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Biocentrism in Environmental Ethics: Questions of Inherent Worth, Etiology, and Teleofunctional Interests

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Biocentrism in Environmental Ethics: Questions of Inherent Worth, Etiology, and Teleofunctional Interests

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Abstract

Some biocentrists argue that all living things have "inherent worth". Anything that has inherent worth has interests that provide a reason for why all moral agents should care about it in and of itself. There are, however, some difficulties for biocentric individualist arguments which claim that all living things have inherent worth.

Some biocentrists maintain that all living things have inherent worth and that artificial living things do not because the former, but not the latter, have interests by recourse to their natural selection etiology. Some also argue that synthetic forms of life do not have moral standing because they are "artificial" instead of "natural". However, there are good reasons to think that naturally-selected functions do not adequately define biocentric *interests* or that what is "natural" is not always of interest to the individual organism.

A systems-based account of interests, on the other hand, attempts to solve the problem of harmful, selected functions by construing what is in a thing’s interests by recourse to whether it has highly integrated functions aimed at its self-maintenance. Cases of harmful selected functions are handled adequately, but unfortunately this account allows for the existence of non-sentient “instant organisms”, that have teleofunctional interests but that do not have teleofunctional interests that provide them direct moral standing. It also allows possible, future, designed entities to count as interest possessors.

A systems-based account cannot provide guidance on what makes the teleofunctional interests of non-sentient beings morally considerable to the extent that they have direct moral standing. While rational agents and sentient beings have interests that provide them with direct moral standing regardless of their etiology, it does not appear that non-sentient living things also

have interests that provide them with direct moral standing. Indirect moral standing is the only kind of moral standing that non-sentient living things can have.

I argue that the non-design etiology of natural selection is incapable of guaranteeing indirect moral standing for non-sentient living things. If, on the other hand, all non-sentient living things were designed, then they would be guaranteed to have indirect moral standing.

Acknowledgements

I owe many thanks to my dissertation director, Dr. Richard Lee, who made helpful suggestions on the drafting of this dissertation. This dissertation would be substantially lacking without his contribution. Thanks also to my committee members Dr. Warren Herold and Dr. Tom Senor for their insights on the questions posed here.

Dedication

This dissertation is dedicated with the deepest of love to my mother, Shirley Gaston Rice. You are missed very much.

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CHAPTER ONE
An Introduction to Biocentrism and Inherent Worth

In the introduction to the Blackwell Anthology on Environmental Ethics, Claire Palmer writes,

> “A wide spectrum of ethical positions is covered by the umbrella term ‘environmental ethics.’ These positions draw on a variety of ethical traditions, from Plato and Aristotle to Mill and Moore. As one might expect, a vigorous debate is being conducted between those advocating such diverse approaches. Certain key questions lie at its heart. One central area of debate concerns value theory in environmental ethics. What is considered valuable, and from where does such value[1] come?” (Palmer, 2000, p.16).

But, of course, this is not the only issue for environmental ethics. The key question highlighted by Palmer involves asking other, more fundamental, questions of metaethics such as, "What is the nature of the value that nonhumans have?”. “Is the value in question objective or subjective?”. “Is it intrinsic or extrinsic?”. “Instrumental or non-instrumental?". These questions are primarily focused on the nature of the value of nonhumans and the environment and can be summed up by the basic question, "What kind of value do these things have?"

Thus, we could perhaps rephrase Palmer’s key question in environmental ethics as three separate questions: "What entities are considered valuable? What kind of value do these things have? And, from where does such value come?"

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[1] There is, of course, the question of what exactly the term “value” itself means. I will assume that value is the same thing as what G.E. Moore calls “goodness” or “good”, terms which he believes are undefinable notions that are “simple”. Moore writes,
“What, then, is good? How is good to be defined?...What I want to discover is the nature of that object or idea, and about this I am extremely anxious to arrive at an agreement… But if we understand the question in this sense, my answer to it may seem a very disappointing one. If I am asked, ‘What is good?’ my answer is that good is good, and that is the end of the matter. Or if I am asked ‘How is good to be defined?’ my answer is that it cannot be defined and that is all I have to say about it…My point is that ‘good’ is a simple notion, just as ‘yellow’ is a simple notion; that just as you cannot, by any manner of means, explain to anyone who does not already know it, what yellow is, so you cannot explain what good is.” (Moore, 1948, pp. 6-7).

The first question is a question of *scope*. Answers to it will determine the range or the type of things that are deemed morally considerable or that have *moral standing*. The second question is a question of *metaethics*. Answers to it will determine the type of value that the things identified in the first question have. And the third question is a question of *environmental ethical theory*.[2] Answers to it will provide some kind of justification for why the entities identified in the first question have the kind of value identified in the second.

I. "What is considered valuable?"

The natural environment and the entities that comprise it are of deep ethical concern to the environmentalist. To that end a basic project for the environmentalist is to establish that entities in the natural world including individual living organisms[3], species, and ecological systems are due some kind of moral standing or considerability. For them things such as butterflies, endangered populations, rainforests and salt marshes deserve significant moral deference and respect from us. The environmentalist seeks to expand the scope of what moral patients are beyond the confines of humans and their interests. However, to what extent this expansion should occur is a matter of some debate. The question regarding the extent of this expansion, and of what kinds of things ought to be covered by it, is one of *scope* for an environmental ethic.[4]

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2 The separation of these questions is not meant to suggest that environmental metaethics is completely distinct and separate from the formulation of environmental ethical theories. In fact virtually any well-articulated environmental ethical theory is going to take some position on metaethics.

3 In this dissertation I will use the term "living things" and "organisms" interchangeably.

4 For references on the question of scope for an environmental ethic, see: B. Muraca, "The Map of Moral Significance: A New Axiological Matrix for Environmental Ethics", Environmental Values or E. Katz, "Is There a Place for Animals in the Moral Consideration of Nature?", in Environmental Ethics: An Anthology (eds. A. Light and H. Rolston III), 2003, Blackwell

In light of these considerations I would like to provide a brief overview of the variety of perspectives on the scope of environmental ethics.

The environmental ethicist's main concern is to argue on behalf of the existence of non-anthropocentric value.[5] This broadening of ethical concern, away from what they regard as a narrow form of anthropocentrism, is aimed at preventing further destruction of the natural world by humans. In order to be successful at treating the natural environment with care, they say that we must first think differently about it. They argue that since our moral regard for nonhumans and the environment has up until this point been either biased or prejudiced, we have unthinkingly harmed the natural world by treating various parts of it improperly. That is we have treated them as falling outside of the scope of moral considerability. The scope for a new, environmental ethic seeks to go beyond mere anthropocentricism usually by incorporating either a biocentric[6] or an ecocentric perspective[7] or some combination of the two.[8]

Publishing. These are but two sources among many that address the question of scope.

[5] Non-anthropocentrism in ethics is basically the claim that there are things beside human beings and their states such as living organisms, species, or ecosystems that have intrinsic value.

[6] There are two basic positions within biocentrism, 1) Biocentric individualism and 2) Biocentric holism. Biocentric individualism claims that *individual living organisms* are directly morally considerable. Biocentric holism, on the other hand, claims that groups of individual organisms, most notably *species*, are the objects of direct moral consideration. A species is a collective unit of individual living organisms that typically are reproductively isolated. For a good treatment on the question of the moral standing, preservation and value of species see "Part II: Values and Objectives" of the book *The Preservation of Species: The Value of Biological Diversity*, ed. B.G. Norton, 1986, Princeton University Press. A biocentrist could embrace individualism, holism or both. For a defense of the scope of biocentrism see, James Sterba's (1998) "A Biocentrist Strikes Back", Environmental Ethics, 20:361-376. Other key figures in the biocentric ethic are Albert Schweitzer, Kenneth Goodpaster, and Paul Taylor.

[7] An ecocentrist claims that entities above and beyond mere individual biological organisms and species have value. For the ecocentrist, the domain of value should encompass ecosystems, communities, and habitats, etc. For an interesting discussion of whether ecosystems have value see Harley Cahen's "Against the Moral Considerability of Ecosystems", *Environmental Ethics*, 1988, 10: 195-216.

[8] Some environmental ethicists argue that there is no need for a new, non-anthropocentric ethic

Biocentrists might be silent on the question of whether ecosystems have value. Being a biocentrist does not entail being an ecocentrist. All that is required for biocentrism is the belief that all living organisms have intrinsic value. One reason for this emphasis is found in their concern for the protection of *endangered* species or rare organisms. Other collective entities of living organisms that are also valued by environmentalists are rare or endangered *communities*[9] of organisms or threatened *habitats*[10] such as salt flats, bogs or savannas.[11] There are also two basic strands of biocentrism. The first is what is known as *biocentric holism*. This position claims that what has value or moral standing is a *species*. The second is known as *biocentric individualism*. This position claims that what has value or moral standing are *individual organisms*. Some biocentrist might choose to embrace both of these views. Some, biocentrists, however, argue that only species can have moral standing, while other biocentrists argue that only individual organisms can have moral standing.

An environmental ethic need not be confined to biocentrism. Since a great variety of living organisms and species are ecologically interconnected as member of an ecosystem, environmentalists have a great concern for this larger collective as well. Ecosystems are not just

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at all. To see a further treatment of the question of whether a non-anthropocentric ethic is needed see: "R. Sylvan, "Is There a Need for a New, an Environmental, Ethic?", in *Environmental Ethics: An Anthology* (eds. A. Light and H. Rolston III), 2003, Blackwell Publishing.

9 A community is an association of different species of individual organisms that usually inhabit a common location or habitat.

10 A habitat includes both biotic *and* abiotic factors which vary on the basis of things like soil type, vegetation type, salinity, altitude, availability of water, climate, temperature, etc.

11 Another somewhat perplexing aspect of the distinction between biocentrism and ecocentrism lies in differences over what it means for something to be "alive". For many ecocentrists the land, habitats and ecosystems themselves simply are alive just as much as individual organisms are. This claim, however, is quite controversial and not universally accepted. For an in-depth evaluation of the claim that ecosystems are alive see Vincent Vesterby's "Are Ecosystems Alive?" in *The Proceedings of the 52nd Annual Meeting of the ISSS*, 2008.

comprised of the individual, living organisms present within a given area but also the abiotic factors in the environment.[12]

In any event, some ecocentrists may nonetheless wish to abandon a commitment to a biocentric ethic which claims that living organisms have *intrinsic* value and instead opt to ground the value of living organisms on their extrinsic or *utilitarian* value in terms of their functional contribution to the larger, intrinsically-valuable ecosystem of which they are a part.

Some environmentalists believe that even the non-biotic components of the earth have value as well. They argue that water soil, natural resources, air, etc. have moral standing.13 Others go even further and claim that the planet itself has moral value. These types of positions are typically found among Deep Ecologists[14] and Gaia theorists[15] who view all elements of the biotic and abiotic world as members of a mutually-dependent and value-laden reality.

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[12] Given that specific habitats are often home to specific organisms, most biocentrists have an interest in habitat protection as well. They do not see biological interests as being all that separate from ecological or ecosystem-level interests. To that end see, Philip Carafo's discussion of the connection between the preservation of species and preservation of habitat or communities in "For a Grounded Conception of Wilderness and More Wilderness on the Ground", *Ethics and the Environment*, 2001, 6:1-17. Respect for the organism means respecting its habitat and surroundings. Also, the dividing line between biocentrism and ecocentrism is not precisely clear cut. An individual animal can also serve as a host to a number of other species that live either in it or on it. So, is the animal in question an ecosystem? Or is it a single biological organism?

