compris par les individualistes. Finalement, nous considérons cinq réponses théoriques possibles à ces problèmes.



INDIVIDUALIST BIOCENTRISM VS. HOLISM REVISITED*

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ABSTRACT:

While holist views such as ecocentrism have considerable intuitive appeal, arguing for the moral considerability of ecological wholes such as ecosystems has turned out to be a very difficult task. In the environmental ethics literature, individualist biocentrists have persuasively argued that individual organisms—but not ecological wholes—are properly regarded as having a good of their own. In this paper, I revisit those arguments and contend that they are fatally flawed. The paper proceeds in five parts. First, I consider some problems brought about by climate change for environmental conservation strategies and argue that these problems give us good pragmatic reasons to want a better account of the welfare of ecological wholes. Second, I describe the theoretical assumptions from normative ethics that form the background of the arguments against holism. Third, I review the arguments given by individualist biocentrists in favour of individualism over holism. Fourth, I review recent work in the philosophy of biology on the units of selection problem, work in medicine on the human biome, and work in evolutionary biology on epigenetics and endogenous viral elements. I show how these developments undermine both the individualist arguments described above as well as the distinction between individuals and wholes as it has been understood by individualists. Finally, I consider five possible theoretical responses to these problems.

RÉSUMÉ :

Quoique les perspectives holistes telles que l'écocentrisme exercent un attrait intuitif considérable, affirmer la considérabilité morale des tous écologiques comme des écosystèmes s'est avéré une tâche très difficile. Dans la littérature en éthique de l'environnement, certains biocentristes individualistes ont argumenté de manière persuasive qu'un organisme individuel, mais pas un tout écologique, peut correctement être considéré comme possédant son propre bien. Dans le présent article, nous réexaminons ces arguments et soutenons qu'ils sont voués à l'échec. Ce travail est divisé en cinq parties. Premièrement, nous nous penchons sur certains des problèmes que pose le changement climatique pour les stratégies de conservation de l'environnement et affirmons que ces problèmes fournissent de bonnes raisons pragmatiques pour lesquelles chercher une meilleure compréhension du bien-être des tous écologiques. Deuxièmement, nous décrivons les a priori théoriques de l'éthique normative qui sous-tendent les arguments contre l'holisme. Troisièmement, nous réexaminons les arguments de biocentristes individualistes appuyant l'individualisme et rejetant l'holisme. Quatrièmement, nous explorons de récents travaux en philosophie de la biologie sur le problème de l'unité de sélection du biome humain en médecine et des éléments épigénétiques et viraux endogènes en biologie évolutionniste. Nous montrons en quoi ces conceptions minent à la fois les arguments individualistes susmentionnés et la distinction entre l'individu et le tout tel que compris par les individualistes. Finalement, nous considérons cinq réponses théoriques possibles à ces problèmes.

TWO PROBLEMS CAUSED BY CLIMATE CHANGE

Consider two much-discussed problems that climate change has posed for environmental conservation¹. The first problem occurs within ecological restoration. Typically, the aim of restoration has been to undo damage or destruction caused to an ecosystem—to restore, as far as possible, that which was damaged or destroyed to the way it was previously². The benchmark used is typically a historical one³. For example, where I live, at the edge of Colorado's eastern plains, restoration projects often aim to return farmland or rangeland to shortgrass prairie, which is what was there before the farmers, ranchers, and housing developments arrived.

Climate change has made—and will increasingly make—problems for this strategy⁴. First, as the climate changes, what existed in a place before might not be able to survive there anymore. For this reason, restoration done with some kind of historical benchmark might well become much more difficult, perhaps even impossible. Second, ecological restoration was initially taken to be a laudable environmental practice on the assumption that what did well in a certain place in the past is likely to do well there in the future. That is to say, the goals of historical fidelity and ecological welfare coincided⁵. But because of climate change, we can no longer assume this coincidence as we look to the future.

The second problem occurs with species preservation⁶. The assumption used to be that species preservation was best accomplished through the preservation of native habitat—in situ preservation⁷. But as the climate changes, many species will not be able to survive in situ. Those that are not able to move to new, more suitable, locations face extinction. For this reason, some conservation biologists have begun to advocate assisted colonization (sometimes called 'assisted migration' or 'assisted dispersal') as a strategy for species preservation⁸. If we want to preserve a species, and if its members cannot survive where they currently are, then the best solution may be to move them to a place where they will do better. Of course in doing that, we would be significantly changing the ecology of the new location, and it is important to consider whether that would be a change for the better or for the worse. Although previously a concern to preserve species and a concern to avoid ecological harm went hand in hand, now in some cases they seem to be coming apart, and we may need to decide which should take priority in cases where they conflict.