[13] For this view see Aldo Leopold's "The Land Ethic" in *A Sand County Almanac*. Deep ecologists such as Arne Naess and George Sessions also hold this view.

[14] The term "Deep Ecology" was first coined by Arne Naess (1973) in "The Shallow and the Deep Ecology Movement", *Inquiry*, 16:95-100. Deep ecologists stress human's place in an interconnected web of ecological relations and of human's oneness with nature. Figures also include Bill Devall, Warwick Fox, George Sessions and Michael Zimmerman among others.

[15] Gaia theorists think that the Earth itself is one living organism with perhaps its own consciousness. A key figure in Gaia theory is James Lovelock. For an interesting discussion on the connection between Gaia theory and environmental ethics see Anthony Weston's (1987) "Forms of Gaian Ethics", *Environmental Ethics*, 9:217-230.

The positions outlined above illustrate that there is a wide variety of views on what the proper scope of an environmental ethic should be. However, most environmentalists tend to focus their concern on the proper treatment of living organisms, species, or ecosystems. Other environmental ethicists wish to cast the net further and claim that land or even the planet Earth itself has value.[16]

For the purposes of this dissertation, I will confine my discussion of environmental ethical theories to those that make arguments in support of biocentric individualism.

II. "What kind of value do these things have?"

Environmentalists are concerned with what *kind* of value that living organisms, species, and ecosystems possess. Many of them maintain that the kind of value they have is *intrinsic*.[17] Biocentrists, for example believe that life has intrinsic value while many ecocentrists believe that ecosystems have such value.

One of the motivating reasons for the biocentrist's endorsement of the claim that living organisms have intrinsic value is that they feel that a proper attitude of respect for nature should

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[16] Some may even go so far as to claim that the universe as a whole is an object of value. Frank Lunger defends the intrinsic moral value of the cosmos in "Anthropocentrism vs. Cosmocentrism: Groping Towards a Paradigm Shift", *The Newsletter of the Philosophical Discussion Group of British Mensa*, 2000, 102, (http://theotodman.com/c10208.htm). Also, Mark Lupisella, a NASA scientist, has argued that the cosmocentric perspective might also serve us well in the endeavor to communicate with extraterrestrial life forms. Both humans and extraterrestrials could communicate over something they value in common, namely our "ultimate shared cosmic origins". See M.L. Lupisella, "Cosmocentrism and the Active Search for Extraterrestrial Intelligence", *Astrobiology Science Conference*, 2010.

[17] Intrinsic value, broadly defined, is the value that a thing has *in and of itself*. There is also some question as to whether saying that something *has* intrinsic value means saying that it possesses that value itself or that it ought to be valued in and of itself.
I will further discuss the concept of intrinsic value and of its various definitions later in this chapter.

move us away from construing things such as non-human living organisms as being only instrumentally valuable for human purposes. Thinking that nature has such value also encourages movement away from radically subjectivist notions of what has value ("I know that *you* think that butterflies are non-instrumentally valuable, but that's just your opinion from your perspective!"). Embracing nature's intrinsic value moves us towards an attitude of evaluation that considers nature and the objects found in nature as morally valuable regardless of how useful or instrumental they might be for us and regardless of whether they happens to be valued merely on the basis some individual's personal opinion. Intrinsic value is usually put in contrast with either radically subjective views of value or strictly instrumentalist value for human beings.[18] Environmentalists think that we should move away from thinking that the natural world only has these kinds of value.

First, environmentalists think that if we continue to believe that nonhumans, species or ecosystems only have instrumental value then we will not have the proper attitude about the environment that we should. Instead of regarding nature as a mere collection of useful instruments, we should regard it as being good in itself. For example, the biocentrist thinks that *all* organisms are valuable, not just the ones that happen to be useful to *Homo sapiens*. They think that a person who believes that all nonhuman moral value is merely instrumental doesn't really have any good reason (apart from those instrumental values themselves) to adequately respect living things that aren't useful for us.

Second, many environmentalists want to avoid radically subjective views about the value

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18 It should be noted, however, that one can reject both instrumentalist and radical subjectivist views of environmental value without also having to accept a theory of intrinsic value. These people might hold the view that a living thing could have extrinsic value, as opposed to intrinsic value, but still think that its extrinsic value gives a reason for why someone ought to value it in and of itself.

of the natural world. They think that if environmental value should turn out to be just a matter of personal preference or opinion, then there wouldn't be any objectively right or wrong answer as to what our moral obligations are towards nature. For instance, should a person choose to regard the red-cockaded woodpecker[19] to be without moral value (as a result of her own personal taste) then that person isn't necessarily committing any moral oversight by having that preference or of thinking that she had no moral obligations toward that species or an individual of that species. Consequently such a person's ethical view cannot be criticized as inadequate. Her view of the moral status of the bird is simply different from, but not inferior to, the biocentrist's view. And since no one preference is inherently better than any other, a preference for non-biocentrism isn't necessarily wrong or inferior to biocentrism according to this type of subjectivism.

Holmes Rolston III, a significant contributor to environmental ethics, has argued that this kind of subjectivity in environmental ethics must be challenged. He writes, "with the environmental turn, so surprising and pressing in the final quarter of our century, [this] subjectivism in values needs review…"(Rolston III, 1982, p. 126).[20] Rolston is wary about the prospect that subjectivism may hold for an environmental ethic. He believes "value is (in part) provided objectively in nature". But he also holds that "value arises only as a product of subjective experience, albeit relationally in nature…" (Rolston, 1982, p. 144). Rolston claims that the objective properties in nature bring about in a perceiver the (admittedly) subjective experience of morally valuing the thing perceived.[21]

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[19] A federally-listed, endangered species.

[20] Later in this chapter I will discuss the objectivism/subjectivism debate as it applies to *intrinsic* value, not simply value simpliciter. This particular debate has taken place between Rolston and J. Baird Callicott.

[21] While some environmental philosophers may want to claim that this view is ultimately a form of value subjectivism, Rolston maintains that it can still avoid a subjectivist meta-ethic (Rolston,

Another environmental ethicist, R. W. Sperry has stressed the need for human society to get it right on the question of nature's moral value. It was objectively wrong for us to have caused as much damage as we have to the environment, Sperry claims, and it is objectively right that we should do something to protect and respect it. This implies the existence of a moral standard beside that of mere subjective preference. And because our environmental problems are so pressing and important, we need a principled way of guiding our dealings with the environment. We must move away from laissez-faire moral subjectivity and recognize the truth of our moral obligations to the environment. He writes,

> "…large segments of civilized society drift today in a state of confusion, at a loss with regard to ethical standards, morality, goals, and sense of purpose and direction in the human endeavor generally….When the Society for Zero Population Growth squares off against the church on issues of abortion, birth control, optimal population, and related questions, by what ultimate standards do we decide who is in the right?...Our tolerant, educated Western societies, in particular, seem more and more to be lacking in conviction with regard to any kind of ultimate standards." (Sperry, 1974, p. 10)

According to Sperry we must not simply wander in a sea of subjectivity if we are going to meet the challenge of protecting the environment as we ought.

III. A Discussion of Intrinsic Value

In opposition to radically subjective or instrumentalist views, environmentalists have taken up the task of persuading others away from such thinking about nature. They want us to take up a different, higher view of nature which values it *intrinsically*. Environmentalists think that nonhumans and ecosystems are valuable in and of themselves and not simply on the basis of

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1982). This is very similar to the position of Y.S. Lo who claims that analysis of a natural object's moral properties reduces to "the empirical relations between the object's natural properties [empirical properties] and people's psychological dispositions to respond to them." (Lo, 2006, p.123).

either subjective, personal preferences or instrumentalist concerns.

Many biocentrists argue that living organisms are valuable *in themselves* for fairly straightforward reasons. Persons who fail to recognize these reasons also fail to value nature in and of itself, and thus are guilty of a kind of moral blindness. These persons, it is argued, either have an inability to recognize their moral obligations concerning nature or they have an outright unwillingness to acknowledge the existence of such obligations.[22]

Environmentalists hold that our proper treatment of the natural world will take root only insofar as we have a new and right understanding of the *kind* of value that nonhumans, species and ecosystems have. They claim that a proper attitude about nature begins by recognizing the intrinsic value that exists in nature.

For instance, in 1949 Aldo Leopold argued that our attitude and outlook toward nature needed to change and be redirected towards an "intense consciousness of land". He wrote,

> "Perhaps the most serious obstacle impeding the evolution of the land ethic is the fact that our educational and economic system is headed away from, rather than toward, an intense consciousness of land. Your true modern is separated from the land by many middlemen, and by innumerable physical gadgets. He had no vital relation to it; to him it is the space between cities and which crops grow. Turn him loose for a day on the land, and if the spot does not happen to be a golf links or a 'scenic' area, he is bored stiff." (Leopold, 2003, p. 46).

An "intense consciousness of land" requires thinking about the land, or the environment,

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22 Some may argue, however, that a person can still believe that they have moral obligations to protect the environment for anthropocentrically-oriented utilitarian reasons. But many environmentalists think that utilitarian reasons of that kind are not enough of a warrant for real moral obligations to protect the environment. For instance, a biocentrist thinks that *all* living organisms are due moral consideration. But since at least some organisms do not appear to have any substantial utilitarian value for human beings, most biocentrists think that anthropocentric utilitarian concerns aren't enough of a warrant for the protection of all of life either. However, should it turn out that *all* living organisms have at least some utilitarian value, an instrumentalist could claim that we would have an obligation to protect them as one would protect a useful instrument. Under those conditions a person could embrace an instrumentalist take on value and also be a biocentrist.

differently. According to Leopold we must value nature for what it is in and of itself instead of viewing nature as existing solely for our benefit. We must value it *intrinsically*[23]. This, he claims, will lead us to a new ethic, one that properly values plants, animals and ecosystems as ends in themselves. All other ethics, particularly the dominant ethic of Western civilization, see nature as a storehouse or factory of goods that are only available for us to use and that exist at our disposal. "We must change this," says the environmental ethicist.

Much of the discussion about moral value in nature has focused on intrinsic value and what precisely it means to say that living organisms and ecosystems have this value. As Lars Samuelsson puts it, "Ever since environmental ethics (EE) began to take form as an academic discipline in the early 1970s, the notion of intrinsic value has occupied a prominent position within the field." (Samuelsson, 2010, p. 517). Also, J. Baird Callicot has said "Indeed, how to discover intrinsic value in nature is the defining problem for *environmental* ethics." (Callicott, 1995). This "defining problem" attempts to place nonhumans and even ecosystems in the proper place of moral valuations, as possessors of 'intrinsic value'. As Holmes Rolston III articulates it, "Natural things can and ought to count morally *for what they are in themselves*." (my emphasis, Rolston III, 2009, p.97).

Still other environmental philosophers have argued that the notion of intrinsic value itself

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23 Leopold stresses the importance of thinking differently about the environment and of the value that is has in itself in the final section of "The Land Ethic". To be clear Leopold does not use the term 'intrinsic' to describe the value of nature, but he does think that nature's value is *not economic*. At least with regard to human economic endeavors nature has non-instrumental value. He writes,

"The 'key-log' which must be moved…is simply this: quit thinking about decent land-use as solely an economic problem. Examine each question in terms of what is ethically and esthetically right…The fallacy that the economic determinists have tied around our collective neck…is the belief that economics determines all landuse."(Leopold, 2003, p.46).