In both cases, aims that used to coincide (historical fidelity and ecological welfare; species preservation and ecological welfare) are beginning to diverge, and conservationists face some difficult questions about what to do. There is a growing literature on this topic in conservation biology⁹, but my concern here is a philosophical problem underlying many of these discussions, namely the question of what we might plausibly mean by 'ecological welfare.' When we ask what kind of ecosystem will do best in the new climate in some location, when we ask whether the introduction of a new species will harm or benefit an existing ecosystem, what exactly are we asking? Is this a question of what is good for an

ecosystem, or is it really a question of what is good for us (or good for sentient beings, or good for individual organisms) with regard to an ecosystem?

The above examples show why this question has practical importance today more than ever. While before we might have been able to use ‘restoration to historical conditions’ or ‘preservation of an endangered species’ as proxies for ‘promotion of ecosystemic welfare,’ we can no longer do so with confidence. This means that we will either have to learn how to talk about ecosystemic welfare directly, or else give up on the idea that there is anything in the world answerable to the idea of the flourishing of ecological communities as such.

Interestingly, while environmental policy seems increasingly to need a conception of ecological welfare, environmental ethicists these days tend to regard the very idea of the good of an ecological whole as a kind of conceptual mistake¹⁰. In this paper, I will revisit the argument that led many to this conclusion in the first place and consider whether it really does rule out the literal attribution of welfare to ecological wholes. In the second section, I review the theoretical assumptions from normative ethics that form the background of these discussions within environmental ethics. In the third section, I describe the central argument that has been given in favour of individualist versions of biocentrism (hereinafter ‘individualism’) and against holist versions of biocentrism (hereinafter ‘holism’). In the fourth section, I argue that recent work in the philosophy of biology, work in medicine on the human biome, and work in evolutionary biology on epigenetics and endogenous viral elements undermine this argument and threaten the distinction between individuals and wholes as it has been understood by individualists. In the final section, I consider five possible theoretical responses to these problems. Ultimately, I argue that the main argument for the superiority of individualism to holism fails. While this does not show holism to be justified, it does remove one of the main obstacles to philosophically justifying the welfare of ecological wholes.

THEORETICAL BACKGROUND

In environmental ethics, the view that nothing can technically be ‘good for’ an ecological whole comes out of a debate within biocentrism between individualism and holism. Biocentrism is the view that all and only living things should be deemed morally considerable. *Individualists* claim that all and only individual organisms should be deemed morally considerable, while *holists* claim that ecological wholes (biomes, species, ecosystems) should also be deemed morally considerable. For a thing to be ‘morally considerable,’ as I am using the phrase here, is for its interests to matter morally in their own right, such that its interests ought to weigh in moral agents’ decisions about what to do¹¹. For the purposes of the current analysis, I will not consider the question of whether one should be a biocentrist at all—though this is a question well worth asking—and for the sake of simplicity I will only discuss one particular ecological whole: ecosystems.

If, as many have assumed, a central part of moral decision-making involves considering how various interests would be affected by different decisions, then an important question for a moral agent to answer is “Which interests do I need to consider?” For the most part, environmental ethicists have taken a broad view about which interests matter: if a thing has interests, then its interests matter¹². And so the important question within environmental ethics has become, “Which things have interests?”¹³ That is, which things have a welfare, or a well-being? Which things are capable of being benefitted or harmed? It is in trying to answer this question that individualists and holists have parted ways. Individualists have argued that only individual organisms have interests—wholes, such as species and ecosystems, do not have interests. They claim that individuals that make up wholes have interests, but the wholes themselves do not.

The main challenge that all biocentrists—holists or individualists—face in extending the notion of interests to cover entities that have no subjective experiences of the world is finding a nonarbitrary basis for the assignment of interests. With a typical human being, we can say that it matters to her how her life goes even if it does not matter to anyone else. She has a unique point of view on the world, and from this point of view, things such as adequate nourishment and the alleviation of pain are properly regarded as good. It is this point of view that serves as the basis for our attribution of interests. We can say that from her point of view the alleviation of her pain is good, even if from everyone else’s point of view the alleviation of her pain is bad. It is not too difficult to extend this notion of interests from human beings to other conscious life forms—dogs, for example. A dog has its own point of view on the world from which the alleviation of its pain is a good thing, regardless of what the rest of us think or what would be good for us¹⁴. This subjective point of view on the world is what grounds our claims that the dog has a good of its own, that what is good for the dog is not just a function of what is good for the rest of us. Proponents of this argument contend, by way of contrast, that we cannot say this about mere ‘things’: what is good for cars is just a matter of what is good for people; cars do not have a good of their own. But dogs do, and people do.

It is, I think, worth reflecting on why this point has been so important in Western ethical thought. In both ethics and political philosophy, taking an instrumentalist attitude toward other people—treating them as though the only interests relevant to how they should be treated are the interests of the State, or the interests of the ruling class, or the interests of those who write moral philosophy—has been considered anathema, an attitude that underlies the worst kinds of immorality: genocide, slavery, eugenics, etc¹⁵. Western ethics has long considered it important to respect individuals in a way that refuses to assimilate their interests to the interests of the wholes of which they are a part. Many writers (e.g., Bentham) have argued that States or other collectives should not even be thought of as having interests, that only individuals have interests¹⁶. The justification for claims such as these is that individuals have a subjective point of view on the world—my interests matter to me, even if they do not matter to the State. A morally acceptable order is one that respects this fact about individuals.

Individualist biocentrists have argued that we can say the same of any individual organism—that even though it does not have subjective states, it still has a good of its own that is not reducible to the interests of others. Let us consider how the argument for that claim proceeds.

THE ARGUMENT FOR INDIVIDUALISM

Biocentrists typically argue that once we understand the function of subjective states in their biological context, we will see that subjectivity is just one of the many tools that organisms use to process information about their environment and to adjust their behaviour accordingly¹⁷. That is to say, subjective or conscious states are just one of the ways that organisms have evolved to pursue their basic biological goals: self-defence, metabolism, reproduction, etc. In humans, for example, pleasure and pain (among other things) represent to us which things in our environment are good (i.e., to be sought) and which things are bad (i.e., to be avoided); pleasure and pain thereby serve as important sources of information for us about our environment. Pleasure and pain states are not simply informative in this regard, they are also motivational—they motivate our seeking and avoidance behaviour. Amoeba also have ways of identifying things in their environment that are to be sought or avoided and initiating the appropriate seeking or avoidance behaviour; they just do it via different mechanisms¹⁸. Our ways of figuring out what is good for us and pursuing it partly rely on mechanisms that utilize subjectivity: internal representations to ourselves of certain aspects of the external world. Other organisms' ways of figuring out what is good for them and pursuing it rely on different mechanisms, such as nonrepresentational forms of chemical signalling. But in the end, these are just different tools that different kinds of organisms have developed to do the very same thing: to seek what is good for them and avoid what is bad for them. Kenneth Goodpaster argues that it is what we seek and avoid—i.e., the ends that these valenced conscious states or other mechanisms subserve—that should be thought of as constituting a thing's welfare. He says,

Biologically, it appears that sentience is an adaptive characteristic of living organisms that provides them with a better capacity to anticipate, and so avoid, threats to life. This at least suggests ... that the capacities to suffer and to enjoy are ancillary to something more important rather than tickets to considerability in their own right¹⁹.

And then, quoting Mark Lipsey:

If we view pleasure as rooted in our sensory physiology, it is not difficult to see that our neurophysiological equipment must have evolved via variation and selective retention in such a way as to record a positive signal to adaptationally satisfactory conditions and a negative signal to adaptationally unsatisfactory conditions . . . The pleasure signal is only an evolutionarily derived indicator, not the goal itself. It is the applause which signals a job well done, but not the actual completion of the job²⁰.

Goodpaster argues that it is the “job well done,” not the “applause” signalling it, that constitutes a being’s interests. If this is right, then in asking which things have interests, we should ask which things have ‘jobs’ of this sort, rather than asking whether a being signals success or failure to itself in a particular way. That is to say, we should look at which things have biological goals along with behaviour directed at achieving those goals rather than at which things use a particular tool for achieving them. Individualists claim that all individual organisms have biological goals but that ecological wholes do not, and this is the basis for their claim that ecological wholes are not morally considerable.

So what exactly are biological goals, and how do we determine which things have them? One might worry that explaining the behaviour of nonconscious living things as a matter of their seeking the achievement of certain ends invokes a kind of Aristotelian teleological understanding of the world that has been discarded by contemporary biology²¹. Contemporary biologists do not see organisms as having particular aims or purposes built into them, and so the kinds of teleological explanations offered by Aristotle are unavailable to those who wish to make their views consistent with contemporary science.

An important task for the individualist, then, is to find an understanding of what goal-direction might amount to that is consistent with contemporary biology. Luckily, philosophers of biology have been working on this very problem, as biology still has a need for teleological explanations consistent with contemporary science. The explanation of goal-direction that most prominent contemporary individualists (e.g., Gary Varner and Nicholas Agar) have relied on is the etiological account originated by Larry Wright. On this view, a thing’s biological goals are just the fulfillment of its biological functions. Biological functions are then explained this way: for F to be a [biological] function of some trait T is for it to be the case that

- (a) T is there because it does F [i.e., it was selected for because of its performance of F in the evolutionary past], and
- (b) the performance of F is a consequence of T’s being there²².