I interpret Leopold's passage here to mean that nature is something that is valuable *in itself* or that it should be valued *for what it is*, not for what it can do for us.

needs to be dropped from the practice of environmental ethics altogether.[24] Some of intrinsic value's detractors argue that environmental ethics should be more about the practical business of solving real environmental problems, than getting bogged down with metaphysically strange concepts such as intrinsic value. They argue that we must assess what it is that we ought to do by finding the best practical solutions to environmental problems through either policy changes or changes in education. Paul Ott, for example, claims that intrinsic value theory in environmental ethics "like all theory, arose as a response to a set of problems in experience, in this case the problems of human overuse and abuse of nonhuman nature." (Ott, 2010, p. 291). That is intrinsic value is not so much an objectively existing concept found in the nature of things but a concept constructed out of human desires to pragmatically respond to environmental problems.[25]

Nonetheless, intrinsic value remains a major aspect of the overall project of environmental ethics. Many environmentalists hold that intrinsic value, as such a central feature, is what *makes* it the case that we have certain moral obligations towards nonhumans or ecosystems. Hugh McDonald explains how intrinsic value links the value of nonhumans and ecosystems to our moral obligations regarding them. He writes,

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[24] They include the 'environmental pragmatists' Paul Ott, Bryan Norton, Bruce Morito, and Anthony Weston. See Bruce Morito's (2003) "Intrinsic Value: A Modern Albatross for the Ecological Approach." *Environmental Values* 12: 317-336, Bryan Norton's (1987) *Why Preserve Natural Variety?*, Princeton University Press, and Anthony Weston (1996) "Beyond Intrinsic Value: Pragmatism in Environmental Ethics." In *Environmental Pragmatism*, edited by Andrew Light and Eric Katz (London: Routledge): 285-306. Also I recommend reviewing Andrew Light's concept of 'methodological environmental pragmatism' in (2002) "Contemporary Environmental Ethics: From Metaethics to Public Philosophy." *Metaphilosophy* 33: 426-429.

[25] Not all environmental pragmatists reject intrinsic value. An environmental pragmatist who accepts the concept of intrinsic value is Eugene Hargrove. See Hargrove's (1992) "Weak Anthropocentric Intrinsic Value", *Monist,* 75:183-207. I will not address the arguments of the environmental pragmatists in further detail here, but I will nonetheless defend a particular understanding of intrinsic value as an important central feature to a biocentric ethic. For a broad defense of the concept of intrinsic value see Katie McShane's (2007) "Why Environmental Ethics Shouldn't Give Up on Intrinsic Value." *Environmental Ethics*, 29: 43-61.

"If something has inherent or intrinsic value, it is entitled to moral considerability. This is the hidden minor in many of the intrinsic value arguments in environmental ethics. The conclusion, that moral agents have a *duty* [my emphasis] to protect bearers of intrinsic value, does not follow directly from the "presence" of intrinsic value. The minor is required to connect value to obligation. This creates a warrant, ground, reason, or justification for the protection of nonhuman nature, however the latter is defined. Environmental ethics, then, is within the rationalist tradition of the West in attempting to justify its ethical mandates with reasons." (McDonald, 2003, p. 8)

In other words, if something has intrinsic value, that value also provides a "warrant, ground, reason, or justification" for our moral duties to those things.[26] And since biocentrists and ecocentrists are interested in providing compelling *reasons* for the existence of the duties that we have to the natural world, they are also in the business of showing how nonhumans, species and ecosystems have intrinsic value and for why such value is reason-giving in the way described by McDonald.

IV. The Varieties of Intrinsic Value

The specific claim that individual, non-human, living organisms have intrinsic value, unfortunately, has been subject to a considerable lack of clarity[27]. As Jonathan O'Neill writes,

"To hold an environmental ethic is to hold that non-human beings and states of

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[26] This, however, should not be interpreted to mean that the *only* way for a person to *care* about the environment is by *valuing* it intrinsically. A person may show care for nature and think that they have duties to protect it and yet only value it for instrumental or personal, subjective reasons. Instead it should be interpreted to mean that the *proper or best way* for a person to value the environment is to value it *intrinsically* which can only be done by recognizing something about the environment that warrants our having that attitude about it. This is what the environmentalist thinks that we should do. We should value nature in the right way and with the right attitude.

[27] There is, however, a very broad understanding of what intrinsic value is even though working out some of its conceptual details has been, and continues to be, a challenge. As mentioned previously, intrinsic value basically refers to the kind of value that a thing has 'in itself'. As Ronald Sandler writes, "Generally, *intrinsic value* refers to the value that something has in and of itself. It is often contrasted with instrumental value - i.e. the value that something possesses as a means to a desired end of another." (Sandler, 2012, p. 92)

> affairs in the natural world have intrinsic value. This seemingly straightforward claim has been the focus of much recent philosophical discussion of environmental issues. Its clarity is, however, illusory. The term 'intrinsic value' has a *variety of senses* [my emphasis] and many arguments on environmental ethics suffer from conflation of these different senses: specimen hunters for the fallacy of equivocation will find rich pickings in the area."(O'Neill, 1992, p.119).

The question of what sense of intrinsic value is most appropriate for an environmental ethic has been considered at length by various environmental ethicists. I will address the existence of intrinsic value's "variety of senses" alluded to by O'Neill by considering three separate definitions of it that have been provided by Ronald Sandler (2012a).[28] These definitions are: 1) intrinsic subjective value, 2) intrinsic objective value, and 3) inherent worth. They are defined as:

> *Intrinsic subjective value*: The value that something possesses in virtue of being valued for what it is, rather than its usefulness as a means to an end.
> *Intrinsic objective value*: The value that something possesses in and of itself, independent of whether anyone actually values it.
> *Inherent worth*: The value that something possesses in virtue of having a good of its own (or interests) that valuers (or moral agents) ought to care about. (Sandler, 2012a, p. 92)

For purposes of this dissertation I will briefly describe the first two senses of intrinsic value and then proceed to a deeper discussion of the third sense of intrinsic value known as

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[28] Jonathan O'Neill has isolated three distinct definitions of intrinsic value (O'Neill, 1992) while Dale Jamieson has isolated four in chapter three of his book "*Ethics and the Environment: An Introduction*" (Jamieson, 2008). For the purposes of this dissertation, however, I will address the three varieties of intrinsic value discussed by Sandler. In formulating an environmental ethical theory one must be sensitive to these distinctions and be prepared to apply their preferred definition consistently. O'Neill identifies three senses of intrinsic value which are different from Sandler's. They are 1) "non-instrumental value", 2) "non-relational (Moorean) value" and 3) "objective value". O'Neill's second sense of intrinsic value, non-relational (Moorean) value defines intrinsic value as, value an object has solely in virtue of its 'intrinsic properties'. G.E. Moore believed that intrinsic properties were non-relational. (see O'Neill, 1992, p. 123). These properties come from the intrinsic nature of the object in question. The link between the thing's intrinsic value and its intrinsic property (ies) is immediate and does not depend on any relations between that entity and other things outside of it. Such relations might be, for example, those between the psychological states of valuers and the thing being valued. That is, this value can be characterized without reference to other objects and any of their states.

"inherent worth". Among all three senses of intrinsic value, inherent worth is the most important for the biocentrist endeavoring to make arguments on behalf of biocentric individualism.

V. Intrinsic Subjective Value

Let us take the first sense of intrinsic value as "intrinsic subjective value"[29]. This notion claims that intrinsic value comes into existence whenever a moral agent values a thing *intrinsically*. Whenever a moral agent values a thing intrinsically that agent values that thing for what it *is,* not for what it *does*. Things can be intrinsically *valued* by a moral agent if that moral agent values it *for what it is*. This type of intrinsic value is one that can only exist in the presence of an actual valuer intrinsically *valuing* a thing. As Ronald Sandler describes it this value is "created by valuers through their evaluative attitudes or judgments – it does not exist prior to or independent from these" (Sandler, 2012b, p.4).[30]

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[29] This sense of intrinsic value is roughly synonymous with O'Neill's "non-instrumental value". O'Neill references Arne Naess who captures this sense of intrinsic value thusly, "This value is independent of any instrumental usefulness for limited human purposes" (Naess, 1984, p. 266).

[30] It should be noted that the usage of the term "intrinsic subjective value" is not considered standard by a number of ethical theorists. Christine Korsgard, for example would most likely object to the use of the term "intrinsic subjective value". She thinks (or would most likely think) that intrinsic value means "intrinsic objective value". That is it is a kind of value or goodness that a thing possesses in itself, regardless of it being valued "intrinsically" by other valuers. For her intrinsic value is not something that can be brought about by a valuer valuing a thing in and of itself. For her the proper distinction should be between intrinsic value and extrinsic value as opposed to intrinsic value and instrumental value. She writes,
"It is rather standard fare in philosophy to distinguish two kinds of this value of goodness, often called "intrinsic" and "instrumental."' Objects, activities, or whatever, have an instrumental value if they are valued for the sake of something else-tools, money, and chores would be standard examples. A common explanation of the supposedly contrasting kind, intrinsic goodness, is to say that a thing is intrinsically good if it is valued for its own sake, that being the obvious alternative to a thing's being valued for the sake of something else. This is not, however, what the words "intrinsic value" mean. *To say that something is intrinsically good is not by definition to say that it is valued for its own sake: it is to say that it has its goodness in itself* [my emphasis]. It refers, one might say, to the location or source of the goodness rather than the way we value the thing. The contrast between instrumental and intrinsic value is therefore misleading,

A major voice behind this view of intrinsic value is J. Baird Callicott. Callicott thinks that intrinsic value is indeed vital to a solid environmental ethic, but he also thinks that intrinsic value as such must ultimately be rooted in metaethical subjectivity. He writes, “After thinking very hard, during the mid-1980s, about the ontology of value finally I came reluctantly to the conclusion that intrinsic value cannot exist objectively.” (Callicott, 1992, p. 132). Callicott claims that value does not specifically reside *in* the object valued. Rather intrinsic value is brought about whenever a person *values* something intrinsically or in and of itself.

Holmes Rolston sums up what this subjective version of intrinsic value means in the following way,

> “To say that something is intrinsically valuable means that it is of such a kind that were valuers to arrive they might value it intrinsically rather than instrumentally…By this account there is no actual value ownership autonomous to the valued and valuable flower; there is value ignition when humans come.” (Rolston, 1988, p. 114).[31]

Other environmentalists might want to clarify Rolston’s statement to say that it is not the case that valuers *might* value a living things intrinsically upon encountering them but that valuers *would* value living things intrinsically upon encountering them. This kind of metaethical subjectivism could still claim that it would objectively be the case that if some valuer, V, were to encounter living organism, X, that V would intrinsically value X.

Even if it should turn out that intrinsic value is, to use Rolston’s term, “ignited” by the presence of a valuer, it does not follow that moral *obligations* are subjective as well. Something

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a false contrast. The natural contrast to intrinsic goodness - the value a thing has "in itself" - is *extrinsic* goodness - the value a thing gets from some other source.” (Korsgard, 1983, pp. 169-170).
So for Korsgard “intrinsic subjective value” would not be a kind of intrinsic value at all but rather a kind of extrinsic value.

[31] Rolston also calls the view that intrinsic value can be *autonomously owned* by the valued object a “theory of *autonomous intrinsic* value” (Rolston, 1988, p. 114).

can possess an objective property that provides a moral agent with sound reasons for the existence of real moral obligations that are genuinely binding. For instance, should it be the case that all living organisms have their own biological life purposes and goals, then the existence of these projects and goals might also provide reasons for why that organism's life should not be ended without good cause. Moreover should the *value* of the organism be the product of a valuing subject it does not follow that the existence of that kind of subjective value precludes the existence of objective moral obligations to treat the organism with care. Hence, it is possible to believe that even if value should turn out to be metaethically subjective, moral obligations might nonetheless be valuer independent.