While the second clause refers to a causal connection between the trait and the achievement of the biological goal, the first clause is usually read as an evolutionary historical claim²³. So, for example, we humans have hearts because they pump blood—i.e., it is the pumping of blood by past hearts that is, via evolutionary selective mechanisms, responsible for the existence of hearts in humans today. That is to say, hearts were selected for in humans because they pump blood. Adding to this the claim that our blood gets pumped as a consequence of our having hearts, we get the claim that the function of our hearts is to pump blood, and that fulfilling this function is a biological goal of ours, and hence one of our interests.

But here is the tricky move. Since a thing has interests only if it has biological goals, and it has biological goals only if it has traits with biological functions, and

it has traits with biological functions only if its traits were selected for because they performed those functions in the evolutionary past, then anything with interests must have traits that are subject to natural selection. And which things have traits that are subject to natural selection? This is the very question at the core of the units of selection problem in the philosophy of biology. Broadly speaking, a unit of selection is the thing that has the trait that gets selected for by natural selection. This, then, is what gets us the relationship between being a unit of selection and being a thing that has interests: since something's interests are just its traits doing what they were selected to do, only things that have such traits will have interests. So to figure out which things have interests, we just need to look at which things have the traits on which natural selection operates. If ecosystems are not units of selection, they cannot have interests. Individualists have argued that ecosystems are not in fact units of selection (a claim that was uncontroversial within philosophy of biology, as ecosystems do not reproduce and hence have no inclusive fitness that could be differentially affected by the possession of a trait), and so concluded that ecosystems do not have interests.

CRITICISMS OF THE ARGUMENT

The first complication comes from developments in work on the units of selection problem in the philosophy of biology. When this argument was first made by individualists, and for a good long while thereafter, there were epic battles going on in philosophy of biology over the units of selection problem, most publicly between Richard Dawkins and Stephen Jay Gould²⁴. While Darwin had assumed that individual organisms are the unit of selection, Gould argued that groups are as well, whereas Dawkins argued that only genes are. Thanks to work by David Hull and Robert Brandon, among others, it is now clear that proponents of different positions in these debates largely had different meanings of 'units of selection' in mind. As noted by Elliot Sober and David Sloan Wilson, and also separately Elisabeth Lloyd, the literature now typically refers not to 'units of selection' but to different roles that different entities might have within the selective process²⁵. In the literature today, we get:

replicators: things that produce copies of themselves²⁶; (in Dawkins' language, active, germ-line replicators)

interactors: things that directly interact with the selective environment; and

evolvers (Lloyd's term is "manifestor-of-adaptations"; Hull's is "lineages"): things that manifest adaptations as a result of the evolutionary process²⁷

So the general view in philosophy of biology today is that to ask "Which things are units of selection?" is to ask a confused question. There are different things we might mean by 'units of selection,' and so we can at best ask which things are *replicators*, or which things are *interactors*, or which things are *evolvers*. If we were to update the individualist argument in light of this development, which of these roles should we think qualifies something as a bearer of interests? That is to say, which one of them is the thing that has the traits that get selected for by

natural selection? There is a rough consensus that only genes are replicators; so if we choose replicators, only genes will end up having interests—on this view, not even individuals would count as having a good of their own²⁸. Interactors are typically regarded as phenotypes, which would have the result that only phenotypes have a good of their own. That said, since phenotypes seem to be traits, we might ask what they are traits of. Strictly speaking, phenotypes are phenotypes of genotypes in environments, which would bring us back to only genes having interests. But we might try to ask, even more loosely, which entity is the ‘vehicle’ that ‘carries’ the phenotype (to use Dawkins’ language). Here there might be room for individuals, though Dawkins’ arguments for the ‘extended phenotype’ show that phenotypes can be traits of other organisms besides the one possessing the relevant genes, as well as traits of groups and, some have argued, even traits of ecosystems²⁹. For example, Dawkins describes the case of a snail parasite, which increases the fitness of its own genes by making the shell of its host snail thicker and thus harder to crush; likewise, many social animals exhibit behaviour at the group level that increases the fitness of their genes, and (again from Dawkins) the lakes that result from beaver dams increase the fitness of the beaver’s genes³⁰. The analysis of evolvers is complicated by debate about what to count as an adaptation, but the two main candidates in the literature seem to be species (Hull’s “lineages”) or genes (Dawkins’ “genes”)³¹. On this view, neither individuals nor ecosystems would count as bearers of interests.