VI. Intrinsic Objective Value

The second sense of intrinsic value provided by Sandler is roughly the same as Jonathan O'Neill's "objective value" defined as "value that an object possesses independently of the valuations of valuers" (O'Neill, 1992, p. 125). According to O'Neill if something possesses intrinsic objective value then it also possesses "*evaluative* properties [which] are real properties of objects, that is, they are properties that objects possesses *independently of the valuations of valuers*[32]" (my emphasis, O'Neill, 1992, p. 125). The evaluative properties of a thing are those properties that make that thing good and worthy of being treated with some care. On this understanding, a thing's moral status is acquired on the basis of its possession of one or more evaluative properties. Under this understanding of intrinsic value some objectively true statement(s) about an object, those statements that employ one or more evaluative properties, are also statements that support the thing's moral standing along with whatever moral obligations we

[32] O'Neill does not say whether these properties are natural or non-natural.

have. Evaluative properties belong to the object in question and continue to exist and be associated with that object regardless of observers knowing about those properties or having thoughts of moral approval of them.

VII. Inherent Worth

The third, and final, variety of intrinsic value considered by Sandler is different from either subjective or objective intrinsic value. This third sense of intrinsic value is that of “inherent worth”. It is defined by Sandler as: “The value that something possesses in virtue of having a good of its own (or interests) that valuers ought to care about”.[33]

It should be noted that the mere existence of interests does not necessarily prove that someone ought to care about the thing that has those interests. For instance, Paul Taylor recognizes that even if all living things have "a good of their own" (an ‘is’[34], Taylor, 1986, p.72), a person may still deny that all living things have what he calls "inherent worth" or that we have any moral duties (“oughts”) to protect them. He writes,

> “The concept of inherent worth must not be confused with the concept of a good of a being. To bring out the difference between them, consider the logical gap between the fact that a being has a good of its own (an is-statement) and the claim that it should or should not be treated in a certain way (an ought-statement). One can acknowledge that an animal or plant has a good of its own and yet consistently with this acknowledgement, deny that moral agents have a duty to

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[33] Instead of referring to a “good of one’s own” I will use the term “interests” instead. The definition of inherent worth provided by Sandler suggests that there is no difference between something have a "good of its own" and it having interests. However, in chapter four of this dissertation I suggest that is possible for some living thing to have interests yet *not* have a "good of their own".

[34] Environmentalist tend to reserve the use of the notion of “having a good of one’s own” in their arguments for non-anthropocentric value. For example, Paul Taylor has said, “Since I am concerned only with human treatment of wild organisms, species populations, and communities of life as they occur in our planet’s natural ecosystems, it is to those entities alone that the concept “having a good of its own” will here be applied” (Taylor, 2003, p. 75). For Taylor, beings that “have a good of their own” deserve moral respect.

promote or protect its good or even to refrain from harming it. One does not contradict oneself by saying, 'Yes, I know that this action of mine will adversely affect the good of living things, but nevertheless there is no reason why I shouldn't do it.' There may in truth be a reason against doing the act, and that reason may be the fact that the act will be detrimental to the good of living things, but we cannot just assert this to be the case on the ground that the living things in question have a good of their own" (Taylor, 1986, p. 71-72).

That is, says Taylor, just because something has a "good of its own" someone may still argue it does not mean that that thing automatically deserves moral standing or that such goods place any moral duties upon moral agents to be recognized. This is roughly known as the "is/ought" distinction. Hume made use of this distinction to argue that normative statements, statements about what we *ought* to do, are not logically deducible on the basis of what *is* the case. Hence, ought statements can always be doubted on the basis of whatever *is* the case. Nonetheless, a person can point to what *is* the case as a means of persuading someone else to accept an evaluative claim.

The first part of Sandler's definition of inherent worth represents an "is" clause. An "is" clause is simply a descriptive statement. The descriptive statement found in the definition of inherent worth above is that of "having interests". According to this clause of the definition there is some objective fact of the matter which makes it the case that a thing has interests.

Note that according to Sandler's definition of inherent worth it is possible for something to have interests but in which such interests are not ones that valuers have some obligation to care about. Claims about having interests, as a purely descriptive matter, are either true or false. If they are true then we still have the question of whether those interests provide reason for why valuers ought to care about the thing that has those interests. Furthermore, something can have interests independently of whether anyone thinks that it has such interests or whether anyone cares about such interests.

The second part of the definition is the "ought" clause. An "ought" clause is some kind of evaluative statement or claim such as "You ought to care about X." or "You ought to value Y in and of itself." This clause of Sandler's above definition simply states that moral agents *ought to care about* the thing that has interests.[35]

But what does it mean to say that a thing “has interests”? And why think that having interests is roughly the same as having a “good of one’s own”? To say that a thing has interests is to say that it has a stake in bringing about some condition that benefits it and in avoiding other conditions that harm it. For example, I have an interest in being properly hydrated. This means that I have a stake in being properly hydrated because proper hydration is beneficial for me. It is a “good of my own” to be properly hydrated. Hence, I have an interest in it. Conversely, it is to my detriment if I am incapable of obtaining water when I need it. I have a stake in avoiding dehydration. This too means that I have an interest in avoiding dehydration.

I will assume that to say that a living thing *has* an interest is also to say that it has an interest *in something.* So for instance, human beings have an interest *in* consuming water, an interest *in* having a heart that functions correctly and an interest *in* having mitochondria that make ATP. Canines, primates and many other vertebrate animals, also have interests in these things too.

Interests are whatever is good for the thing that has them. Consuming water, having a properly functioning heart and having mitochondria that make ATP are things that are “good for” many living things.

As a first approximation, I will define an interest in the following way:

X has[36] an interest in Y (Y is an interest of X’s) if and only if Y is good for X

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[35] The point I intend to make here is not that having interests is a sufficient reason for why someone ought to care about a thing that has interests. Rather I am pointing out the presence of both an "is" and an "ought" clause within Sandler's definition of inherent worth.

[36] Non-psychologically 'has'. To say that someone non-psychologically has an interest is roughly

where “Y is good for X” means that:
1) If X is denied Y then X is harmed and 2) If X is not denied Y then X is benefited.

This definition is simply meant to serve as a first, rough approximation of what an interest is. In chapter three I will make further clarifications of this definition of interests. The main point I wish to get across here is that my use of the term “interests” will be limited to what is *necessary* for a thing’s self-regulation or maintenance. These are the kinds of interests that a thing can non-psychologically have. A thing can non-psychologically have interests in what contributes to its self-regulation.

There can however, exist cases were something, Y, can be good for X but in which X would not be harmed if it were denied Y. For example, a little bit of extra fertilizer on a plant might be “good for” it. But if the plant is *denied* that little bit of fertilizer it is not harmed. A little bit of extra fertilizer, is not necessary to the continued self-regulation and maintenance of it. On the above definition the plant would not have an interest in the little bit of extra fertilizer even though it looks as if having a little bit of extra fertilizer would be in the plant's interest.[37]

Also, having interests is not the same thing as having some physical characteristic. I don’t have an interest in drinking water in the same sort of way that one has blue eyes for example. I have an interest in drinking water because the consumption of water is tied to my continued well-

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the same as to say that there are certain things that are in a person's interests regardless of whether he or she has a psychological awareness of it being good for them. To say that someone psychologically has an interest is to say that that person has a conscious or psychological desire or preference for something. If my wife psychologically has an interest in going walking then she has a conscious desire to go walking. This is the difference between psychologically having an interest and non-psychologically having an interest. On the above definition a person has an interest if they have a non-psychological interest.

[37] I am here simply using this case to show that there is a problem for the definition of having an interest provided above. I will address this particular problem for the above definition of interests when I discuss the unified, definition of interests in chapter three.

being. But having blue eyes is a characteristic that is not connected to my continued well-being in the same sort of way. Thus, I have an interest in drinking water, but having blue eyes doesn't factor into what is in my interests.

Biocentrists claim that human beings are not the only living things that have interests. They think that all living things have interests in the same sort of way that we have an interest in proper hydration. For example, proper hydration and the avoidance of dehydration are good for many animals. As such a deer will purposefully seek out water because it has an interest in it. The reason why the deer engages in the "goal-directed" behavior of seeking out water is because proper hydration is good for it. Proper hydration is in its interests. Biocentrists use this line of thinking to argue that all forms of life have various interests in light of the kinds of beings that they are. Every living thing in some sense "pursues" those things which are good for it and "tries" to avoid those things which are bad for it. Their biological "pursuits" may not, however, be ones that are *consciously* pursued. In the case of plants for example, gathering sunlight is in their interests because it is good for them. And the fact that it is good for them is evidenced by some of their goal-directed behaviors or tendencies[38] to get sunlight.

Many biocentrists argue that if a thing has interests then there is some good that it pursues (or is pursuing) in one way or another.

But not all living things have the *same* interests. For example, a trout does not have an interest in breathing air because breathing air is not one of the things that it needs to do. However, breathing air is good for a kangaroo. So what is good for one living thing might not

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[38] I do not mean to say here that having interests means having pursuits or goal-directed behavior only that having pursuits is regarded by some biocentrists as providing some *evidence* about what is good for them and what they have interests in. Also, I do not hold the view that *all* living things should be regarded as beings capable of engaging in "pursuits" or having "goal-directed" behavior.

necessarily be good for some other living thing. The biocentrist holds that these goods are goods *of the living things themselves* not merely goods *for something else*. As Sandler writes,

> "An entity possesses a good of its own if it can be benefitted or harmed in a way that isn't relative to another's aims or goals. For example, if in the process of an excavation the roots of an oak tree are ripped up, it is in a straightforward way bad for and harmful to the oak tree. It impairs its parts and processes, and thereby its capabilities to survive, grow, and reproduce. Moreover, it is possible to make sense of the harm without having to refer to anything beyond the oak tree – e.g., the owner of the tree or the services that it provides for people or other species. It is bad for the oak tree because it diminishes its capacity to pursue its ends (or to flourish as an oak tree), independent of the effects on other organisms" (Sandler, 2012a, p. 97).

With regard to an oak tree there are things that can either harm it or benefit it. Ripping up an oak tree's roots causes it to be harmed. It is "bad" for the tree to sustain that kind of damage because such damage either hampers or prevents its normal growth. It is "good for" the tree to avoid such damage because avoidance of such damage contributes to its proper growth. Accordingly, the tree has an interest in avoiding root damage.

But not only do oak trees have an interest in *avoiding* harmful conditions they also have an interest in obtaining that which is positively beneficial to their survival and flourishing. So, for instance, an oak tree has an interest in obtaining water and sunlight. It "directs" (nonconsciously) its own physiological processes towards obtaining those things. Water and sunlight are "good for" the tree just as much as avoiding root damage is "good for" the tree. Thus, with regard to the tree's growth, maintenance, survival and reproduction, etc. the oak tree has an interest in both avoiding root damage, and in obtaining water and sunlight.

The above argument is the main reason why many biocentrists speak of "goods of one's (or its) own" to be roughly interchangeable with "interests". A thing that has a "good of its own", is a thing that can either be harmed or benefitted and a thing that can be harmed or benefitted has some goals or purposes[39] of its own that can either be prevented or realized by various conditions.[40]

Biocentric arguments that make reference to the concept of interests play a significant role in the overall moral project of showing why all living things should be valued intrinsically. Kenneth Goodpaster, one of the pioneers of the case for biocentrism notes the importance of interests and its usage. He writes,

> "I think the core of my answer must derive from reflection on the concept of morality itself. Though this concept is not *exhausted* by its inclusion of reference to the *good* and *harm* done to others by an agent, this reference is surely a central part of it. Beneficence and nonmaleficence, then, are not only necessary ingredients in our shared conception of moral (vs. nonmoral) obligation, they are *central*. *But one cannot do good for or avoid harm to entities that have no interests* [my emphasis]. Inanimate objects have no interests." (Goodpaster, 1980, p. 282).