None of the new categories can get the individualist quite what she wants, which is the claim that individuals, but not wholes, have interests. If we look at replicators, then only genes have interests; if we look at interactors, then individuals, groups, ecosystems, and many other kinds of things can have interests; if we look at evolvers, then either genes or species but not individuals have interests. So the defense of individualism by identifying bearers of interests with units of selection has been undermined by the turn that the units of selection debate has taken. Upon reflection, this should not be terribly shocking. Philosophers of biology are not interested in determining which things have a good of their own, and so their classifications are neither constructed in light of nor answerable to facts about what is or is not relevant to the possession of interests. Philosophers of biology are interested in arriving at the most accurate way of modeling how evolutionary processes work; accordingly, things that play a slightly different role in those models (a) ought to be classified differently and (b) ought to be classified by the role that they play.

This turn in the units of selection debate thus makes it much more difficult to use ‘unit of selection’ as a proxy for ‘bearer of interests,’ and I think there are further reasons not to want to identify these two notions in the first place. Indeed, progress on the units of selection problem might motivate us to revisit the individualist attraction to units of selection—an attraction that I think was ill-founded to begin with.

Recall that we arrived at the concern with units of selection by looking for something about an entity that could count as ‘its good.’ While we seemed to arrive at a nonarbitrary feature of organisms that we could use to give content to its interests, this feature does not seem to give us the content that we should think of as constituting the organism’s interests. The etiological account of functions, as its proponents readily admit, is mostly backward-looking: F counts as a function of T if and only if T still does F and T’s performance of F contributed to the evolutionary success of possessors of T in the past. When we use this as the basis for interest-attributions, we are essentially saying that what it is good for a thing to do *in the present* is whatever conferred a selective advantage on that thing’s ancestors *in the past*. But this will coincide with our intuitive sense of what is good for a thing only in cases where the thing’s current selective environment is largely the same as its ancestors’ environment was. In cases where behaviours that previously conferred a selective advantage now make it more difficult for an organism to survive, we are rightly reluctant to say that continuing to exhibit this behaviour is nonetheless good for the organism.

How serious a problem is this? Recall the problems we face with climate change. Most experts believe that the pace of changes in the climate are such that environmental change will happen too rapidly for adaptation by natural selection to keep up with. Hence the dire predictions about huge rates of extinction in the next century. I contend that the individualist argument above only looked plausible as an account of interests against a background in which a thing’s continuing to do what it evolved to do, what is ‘natural’ for it to do, continues to be what is good for it. In an environment where most things are pretty well adapted to their current circumstances, their ‘natural’ behaviours and the behaviours that are good for them will tend to coincide. But crucially, the background has changed and will continue to do so. Increasingly, we face a world where maladaptation is the rule rather than the exception—where an organism’s natural behaviours might well doom it in its current context. The coincidence assumed by individualism between ‘natural’ behaviours and advantageous behaviours is disappearing.

This brings us to a further criticism. As John Basl and Ron Sandler have pointed out, the backward-looking method for establishing the content of interests is also a problem for synthetic organisms—i.e., those that exist and have the features they do due to human engineering rather than evolutionary history³². Such organisms will turn out not to have interests at all, even if they behave in the same ways and with the same effects as evolved organisms. This produces what Basl and Sandler call the “symmetry puzzle”: two organisms can have perfectly identical intrinsic properties, but if one is the product of evolution and the other of human engineering, the first one will have interests and the second will not. This strains credulity: one would expect identical organisms to have the same interests. Again, in such cases, looking to the evolutionary past to determine what is good for something in the present does not appear to be a very good strategy. My assessment of the defence of individualism, then, is that while these arguments might be able to find something nonarbitrary about organisms

that can give content to their interests, the content identified is not what we should consider their interests to be.

There are further reasons for worrying about the superiority of individualism over holism. The more we learn about organisms, the more we see that many turn out to be, as a matter of both evolution and biological functioning, a lot more like wholes than like individuals. Human beings, obvious bearers of interests with which the individualists began their argument, are a case in point. Medical research increasingly studies not the human body, but the human biome. We humans, it turns out, share our bodies with approximately 10,000 species of bacteria. Bacterial cells outnumber “human” cells in our bodies by a ratio of 10 to 1³³. Their behaviour regulates our metabolism, our immune system, our moods, and much, much more. They do so much of what goes on in our bodies that at least one scientist has concluded “the model that places our genes at the root of all human development is wrong³⁴.” This is why medical researchers have gotten so interested in ecology lately: they hope to develop a much more accurate understanding of how humans work by studying humans as ecosystems rather than as individuals.

Functionally, then, organisms are not as easily individuated as one might have thought: we operate a lot more like ecosystems than like discrete individuals. However, a defender of individualism might concede this point but nonetheless insist that it is our DNA that makes us unique. After all, the way that the bacterial cells were distinguished from the human cells to arrive at the “10 to 1” ratio mentioned above was by looking at what kind of DNA each cell has. So perhaps we can individuate organisms genetically. While everything in my body might not count as “me,” at least all of the cells in my body with my DNA do. An organism, then, is whatever has its DNA; organisms with different DNA count as part of the organism’s environment rather than as part of the organism itself.

But this method of individuation won’t quite get us discrete individuals either. The distinction between organism and environment turns out to be rather messy, as do the contents of our genetic code itself. New developments in evolutionary biology have complicated our picture of how evolutionary mechanisms work. Epigenetics has shown that the relationship between genes and the environment is more complicated than we had thought. Not only can the environment alter an organism’s genes by switching genes on and off, but it can produce heritable changes that are passed on to subsequent generations (through epigenetic tags added to DNA and then replicated as cells divide)³⁵.

Finally, there is the matter of our DNA itself. Aside from the obvious point that identical twins share the same DNA (yet I hope we would be reluctant to call the two of them *one* organism), advances in microbiology have shown that the genomes of many organisms contain endogenous elements: genetic material inserted into germ-line DNA by viruses or other parasites and then reproduced in the genome of subsequent generations. What people used to call “junk DNA,” i.e., the 98% of human DNA which does not code for proteins and which does

not appear to have any epigenetic function, is now understood to contain, and might even turn out to be entirely made up of, genetic material inserted into our DNA by other creatures³⁶. If that is right, then the majority of our DNA might not be, strictly speaking, *our own*.

In sum, new developments in the biological sciences are making the line between individuals and wholes a lot less clear. What human beings *are as systems* now looks a lot more like ecosystems than like the discrete individuals we used to consider ourselves to be. Furthermore, the genetic code that one might think could mark us off as individuals is not very well distinguishable from that of our evolutionary companions. Even the distinction between our genes as replicators and the selective environment they encounter is not as clear as might have been thought: our environment produces heritable changes in the genome of an organism just as germ-line mutations do.

A hardcore individualist should find this threatening. If individuals turn out to be wholes, then individuals cannot have interests. Or, what is more likely at the moment, if the line between individuals and wholes becomes very unclear, then it will become correspondingly unclear which things have interests. On the other hand, if we could say that being a whole does not necessarily mean being something that cannot have a welfare, then there need not be any potential threat to our moral considerability. That is to say, if moral considerability did not rest on being an individual *as opposed to* a whole, then these developments in the sciences need not undermine our moral sense of what we are responsible to in the world.

I think that the preceding arguments establish two claims: first, that in order to meet the challenges to environmental policy and to our understanding of individuals, we have a strong pragmatic interest in finding a way talk about the welfare of wholes; second, that existing arguments meant to vindicate biocentric individualism pose no threat to our ability find one. However, none of this is yet to show that, or how, we might vindicate the literal attribution of interests to wholes.

POSSIBLE ALTERNATIVES

While the aforementioned project is too large a task to carry out here, it is worth considering the alternative theoretical responses to the challenge to individualism described above that might be available to ethical theorists. I briefly describe the five that seem most plausible, along with the advantages and disadvantages of each.

First, and most conservatively, we might remain individualists, but take the new, more complicated, understanding of what organisms are as a reason to adopt a more permissive conception of an 'individual.' Such an understanding might allow some ecosystems to count as individuals and hence as bearers of interests. A more radical revision of our notion of an individual might accept a kind of nominalism about individuals, asserting that the world contains nested systems

at different scales, with different degrees of cohesion and complexity, and that it is up to us to decide which of these to count as individuals for the purposes of morality. (One imagines Bentham rolling over in his grave—or, more accurately, in his display case—at this thought, since it clearly opens the door for the State to have interests that are not just an aggregation of the interests of individual citizens.) While this might address the problem of the blurry boundary between wholes and individuals, there is one important problem it does not solve, namely, how to determine what the interests of nonconscious individuals consist in. We still need a reason for thinking that whatever we consider their interests to be is not just a matter of our projecting our own interests onto them. The nice thing about the individualist argument was that it did seem to solve this problem—claims about the interests of organisms were as much mind-independent facts about the world as claims about evolutionary history (since they *were* claims about evolutionary history). Having lost that solution, the question is what we might replace it with.

Second, we might abandon the commitment to individualism and look around for some fact about wholes that could serve as the nonarbitrary basis for our claims about their interests. This is the approach that has been most popular in conservation biology, where claims about ecosystem health, ecosystem integrity, ecological sustainability, and biodiversity have remained common in spite of the individualist arguments aimed at undermining their normative status as ecosystemic interests. The outstanding challenge to this approach is to show why this basis for the attribution of interests is not arbitrary—i.e., what reason we have for thinking that these states really are what is good for the ecosystem (as opposed to good for us with regard to the ecosystem, or what we imagine we would want if we were ecosystems, etc.).