Here Goodpaster is arguing that doing good for or avoiding harm to a thing is a central factor in whether it has interests. For Goodpaster if a being has interests then that being is one

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[39] I do not wish to defend the claim that all living things have goals. Rather I am attempting to describe what many biocentrists think having an interest means.

[40] Paul Taylor, however, thinks that having a good of one's own is *not* synonymous with *having* interests. Taylor interprets the "having" of interests to be akin to having various *psychological* states, such as desires or intentions or conscious aims towards acquiring some good or of having experiences of satisfaction and dissatisfaction. Beings that do not have interests in this sense are ones that "are not interested in, [and] do not care about, what happens to them" (Taylor, 1986, p. 63). Nonetheless Taylor thinks that there can still be things that are *in* an organism's interest that the organism itself might not *have* an interest in. For Taylor, those things that are in an organism's interest are also the *goods of* that organism. Gary Varner, on the other hand, construes the *having* of interests to be understood in non-psychological terms, in terms of what is *good for* an organism. For him a thing can *have* interests even if it doesn't have psychological states of being interested in or of satisfaction and dissatisfaction. On this point, then, Varner and Taylor disagree as to what the appropriate understanding of *having* an interest should mean. For this dissertation I will interpret the having of interests to be *either* having an interest psychologically (in the case of having psychological preferences) *or* having an interest non-psychologically (in the case of having interests that do not depend on the existence of any psychological preferences).

that can be either benefited or harmed.[41] Also Goodpaster thinks that if a being has interests then that being has moral worth.[42]

Gary Varner reiterates this basic view when he writes,

> "It is because the concept of others' interests is so closely allied with the concepts of *doing harm to and benefitting others* [my emphasis] that interests are crucial to our thinking about ethics. To say that a being has interests is to say that it has a welfare, or a good of its own, that matters from the moral point of view. This is why the *satisfaction of interests* [my emphasis] constitutes a fundamental moral value." (Varner, 1998, p.6).[43]

Others, of course, could argue that the satisfaction of an organism's interests isn't necessarily a morally good thing or that moral agents have any obligation to bring about what is good for them, to avoid what is bad for them or even to care about them. As Ronald Sandler writes,

> "While it is relatively uncontroversial that all natural living things have a good of their own, it is quite controversial which of those goods moral agents ought to care about. On biocentric views, moral agents ought to care about the good of all living things (Taylor 1986; Sterba 199[8], 2001); on sentientist[44] views, they need only care about the goods of all conscious or self-aware living things (Singer 1975; Jamieson 1998); and on anthropocentric views, they need only care about the goods of members of the species *Homo sapiens* (Baxter 1974; Pinchot 1914)" (Sandler, 2012a, p. 98).

I will use the term "interests" to broadly denote those goods *of living things* that if

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41 In chapter three I make a distinction between different kinds of "harm". For example, a picture can be "harmed" if someone scratches it. But this does not mean that the picture has interests. There can exist some things that can be harmed but that do not have interests. However, anything that has interests can be harmed.

42 Gary Varner also agrees with the notion that having interests is key in moral arguments in support of a life-centered ethic. He writes, "I do not claim that the satisfaction of interests is the only kind of moral value, but I do think it carries special weight, and…the environmentalist agenda will be based, ultimately, on the satisfaction of interests." (Varner, 1998, p.7)

43 As a reminder, I argue in chapter four of this dissertation that having a good of one's own is not the same thing as having interests.

44 A sentientist is someone who thinks that only sentient beings, beings capable of feeling pleasure and/or pain can qualify as beings that have moral standing.

pursued bring about their well-being.[45] If those goods are in one way or another prevented from being realized, then that thing is subject to a harm. And if those goods are realized then it obtains some benefit.

VIII. Clarifying the Definition of Inherent Worth

According to the definition of inherent worth provided above the value that a thing has is based on whether the interests of a thing provide a valuing agent a compelling reason to care about it.

As I mentioned previously, some might wish to regard inherent worth as defined here as being a kind of intrinsic value. Others, however, might want to argue that it is *not* a kind of intrinsic value but rather a kind of extrinsic value. Christine Korsgard would not regard inherent worth as defined here to be a kind of intrinsic value because for her intrinsic value is not something that is brought about by a valuer valuing a thing in and of itself. For her intrinsic value is a kind of value that a thing *possesses in itself*, regardless of whether it is valued "intrinsically" by other valuers.

For the purposes of this dissertation I will not address the question of whether we should regard inherent worth as being a kind of intrinsic value or as a kind of extrinsic value. Whether inherent worth is itself a type of intrinsic or extrinsic value is not an issue I wish to defend.

At this juncture I would like to provide some further clarification on the definition of inherent worth that was provided by Sandler. In the following passage Sandler argues that inherent worth, while sharing some similarities with intrinsic objective value, can also be distinguished from it. He writes,

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[45] However, in chapter three I raise the view that some non-living things can have interests too.

> "On some accounts of the basis of inherent worth it is a variety of intrinsic objective value. On other accounts it is not. This is possible because the concept of inherent worth differs from that of intrinsic objective value in the following way: if an entity has intrinsic objective value it possesses that value even if there are no valuers, whereas an entity possesses inherent worth *if a valuer ought to care about its interests* [my emphasis]. One possible reason that a valuer ought to care about the interests of an entity is it has intrinsic objective value, but that is not the only possible reason." (Sandler, 2012a, p. 97)

I would like to consider the above passage in further detail.

As Sandler suggests, "One possible reason that a valuer ought to care about the interests of an entity is it has intrinsic objective value, but that is not the only possible reason". For instance, a valuer might hold the view that they ought to care about the interests of some things and yet deny that intrinsic value itself is objective or that the thing in question has intrinsic objective value. They may, for instance, think that intrinsic value is subjectively conferred yet still affirm that they ought to care about it and its interests accordingly. It is for this reason that a person can *care about* the interests of a thing for reasons other than its possession of intrinsic objective value especially if they think that intrinsic objective value is a problematic metaethical concept.

The definition of inherent worth provided by Sandler suggests (if not explicitly) that if an entity possesses interests *and* the possession of interests does something in the way of providing objective grounds or *reasons* for why valuers ought to care about it then it has inherent worth. The proponent of inherent worth on this view seems to be committed to the view that at least some interests are genuinely *reason-providing* and that such interests should not be merely regarded as morally compelling based on one's own personal opinion or preference about the thing that has interests. However, if one grants *from the outset* that having interests automatically provides a reason for why valuers should care about living things, then it would be a rather straightforward matter to show that living organisms have inherent worth simply by showing that they have interests.

This seems to be the approach of Paul Taylor who writes,

> "If the fact that an entity has a good of its own does not logically entail that moral agents ought or ought not to treat it in a certain way, the problem arises: What relationship holds (if any) between an entity's having a good and the claim its good makes upon moral agents? I shall argue that, if a moral agent is to recognize or acknowledge such a claim, the entity in question must not only be thought of as having a good of its own; *it must also be regarded as having inherent worth* [my emphasis]." (Taylor, 1986, p. 72).

That is, Taylor thinks that having a good of one's own (interests) is the thing that objectively and automatically provides a reason to think that something has inherent worth.[46]

I, however, will be working on the assumption that the possession of interests does not by itself necessarily or definitionally entail the existence of inherent worth for the thing that possesses those interests. In order for living things to have inherent worth their interests must be ones that have some objective quality about them that makes their possessor one that ought to be cared about. Also I will be working on the assumption that if something has interests that do provide a reason for why valuers ought to care about it, that such reasons *make* it the case that *all* valuers ought to care about the thing that has those interests. What I want to suggest is that the "reason providing" nature of interests makes it the case that all valuers ought to care about the possessor of those interests even if those reasons are not appreciated or even fully known by any valuers. There could exist some cases where a living thing could have an interest yet the interest in question not be one that makes its possessor a thing that all valuers ought to care about. In other words there can exist interests that might not provide a reason why any valuer should care

[46] Gary Varner also appears to hold this view. He writes, "To say that a being has interests is to say that it has a welfare, or a good of its own, *that matters from the moral point of view* [my emphasis]." (see footnote 35 above). He also writes, "As I am using the term…an interest is, *by definition* [my emphasis], morally significant." (Varner, 1998, p. 77).

about the thing that has those interests. Hence, I will, unlike Taylor and Varner, treat the possession of interests and whether those interests provide reasons for why valuers ought to care about their possessor as two separate questions. To that end I would like to make a distinction between interests and interests that provide such reasons. Interests that provide reasons for why all valuers should care about their possessor are ones that I will call "*morally considerable interests*".

Since there is such a distinction I intend to define inherent worth more precisely. Such a definition should make it a necessary condition that having inherent worth requires not simply having interests but also having "morally considerable interests", that is those interests that also provide a reason for why all moral agents ought to care about the possessor of those interests. By "moral agent" I mean a being that has the cognitive faculties that enable such a being to engage in moral reasoning. A moral agent is one that is able to engage in at least three things, 1) to discern right action from wrong action, 2) to be responsive to reasons for moral actions and evaluations and 3) to make judgements regarding what has value and of what kind of value that there is. A moral agent, as I use the term, is one that has properly-functioning cognitive equipment that enables that being to engage in moral reasoning. So, if there happens to be an individual that has some kind of brain injury that results in a malfunction of his cognitive equipment that prevents him from properly engaging in moral reasoning, then that individual would not be a moral agent.

With the above clarification in mind I offer the following, amended definition of inherent worth:

> ***First clarified definition of Inherent Worth (IW1)****: The value that a thing has in virtue of,*
> *a) having interests and*

b) where such interests provide a reason why all[47] *moral agents ought to care about the thing that has such interests.*

However, it might be objected that to ‘care about’ a thing is not necessarily the same thing as to *intrinsically value* it or to *value it in and of itself*. For instance, I can *care about* my car because it is a useful tool for transportation. But that does not necessarily mean that I also *intrinsically* value my car.[48] I might only care about it instrumentally and not value it *non-instrumentally*. It should be noted that when biocentrists say that we should "care about" living things they don't mean that we should care about them *because* they are instrumentally useful. They think we should care about them in a different sense, that of caring about them intrinsically. For them, the instrumental value of living organisms should *not* be the reason why all moral agents should care about them. Instead valuers should care about them for reasons independent of their instrumental usefulness.

As such they would challenge the above definition of inherent worth by making the following argument.

1) If x cares about y, then x values y non-instrumentally.

2) If x values y non-instrumentally, then x values y intrinsically.

3) Thus, if x cares about y, then x values y intrinsically.

Still others could object to the first premise of the above argument on the grounds that there can exist some things, indeed *many* things that we "care about" but that we do not *non-*

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[47] I use the word "all" here to highlight the inclusion of not just human beings in the range of moral valuers, but to all moral agents properly responsive to moral reasons. Presumably, there could exist other moral agents besides human beings such as space aliens for example.

[48] This should not mean that I cannot intrinsically value my car. I could take up the attitude of valuing my car in and of itself as well.

instrumentally care about.[49] For instance, sometimes we care about things because of how instrumentally valuable they are to us. For example, it makes some sense for many of us to say that we "care about" our cars because of how useful they are in providing us with transportation. This sense of "caring about", however, is not a sense non-instrumentally valuing a thing. Rather this sense involves caring about a thing as a means of utilizing it for an instrumental end. It is a sense of valuing a thing *instrumentally*.