Third, we might give up the idea that for a thing to have interests, it must have something akin to a subjective point of view on the world—some aspect of it that is unique to it and that can give content to its interests. It is worth pointing out that in theories of human well-being, one's own subjective states are often not regarded as unproblematically giving content to one's interests. Perfectionists, for example, regard general facts about human nature as determining what is good for one. The capabilities approach grounds claims about human welfare in general claims about the kinds of creatures humans are. Even preference-satisfaction theorists are typically only willing to countenance preferences that meet certain objective evaluative standards as constituting one's interests. While there are some hedonists still around, I think it is fair to say that these days it is at least controversial what role subjective states play in determining the content of human interests. That said, while ethical theory has moved away from deference to an individual's subjective point of view on the world in determining individual welfare, political philosophy has moved toward it. The importance of active citizen participation in democratic decision-making, the value of worker participation in corporate governance, the understanding of political representation as properly a dialogical process—in political philosophy, the importance of the individual's own unique point of view on the world, and the value of its repre-

sentation in political decision-making, has grown. The further separation of ethical theory from political theory might be a fallout of this third approach. The challenge for this approach would be to show how it avoids the kind of instrumentalism toward others that motivated the concern to put the individual's perspective at the center of morality in the first place. That is to say, the third approach needs to show what we can point to as evidence that the interests we are attributing to other things really *are* their interests—rather than the interests of the State, say, or our own interests projected onto them.

Fourth, we might give up the kind of welfarist assumption that seems to be in the background of this whole discussion, namely that what we are responsible to in the world is only, or perhaps even most importantly, the interests of others. If it is a good thing that ecosystems be in certain kinds of states rather than others, then perhaps we need not show additionally that it is *good for* the ecosystems in question. On this view, the discussion of moral obligation that starts with moral considerability is a kind of confusion. This approach, I think, faces two challenges. First, a justificatory challenge: showing why biodiversity, for example, would be a good thing if it is of no benefit to anyone or anything. Second, an explanatory challenge: showing how non-welfare goods are to be treated when they conflict with welfare-goods—e.g., when biodiversity and welfare conflict, which ought to be considered more important and why.

Finally, we might take all of this to be an argument that we should not accept any kind of biocentrism at all. That is to say, perhaps we should not be willing to attribute interests to anything that has no subjective states. Going in this direction leaves us with a familiar set of problems, both practical (e.g., we have to formulate environmental policy by looking at what is good for conscious individuals) and philosophical (e.g., a world with rich, flourishing ecosystems but no conscious life turns out to have no value at all). That said, if coupled with an abandonment of the welfarist assumption (the assumption that all *good* must be *good for*), we might be able to consider ecological damage to be morally bad without having to construe it as a harm to the ecosystem. We would, of course, still need to explain what counts as damage and why it is a bad thing.

In any case, what I hope I have shown here is that even with all of the standard welfarist assumptions, the individualist argument against holism simply is not as good as many have thought. If one is going to be a biocentrist, then, it is not obvious that one ought to be an individualist.

NOTES

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- ¹ For discussions, see Harris *et al.* (2006); Sandler (2012).
 - ² For discussion of this aspect of ecological restoration, see Hourdequin and Havlick (2011); Egan (2006); Hobbs *et al.* (2004); Higgs (2003).
 - ³ Egan and Howell (2001); Higgs (2003).
 - ⁴ Harris *et al.* (2006); Sandler (2012, pp. 47-74).
 - ⁵ For an extended discussion, see Sandler (2012). There are other criticisms of the legitimacy of historical benchmarks in ecological restoration, for example those questioning the legitimacy of picking out the state of a system during a certain historical time period as the 'natural' state of that system.
 - ⁶ See Sandler (2012) for a discussion of this issue.
 - ⁷ See, e.g., Primack (2004, p. 183).
 - ⁸ See, e.g., McLachlan *et al.* (2007); Mawdsley *et al.* (2009); Hoegh-Guldberg (2008); and Seddon (2010).
 - ⁹ See, e.g., Ricciardi and Simberloff (2009a; 2009b); Schlaepfer (2009).
 - ¹⁰ For discussions of the intuitive appeal of holism, see Nelson (2010).
 - ¹¹ Some writers (e.g., Regan 1983) refer to this as intrinsic or inherent value. How we should think about the relationship between value and considerability is not an issue I will take up here.
 - ¹² See, for example, Singer (1990); Varner (1998); Goodpaster (1978). For a criticism, see O'Neill (2001, pp. 168-170).
 - ¹³ For something to be in your interest is for it to be beneficial to you. As Regan (1981) points out, there is a difference between taking an interest in X and X's being in your interest. The question here is not which things can take an interest in something else, but rather, of which things it is correct to say that there is something that is in their interest.
 - ¹⁴ For an example of this kind of reasoning within animal ethics, see Regan (1983).
 - ¹⁵ See, for example, Shklar (1989).
 - ¹⁶ Bentham (1789).
 - ¹⁷ One finds precursors of this argument in Schweitzer (1929). It was popularized more recently by Goodpaster (1978). One also finds versions of the same reasoning in Rolston (1988), Agar (2001), Varner (1998); Callicott (1980). Agar also attributes this view to Paul Taylor. While this is the most common and influential argument for biocentrism, I do not mean to suggest that it is the only argument that has ever been given. Its influence, however, is such that most contemporary arguments for individualism resemble it quite closely.
 - ¹⁸ The mechanisms involve a chemical signaling and response function called chemotaxis. For a description, see Willard & Devreotes (2006).
 - ¹⁹ Goodpaster (1978, p. 316).
 - ²⁰ Goodpaster (1978, pp. 316-317), quoting Mark W. Lipsey, "Value Science and Developing Society," paper delivered to the Society for Religion in Higher Education, Institute on Society, Technology and Values (July 15-Aug. 4, 1973), p. 11.
 - ²¹ Sober (1986). Indeed, Taylor invokes the Aristotelian concept of the "telos" in explaining his view. See Taylor (1980, pp. 119-129); for a discussion see Hauskeller (2005).
 - ²² This definition is a modified version of the one given in Wright (1973, p. 161). See n. 24 for an explanation of the modification.
 - ²³ It is worth noting that Wright's original definition does not require that the causal history involve natural selection. Later proponents of his account, such as Millikan (1984) and Neander (1991) have added this requirement (or something quite close to it), and individualists in environmental ethics have typically followed their lead. In the case of Millikan and Neander,

the reason is that they were trying to explicate a notion of biological function in particular rather than function in general. Individualists in environmental ethics had an interest in ruling out the attribution of interests to artifacts (cars, computers, and the like), and so requiring a causal history involving natural selection seemed to accomplish this goal. For an example of this reasoning in environmental ethics and a discussion of some of the problems that result from it, see Basl and Sandler (2013).

²⁴ See, for example, Gould (1997). This debate is described in detail in Sterelny (2003).

²⁵ Sober and Wilson (1994); Lloyd (2007).

²⁶ Or more precisely, things of which copies get made. See Lloyd (2007, p. 45).

²⁷ The definition is paraphrased from the formulation in Lloyd (2001, p. 284). Lloyd credits Hull (1980) with the introduction of the term ‘evolvers.’ See also Hull (1978; 1980) for his discussion of ‘lineages.’

²⁸ The explanation of why individuals are not replicators is as follows: sexually reproducing organisms do not make copies of themselves at all; asexually reproducing organisms do not pass along changes to their offspring, as mutated genes do. For a discussion, see Agar (2001, p. 111) and Dawkins (1982).

²⁹ See Dawkins (1982). For examples of phenotypes manifest in other organisms, see Dawkins (1982, pp. 209-249). For examples of phenotypes manifest in ecosystems or other larger wholes, see Whitham *et al.* (2003). See also Dawkins (1982); Laland (2004); and Dawkins (2004) for a discussion of niche construction. Agar argues against what he considers a “too much extended phenotype” on pragmatic grounds: he claims that conventional biologists and researchers into genetic diseases typically are not interested in phenotypic effects quite so broad, and so we are justified in limiting our attribution of phenotypes to those that do not “go beyond the skin” of the organism possessing the genes that are causally responsible for them (Agar, 2001, pp. 111-114). However, not only are there other branches of science where scientists are interested in broader phenotypic effects (e.g., ecology), but also, since phenotypic attributions are being used as the basis for interest-attributions and hence moral considerability, one might think that the research interests of a certain class of scientists is not a legitimate basis for including or excluding entities from these moral domains.

³⁰ Dawkins’ example of the trematode parasite is discussed in Agar (2001, p. 111). For further examples and explanation, see Dawkins (1982; 2004).

³¹ Lloyd (2001, p. 272).

³² Basl and Sandler (2013).

³³ Turnbaugh *et al.* (2007).

³⁴ Specter (2012), quoting Martin J. Blaser, Professor of Microbiology at the New York University School of Medicine.

³⁵ Armstrong (2014).

³⁶ Holmes (2011).

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