But the sense of "caring about" that I am endorsing here, and that most environmentalists endorse, is a sense of caring about something *intrinsically*.

But what does it mean to care about a thing intrinsically or non-instrumentally?

Consider these comments from Robert Simpson on the different things that we intrinsically value. He writes,

> "The things people value intrinsically can be grouped into three categories. First, there are things whose value seems basic, primitive, or irreducible. ‘Pleasure’ is the stock example of this – it’s difficult to conceive of any further basis or reason for pleasure being valuable; it just seems valuable full stop, so to speak. Call whatever is valuable in this way an ‘elemental good’. Second, there are things which, according to influential strands of ethical theory, there is a categorical obligation to value intrinsically: persons, or relationships, or some class of beings *en masse* (e.g. self-conscious creatures). Call anything that is valuable in this way a ‘deontic good’. Third, there are all the things that do not seem like either elemental or deontic goods, but which we intrinsically value nevertheless. As an example, think of how you might value a beautiful tree in a park or garden. It’s not that you believe you have a categorical duty to value the tree intrinsically. Nor is it that you can’t conceive of there being any further bases or reasons for the tree’s being valuable – indeed, the tree’s extrinsic benefits may be a large part of why it matters to you. Nevertheless, you don’t *value* the tree extrinsically, *in view of the further good things it contains, leads to, or is associated with* [my emphasis]. Rather, to use that familiar and enigmatic expression, you value the tree ‘in and of itself’. This is one example among many. Because of the rich variety of ways in which people find value in their lives, there is wide range of things which people value intrinsically despite the fact that those things would not seem – to the duly reflective valuer – like elemental or deontic goods." (Simpson,

[49] I also discuss notion of "caring for" something instrumentally versus "caring for" something non-instrumentally in section VIII of chapter one.

pp. 2-3, 2015)

What Simpson is getting at in his description of the third sense of the way that we intrinsically value things is that of taking up a valuing stance that has *no regard* for a thing's utilitarian value in bringing about some other good. We value that thing *non-instrumentally*.

Basically whenever a person cares about something non-instrumentally they value it without an eye to how useful that thing might be. This is how biocentrists think we should value all living things. Things that we care about non-instrumentally, are things that we *care about* in the way that biocentrists and other environmentalists think we should.

To that end I would like to amend premise one of the above argument to reflect this sense of "caring about" a thing non-instrumentally.

The amended argument is the following:

1) If x cares about y *non-instrumentally*, then x values y non-instrumentally.[50]

2) If x values y non-instrumentally, then x values y intrinsically.

3) Thus, if x cares about y non-instrumentally, then x values y intrinsically.

Some at this point might still have an objection to the above argument. They might find fault with the second premise. They might say, "The only things that can be intrinsically valued or cared about are those thing that *have* intrinsic value. So, for example, Michaelangelo's *Pieta* does not have intrinsic value. So we cannot care about this sculpture *intrinsically*."

But an objector to the above argument might respond by saying, "I grant that the *Pieta* only *has* extrinsic value. But why should that preclude my *valuing* it intrinsically? Why can't having a desire to protect it from harm, without thinking about how useful it might be for some instrumental end, be a proper evaluative stance for me to take? And why can't this instance of

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[50] I also discuss this issue in section VIII of chapter one.

valuing it *in that way* be a way of intrinsically valuing it? After all I don't find myself valuing the sculpture *because* it is instrumentally useful (although it is so). Rather I just find it reasonable to care about it without any concern *for how extrinsically valuable it might be*. In other words, just because something only has extrinsic value that should not mean that it cannot be valued intrinsically which makes no reference to its extrinsic value *to the valuer*."[51]

This view is also consistent with what Katie McShane has to say regarding the reasons why it is appropriate from some person to care for somethings *extrinsically* and *inappropriate* for them to care for other things in this same sense. She writes,

> "...the distinction between intrinsic and extrinsic valuation plays an important role in ethics, and rightly so. We think that some things *should be valued intrinsically* [my emphasis] and other things should be valued extrinsically. While these judgments will usually be context dependent, they are nonetheless very important in our thinking about what to do and how to feel. For an example, consider the case of Ebeneezer Scrooge, the character from Charles Dickens' A Christmas Carol.[52] What was Scrooge's moral mistake? His mistake was that he valued money intrinsically and he valued people extrinsically (instrumentally, in fact).[53]

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[51] Not all things that a person intrinsically values should be cared about in the same way. McShane illustrates this when she writes,
"...the way it is appropriate to treat the proper objects of different kinds of intrinsic valuation are quite different. Consider the difference between the ways that it is appropriate to treat the proper objects of awe, on the one hand, and the proper objects of love, on the other hand. You might want to say that both the Mona Lisa and your daughter have intrinsic value, the artwork because it is the appropriate object of awe and the child because she is the appropriate object of love. But the ways that it is appropriate to treat them will be quite different. It might be appropriate to put the Mona Lisa in a big plastic cage to protect it from flashbulbs and treat it with various chemicals in order to ensure that it changes as little as possible over time. But to lock your daughter away and carefully control the environment in an attempt to prevent her from changing in any way would be terrible. You should nurture her, help her to develop and change over time, and try to make it so that she changes in good ways rather than bad ones. But taking this strategy of benevolent improvement with the Mona Lisa would be a disaster. The Mona Lisa probably would look better in a nice hat, but you should not add one, even if the hat would constitute an aesthetic improvement." (McShane 2007, p. 56)

[52] McShane enters the following footnote here: See Charles Dickens, *A Christmas Carol* (Peterborough, Ontario: Broadview Press, 2003).

[53] McShane enters the following footnote here: That Scrooge is unfriendly and a miser is well known, but the text also provides glimpses of his attitudes toward human relationships in

> He got it backwards. People are supposed to be valued intrinsically and money is supposed to be valued extrinsically. In fact, that is the whole point of the morality tale—and it has a happy ending because Scrooge finally figures out his mistake and gets it right. But Scrooge is not that uncommon: many of our morality tales are about people who care about the wrong things in the wrong ways and how they do or do not fix this mistake." (McShane, 2007, p. 53)

So, in order to further clarify what the notion of to 'care about' should mean for a biocentric conception of inherent worth I offer the following clarification to the above definition of inherent worth:

> ***Second clarified definition of Inherent Worth (IW2)****: The value that a thing has in virtue of,*
> *a) having interests and*
> *b) where such interests provide a reason why all moral agents ought to non-instrumentally care about the thing that has such interests.*

Let us refer to clause "a" as the "interests clause". This clause is satisfied by the presence of the conditions needed for an entity to have interests.[54] Clause "b" is what I will call the "moral considerability clause". This clause is satisfied whenever the interests identified in the first clause also provide reasons for why all moral agents ought to non-instrumentally care about the thing that has those interests.[55] That is, clause b, identifies *morally considerable interests*.

For the purposes of this dissertation I will use this definition of inherent worth (IW2) as a means of capturing an important sense, or variety of intrinsic value that is of interest to biocentric individualists. I will also regard the "is" clause of inherent worth (clause a) to be synonymous with objectively true statements about living organisms that demonstrate that they have interests.

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general: "'Why did you get married?' said Scrooge. 'Because I fell in love.' 'Because you fell in love!' growled Scrooge, as if that were the only thing in the world more ridiculous than a merry Christmas" (ibid., p. 43).

[54] The question of precisely what these conditions are (or should be) will be addressed in the next chapter.

[55] In the next chapter I argue that the minimal condition of intrinsically valuing a thing is that of its "moral standing". If something has moral standing then it at least has minimal intrinsic value.

IX. "From where does such value come?"

So, what actually *is* it about individual living organisms that grounds their inherent worth, makes them worth protecting and demands our ethical consideration? Many of us may have an intuition or *feel* as if plants, animals and other nonhumans simply have some kind of moral standing, but the grounding for an environmental ethic must surely do more than that. Can environmentalists ground their claims of the value of living organisms by some objective feature(s) that they possess? Given that this dissertation is confined to the arguments for biocentric individualism[56] that also rely on a definition of inherent worth, there is a rather straightforward answer to the question "From where does the value of individual living organisms come?". The answer is that individual living organisms have inherent worth because they have interests and those interests provide a reason for why moral agents ought to non-instrumentally care about them.

But how does one go about showing that something has inherent worth? According to the definition of inherent worth above one needs to show two things in order to support that claim.

The first is that it must be shown that *all* living organisms have interests.

The second is that it must be shown that the identified interests that belong to all living things have some quality about them that provide moral agents with a reason to non-instrumentally care about all living things. To put it another way if all living organisms have inherent worth, then that means that they all have interests that provide a reason for why any moral agent should care about them non-instrumentally.

[56] However, I do advance some further considerations for the moral standing of ecosystems and species in this dissertation.

X. The Aim of this Dissertation

A proper analysis of the biocentric individualist's ethical project should take into account the concept of interests. These interests are an important factor in many arguments in support of the general claim that all living organisms have inherent worth. The basic reasoning behind these interest-based arguments goes something like this,

1) Anything that is capable of being harmed or benefited has interests.
2) Many, if not all, living organisms are capable of being harmed or benefited.
3) Thus, many, if not all living organisms have interests.
4) Beings that have interests are ones that ought to be non-instrumentally cared about.
5) Thus, many, if not all living organisms have inherent worth.

Beginning with chapter two I will describe Gary Varner's view that etiology plays an important role in whether a living thing has interests. An etiology is a causal history of some kind put forward as an explanation for how something came about. Etiological accounts of interests attempt to show that the causal history of a thing is relevant to whether it has interests. I will discuss Gary Varner's evolutionary, or natural selection, etiological account of biological interests. This account claims that all naturally-selected, living things are morally considerable *because* they have interests. This account also claims that artifacts are not morally considerable because they were not produced by the process of evolution by natural selection. Varner argues that only biological organisms have morally considerable interests because those interests are "biological" meaning that their biological functions are proper functions that arose via a process of natural selection. All manipulated forms of life, including other complex designed contrivances, do not have structures that perform biological functions hence they do not have interests. On this understanding a living thing's interests are morally considerable if its functional structures were brought about by an *evolutionary, natural selection etiology*. Non-biological interests, such as those that arose via a process of artificial selection or design, are not morally considerable because those interests did not arise in the context of that etiology.

In chapter two I also provide an overview of all of the relevant etiologies that a biocentrist could appeal to in order to construct an etiological account of interests for all living things. These etiologies are a natural selection etiology, an "Instant Organism" etiology, an agent-selection, non-teleological etiology and a design etiology. I will argue that under Varner's account some of the identified interests are not in the interests of the individual organism. I will argue that the process of natural selection is incapable of showing that all "proper functions" are of interest to individual living organisms. There are many cases in which a proper function generated by a natural selection etiology is not in the individual organism’s interests to have. That is, even if one were to grant that evolutionary etiological accounts are able to identify "proper functions", there is no guarantee that those functions are actually what represent the organism’s own good. As such Varner's account is unsuccessful in accounting for the inherent worth of all individual living things.

In chapter three I discuss a non-etiological account of interests advanced by Craig Delancey. This account, known as a "systems-based" account, claims that living things have interests by recourse to the kind of internal organization that they have as self-regulating beings. On this view living things have interests that are independent of their etiology. I will argue that while this account is successful at identifying the existence of interests for all living things it is unsuccessful at identifying the existence of morally considerable interests for all living things. In this chapter I will also challenge the basic claim made by Varner that having interests means having morally considerable interests. Insights from the system's based account, a non-etiological account of interests, show that living things produced by *any* etiology whatsoever will have interests. But this account also shows that some *artificial* things might likewise be regarded as having interests.

For instance, artificially-produced forms of life possess just as many interests and life functions as their natural counterparts do. How they came about is irrelevant to whether they have interests. The systems-based account also leaves open the possibility that some non-biological entities such as sophisticated robots can have interests as well. The system's based account implies that while biological organisms have interests it is not true that they are the *only things* that can have interests. This is a problem for the biocentrist who wishes to keep artificially-produced organisms and other complex, designed entities that are not “alive” in the traditional sense, outside of the scope of moral standing.

Some biocentrists think that artificially-produced entities cannot have interests or be morally considerable because they are not "natural". But the claim that naturalness grounds the moral standing of a thing has its own problems. I will argue that there are good reasons to think that naturalness, as opposed to artificiality, is not a good-making property, particularly when it comes to the moral status of interests. An artificially-produced entity can have interests in the same sort of way that a naturally-produced one can. Hence, any supposed moral difference between an artificially-produced entity, whether biological or not, and a similar naturally-produced entity cannot be based on whether they have interests.

In chapter four I argue that while it is true that all living things can be identified as *having interests* (because they all have teleofunctional interests) under a non-etiological, "systems-based" view, that account of interests cannot provide guidance on why those interests should be regarded as ones that provide them with direct moral standing. I then consider the question of whether an organism's etiology could make a difference to whether its interests are morally considerable in the sense of providing it with direct moral standing. I argue that while rational agents and sentient beings have interests that provide them with direct moral standing regardless of their etiology, non-sentient living things do not have interests that provide them with direct moral. I then inquire into whether an agent-selection, non-teleological etiology, an instant organism etiology or a natural selection etiology could be capable of bringing about non-sentient living things that have interests that provide them direct moral standing. I argue that these etiologies cannot produce non-sentient living things that have interests that give them direct moral standing.

At the end of chapter four I argue that all non-sentient, living things regardless of their etiology cannot have direct moral standing. This means that some form of indirect moral standing is the only available option left for the biocentrist hoping to argue on behalf of the protection of all non-sentient living things. I then inquire into whether all non-sentient living things could be guaranteed to have indirect moral standing. I argue that a natural selection etiology is unable to guarantee indirect moral standing for all non-sentient living things brought about by that etiology.

In chapter five I will consider the question of whether a design etiology could guarantee indirect moral standing for all non-sentient living things produced by that etiology. I argue that all non-sentient living things if designed would be guaranteed to have indirect moral standing in that there would exist a reason not to harm those beings independently of human preferences or interests in them.

CHAPTER TWO
A Natural Selection Etiological Account of Biological Interests

In the previous chapter I attempted to highlight the basic grounds that biocentrists appeal to in their argument for the claim that all living things have inherent worth. Many of them think that anything that has interests also has inherent worth. At is claimed that since all living things have interests that automatically provides reason to think that all living things should be cared about non-instrumentally.[57] Some biocentrists think that the fact that all living things have interests automatically provide a reason for why they are, or at least should be, morally considerable. But, as I mentioned in the previous chapter, I will not assume that having interests automatically provides such a reason.

In the first section of this chapter I will provide some further background information relevant to this kind of basic biocentrist's arguments in favor of the inherent worth of all individual living things.

In the second section I will provide a discussion and critique of Gary Varner's natural selection etiological account of interests which makes particular reference to the concept of "biological interests" as providing a reason to think that all living things have moral considerability.[58]

In the third section, I will provide some background information relevant to the

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[57] The "reasons" here are meant to indicate reasons that are available to valuing agents that can be responsive to the reasons given. For example, there cannot be a "reasons for" a cat to value other cats in and of themselves because cats (and all other non-rational beings) cannot be responsive to those reasons. The "reasons for" are reasons for valuing agents to consider and be appropriately responsive to.

[58] As I mentioned previously in chapter one, whenever I use the term "moral considerability" I mean that living things that have such considerability are things that ought to be cared about non-instrumentally. Also, the term "morally considerable interests" refers to interests that provide a reason for why someone should care about the possessor of those interests non-instrumentally.

development of Varner’s etiological view and why Varner invokes etiology as being important to the existence of morally considerable interests. Varner argues that only organisms that have a natural selection etiology can have biological functions which makes them candidates for interest possession.

In the fourth section, I provide an overview of all of the relevant etiologies that could be invoked to explain the existence of living things and their interests. These etiologies are 1) a natural selection etiology, 2) an agent-selection, non-teleological etiology, 3) an "instant organism" etiology, and 4) a design etiology.

In the fifth section I will provide some background information on what a non-etiological account of interest is and what sets it apart from etiological accounts of interests.

In the sixth section, I explain Graig Delancey's criticism of Varner’s etiological approach and why he thinks that it is not adequate to account for the existence of interests for all living things. In light of these criticisms, and some of my own, I will argue that biocentrists should abandon Varner's approach and seek an alternative account of interests.

In the seventh, and final, section I provide a conclusion along with some background information relevant to the development of a non-etiological view of interests known as the "systems-based" account of interests.

I. Background Information Relevant to Biocentric Individualism

I will now provide some background information pertinent to the development of the biocentrist’s argument in support of the view that all living things have interests. As previously mentioned, many biocentrists claim that all living things are valuable in and of themselves because they have interests.

Others, however, are not convinced that *all* living organisms have interests. They think that only *sentient* forms of life are capable of having interests.

For instance Tom Regan highlights what he calls the “interests argument”.[59] This argument attempts to show that not all forms of life, especially non-sentient forms, are worthy of ethical or moral consideration because they do not have interests. The argument goes something like this:

(1) The only beings which can have moral standing are those beings which can have interests.
(2) The only beings which can have interests are those which have the capacity for consciousness.
(3) Therefore, the only beings which can have moral standing are those which have the capacity for consciousness. (Regan, 1981, p. 21).

This argument, according to Regan,

> "…exploits an ambiguity in the concept of something having interests. To speak of A's interests in X might mean either (a) that A is interested in (wants, desires, hopes for, cares about, etc.) x, or (b) that X is in A's interest (that X will contribute to A's good, or well-being, or welfare). Clearly if the only beings which can have moral standing are those which can be interested in things (have desires, wants, etc.), then only conscious beings can have moral standing...If, on the other hand, we mean beings which can be benefited or harmed by what is given or denied them, then it is an open question whether the class of beings which can have moral standing is coextensive with the class of beings having the capacity for consciousness." (Regan, 1981, p. 21-22).

Biocentrists attempt to diffuse the “interests argument” by showing that premise two of the argument is false. One way to do that is to show that having interests is not a privilege reserved only for conscious beings and that *having* an interest in X is not coextensive with *taking* an interest in X.[60] All living organisms, whether conscious or not, have interests by the fact that

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[59] Regan highlights this argument in order to refute it. He does not endorse the interests argument.

[60] I have previously mentioned that traditional anthropocentrism does not regard the interests of non-humans, whether conscious or unconscious, to be of intrinsic moral concern. However, Anderson-Gold (2003) has argued that anthropocentrism can be ‘reconstituted’ into an

they can be helped or harmed. They have various needs[61] and pursuits that can either be furthered or thwarted.

Various biocentric ethical theories have made use of the basic argument that all living organisms have interests as evidenced by the fact that they all "pursue" in some sense those things that are good for them. Most notably living things have an interest in whatever allows them to maintain their own biological integrity and well-being. Whatever contributes to a living thing's well-being is what it "tries" to bring about.[62] So for example, a bacterium has an interest in finding enough nutrients in its environment. Bacteria routinely "seek out" sources of nutrients. If a bacterium cannot get nutrients it is harmed. If it can get nutrients then it is benefited in some way. Nutrients contribute to its biological integrity and this is enough to show that it has interests.

There are several examples of biocentric ethical theories that rely on the notion of interest possession as a justification for the moral considerability of not just some but of all living things.

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environmentally-friendly ethic. She argues that the human perspective is ‘ineliminable’ to any ethic simply because all ethics aims to prescribe and guide *human* action. Hence, the anthropocentric point of view simply cannot be taken away. But this does not mean that anthropocentrism must only be aimed at human interests. It only means that a human perspective is necessary in knowing what our moral obligations to the environment are. Instead, *reconstituted anthropocentrism* maintains that nonhumans have an objective “good of their own” that we as humans can come to know and understand from *our own uniquely human perspective*. On this basis it is objectively wrong to think that only humans and their interests are morally considerable. According to Anderson-Gold, “This ‘objective knowledge’ may include changes in our understanding of the capacities of non-human animals, the functioning of natural systems, and even our more general model of nature.” (pp. 114-115). Hence, this version on anthropocentrism is decidedly different in kind from the traditional or classic understanding of ethical anthropocentrism.

61 This, of course, is separate from what a living thing may *want.* The *needs* of an organism are to be understood here as being purely biological and objective. Consequently, biological interests are based on what a living thing objectively *needs* independently of whatever mental states such as wants, desires, longings. etc. that living thing may or may not have.

62 In section IX of chapter four I argue that non-sentient living beings actually do not have *goals* or a "good of their own" per se.

As Hans-Jürgen Link describes it, these theories,

> "rel[y] on the observation that living beings appear to aspire to an inherent end; after all, even biologists seem to give a functional description of life. Plants, for example, grow, seek nutrition and reproduce. In an Aristotelian diction, organisms give the impression of being directed towards a *telos*…Even if less complex life forms do not have experiences, it is argued, to compromise a living organism is contrary to its 'interests' and therefore morally wrong since it is not appropriate to its natural *telos*" (Link, 2013, p. 439).

Likewise, Gary Varner writes that "…I believe that the strongest reason for pursuing the environmentalist agenda will be based, ultimately, on the satisfaction of interests." (Varner, 2001, p. 7). So interests and the satisfaction of interests feature prominently in arguments in support of an environmental ethic and in particular a biocentric one.[63]

At first glance many people might find an ethical position of biocentrism to be implausible. For instance, a biocentrist might try to argue that a swamp privet (an invasive plant) has interests and so on that basis never deserves to be killed. But someone could reasonably argue that the action of killing that plant is not morally wrong especially if that plant is interfering with the flourishing of other plants or wildlife or is harming one's own property. Initially many people might think that if *this* is what biocentrism amounts to then it is simply implausible. Many would not be willing to say that they think that a plant matters *just as much*, ethically speaking, as a dog or another human being.

But a biocentrist herself need not embrace such a view. All that a biocentrist has to endorse is the claim that all living things have some moral standing. Dealing with value conflicts or cases of competing interests would be another matter. Biocentrists that point to the existence of interests are only trying to argue that their having such interests give some reason for why

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[63] This is, of course, not to say that interests and the satisfaction of interests are the *only* support for an environmental ethic.

they should be valued non-instrumentally, in and of themselves.

Biocentric individualists argue that the existence of these kinds of interests, interests in meeting basic requirements for biological flourishing or well-being, are what make all living things morally considerable. A mouse, for example, has an interest in drinking water. And since it has that interest it would be wrong to deprive that mouse of water. The reason why it is wrong to interfere with such biological goals is because such interference is harmful to it. So in the case of drinking water a mouse should be left free to pursue that interest all else being equal.

Interests can also be connected to other interests. For instance, a blue jay can have an interest in flying as a means of catching food and if it does have that interest then it also will have a related interest in its wings functioning properly. If we consider the blue jay's interest in its wings functioning correctly and if flight is something that is good for the bird then, says the biocentrist, it looks like stopping or interfering with the blue jay's attempts at flight or damaging its wings would be wrong because such interference is harmful or detrimental to the bird. If having interests makes living things morally considerable then interfering with the satisfaction of their interests causes them to be harmed. Such beings cannot properly function or flourish unless they are left free to pursue their interests in which case the functions of their structures are allowed to occur.

But sentient organisms like blue jays and human beings are not the only beings that can have interests according to the biocentrist. Non-sentient forms of life such as plants have interests too. For example, an oak tree has an interest in obtaining sunlight. It has leaves that contain chlorophyll which enable it to absorb the sunlight necessary for its own growth. One of the ways in which we can know that plants have such an interest is by observing its growth. A plant's interest in acquiring sunlight is evidenced by its behavioral tendencies to move toward sunlight. Plants in general direct their own growth towards sources of light under various conditions. Plants exhibit a "goal-directed" behavior in response to its need for sunlight. This indicates that the plant has an interest in acquiring sunlight. If the plant were moved away from the light or covered so that it could not get light the plant would be harmed. Its leaves would fall off and its growth would be stunted. The plant thus has an interest in obtaining sunlight and it also has an interest in its leaves working properly to harness that light. So, argues the biocentrist, interfering with this biological end for no good reason would be ethically wrong too.[64]

II. Gary Varner's Natural Selection Etiological Account of Interests

Gary Varner has commented on the proposition that goal-directed behavior indicates that a thing has interests. All living things have what he calls "biological interests". A biological interest, according to Varner, is an interest in some biological process taking place or in some biological structure performing a vital function.

For Varner, all biological interests are morally considerable. For instance, a butterfly has a biological interest in locating sources of nectar, but it also (presumably) has a biological interest in its proboscis working properly so that nectar can be efficiently extracted from flowers. All living things have biological interests. And since they do they are all morally considerable.

But conscious living things have additional interests besides biological interests. These interests are what Varner calls "preference interests". A preference interest is a psychological preference or desire that a conscious, living organism can have for certain things. Non-sentient

[64] This argument would apply to all living things. Even the simplest forms of life such as bacteria have interests. An *H. pylori* bacterium, for example, has an interest in acquiring nutrients from its environment. Acquiring nutrients is good for the bacterium's welfare. Hence, interfering with that bacterium's interests is *prima facie* wrong.

forms of life, on the other hand, have biological interests but not preference interests.[65] They do not have psychological states such as desires or preferences. As Varner writes,

> "…I offer two general clarifying remarks. First, since [my] burden…is to explain how non-conscious beings such as plants can have interests, and since our paradigm of an interest involves the endeavors of conscious beings, it is useful to introduce a terminological distinction between those interests that do involve consciousness in some and those that do not. Tom Regan marks this difference by distinguishing between conscious "preference interests" on the one hand, and "welfare interests" on the other. Although I use Regan's term for the former, I instead call the latter *biological interests*. My reason is that "welfare" suggests too strongly something like the integrated satisfaction of all an individual's interests, and when I say that "A has a biological interest in X" I mean only that X is in *one* of A's interests, that X would be good for A in some respect or other, rather than that X would be best for A, all things considered." (Varner, 1990, p. 254).[66]

Varner argues that goal-directed behaviors or tendencies are not strictly reserved for living organisms. He acknowledges that artifacts could exhibit these behaviors and tendencies as well.[67] But that leaves open the suggestion that artifacts could possibly have goal-directed behaviors and interests too and thus would be objects of moral considerability. Varner writes,

> "…if we are going to attribute interests to plants on the grounds that they exhibit goal-directed behavior, then by the same token we will have to assign an interest in regulating temperature to a home heating system, and to do so would constitute a *reductio ad absurdum* of the proposal…Since simple artifacts clearly have needs in certain senses of the word, two things will have to be established before we can understand how the fact that plants needs suffices to show that they have interests. The first is an empirical claim:
> *The empirical claim*: plants have needs in some sense in which artifacts do not.
> The second is a normative claim:
> *The normative claim*: this difference qualifies plants, but not artifacts, for direct

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65 We could, however, image a case of angels or disembodied spirits that have neither ancestors nor any sort of biological interests but who could still have other interests based on their desires for certain things. These beings would have preference interests but not biological interests. Plants, on the other hand, have biological interests but not preference interests (since they are nonconscious).

66 From this point on I will use the term "biological interests" to denote those interests that *all* living things have whether sentient or not.

67 I will address the subject of whether artifacts can have interests in a section III of this chapter three.

moral consideration" (Varner, 1990, p. 251).

Varner thinks that only *living* entities, not artifacts, have interests.[68] Hence, all living things are morally considerable but all artifacts are not.

Varner tackles this problem by arguing that artifacts do not have interests. He argues that there are some empirical facts about plants which demonstrate that they have interests and other empirical facts about artifacts which show that they do not have interests. He does this by way of establishing criteria for interest possession that rule out artifacts as interest possessors.

According to Varner, if something possesses a structure with a *biological function*[69], then that thing also has a *biological interest*[70] in that structures performing that function. Varner makes the connection between the fulfillment of biological functions and with what is in the biological interests of living things by means of the following argument. He writes,

> "if the fulfillment of the biological function (what Millikan means by proper function) of our subsystems is in our interest irrespective of our being capable of consciously taking an interest in their fulfillment, would not the fulfillment of those functions in plants be in their interest, even though they are incapable of taking an interest in them? That is the best available argument for the expansive conception of *moral standing* [my emphasis] represented in biocentric individualism" (Varner, 1998, p. 74).

Varner here is making an analogical argument of sorts. Since the fulfillment of the biological function of the human heart (pumping blood) is *in* our interests irrespective of us taking an interest in it, and since the pumping of blood is good for us, then the fulfillment of the biological functions of plants is likewise in their interests irrespective of it *taking* that interest and thus it is likewise good for them. And since our interest in having properly-oxygenated blood

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68 This, of course, assumes that anything that is an artifact cannot also be a living thing.

69 Later in this chapter I will discuss Varner's use of the term "biological function" and how he defines it.

70 I will also discuss and critique Varner's concept "biological interest" in section VI this chapter.

is one of the many things that gives us some degree of moral standing, plants should also be accorded some degree of moral standing too.

Some may find Varner's argument by analogy to be seriously flawed. For instance, someone could reasonably think that plants are simply not like human beings in the relevant sorts of ways that could make their interests morally considerable. It could be argued that the fact that certain things might be in both the interest of a plant and in the interest of a human being does nothing to show that there is also an ethical dimension to the plant's interests. For purposes of the discussion I will assume that it is true that both sentient and non-sentient forms of life have interests. What I want to explore is Varner's claim that the above analogy warrants, in his words, "the expansive conception of moral standing represented in biocentric individualism" which is that the existence of biological interests for all living things makes it the case that all living things are morally considerable.

As I alluded to previously, this "expansive conception" need not entail the view that all living things must never be harmed or killed or that all living things have the same degree of moral standing. Instead I will take it that the biocentrist must at least be committed to the proposition that all living things have some kind of *minimal* moral standing based on their possession of interests such that all things being equal they should not be harmed or killed but should instead be valued in and of themselves to some degree.

With the above considerations in mind, I think a further note of caution is in order. Varner works on the assumption that having interests is a *sufficient* condition for moral standing. He thinks that if something has interests then that thing is morally considerable. He writes, "To say that a being has interests is to say that it has a welfare, or a good of its own, that matters from the moral point of view." (Varner, 1998, p.6). Elsewhere Varner writes, "As I am using the term…an interest is, by definition, morally significant."[71] (Varner, 1998, p. 77).[72] I, unlike Varner, will argue in this chapter that having interests does *not* always or necessarily entail having morally considerable interests. More precisely, having interests does not entail the claim that all possessors of interests should be valued intrinsically or in and of themselves.[73] More needs to be said about the kinds of interests in question and why we should think that those interests give any moral agent a reason to value the possessor of the identified interests in and of itself.

III. The Importance of Etiology to Varner's View

Varner's criteria of biological functions were partially-inspired by Larry Wright's teleological explanation of function[74].

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71 Varner here suggests that interests *themselves* are morally significant and that (presumably) possessors of interests are morally significant in light of that fact. Most biocentrists believe that *possessors* of interests are morally significant. But some of them may either be agnostic or actually oppose the view that interests themselves are morally significant. I will work on the assumption that the biocentrist would at least accept the latter position without necessarily having to accept the former. Whether the biocentrist thinks that interests *per se* are morally significant is a subject I will set aside for the purposes of this dissertation. Also, in light of the clarified definition of inherent worth, I will assume that if something is to have inherent worth it must possess an interest that also provides a reason for why the thing that possesses it should be valued in and of itself.

72 Premise one of Regan's above argument, however, claims that having interests is not a sufficient condition but is instead a *necessary* condition for a thing to have moral standing. Varner does not address this aspect of Regan's argument. I will set this point aside for the purposes of this dissertation.

73 In this chapter I will attempt to show that having biological interests, in Varner's sense of the term, is not a sufficient condition for the claim that satisfaction of such interests brings about what is good for individual living things. If a thing has biological interests it does not mean that those interests are morally considerable. Various counterexamples will show that it is possible for a living thing to have a biological interest in some state of affairs and yet that interest not be a compelling reason for why its possessor should be valued in and of itself.

74 See Larry Wright's book *Teleological Explanations: An Etiological Analysis of Goals and Functions*, 1976, University of California Press.

Varner, however, thinks that there is a serious problem with Wright's criteria of function. According to Varner, Wright's criteria of function could be used to attribute functional purposes or goals to the structures of artifacts. But, argues Varner, Wright's criteria should not be used as means of identifying functional *interests*.

Wright's criteria of functions are etiological. That is, they are ones that refer to the causal history of a function in question.[75]

Wright's criteria of functions claims that:

The function of *X* is *Z* if and only if:

(i) *Z* is a consequence (result) of *X*'s being there,

(ii) *X* is there because it does (results in) *Z*.

Biocentrists think that the fact that biological structures have functions is important for biocentric accounts of interests for the following reason. All living things seem to be comprised of various structures that have functional purposes, the functions that those structures are *for*. The heart, for example, has the functional purpose of pumping blood. The pumping of blood is what the heart is *for*. The pumping of blood is vital to the good of the organism that has that heart. If the organism's heart were not able perform its functional purpose we would say that the heart is malfunctioning. A malfunctioning heart is not good for the life of the organism. The organism thus has an interest in its heart performing its functional purpose.

There are other functions that structures can perform but that are not the functional purposes of those structures. The heart, for instance, does not have the functional purpose of making its characteristic "thumpa-thumpa" sound. This is a function that the heart performs but it is not its functional purpose. The heart does not *have the function* of making that "thumpa-

[75] See also page 71 of Christopher Boorse's "Wright on Functions" in *The Philosophical Review*, LXXXV: 70-86.

thumpa" sound. Performances of making the "thumpa-thumpa" are not vital to its well-being at all. Hence an organism does not have an interest in its heart making the "thumpa-thumpa" sound.

Varner argues that if the biocentrist were to apply Wright's above criteria of function, to an etiological account *of interests* it would turn out that many human-designed artifacts, as well as all living things, would have interests. Thus, both artifacts and living organisms would be morally considerable. But Varner think that artifacts do not have interests. Hence, he thinks that Wright's criteria of function should be amended in some way.

For example, Varner might argue that under Wright's criteria of function that both cars and elephants could be said to have parts or subsystems that have a function. According to the Wright criteria the function of a car battery is to supply power to the car if and only if the power being supplied to the car is a result of the car battery being there and the car battery is there because it supplies power to the car.[76] Similarly, the function of the elephant's trunk is to siphon water if and only if the siphoning of water is a result of the elephant's trunk being where it is and the elephant's trunk is where it is because it siphons water.[77]

On that basis it looks like both cars and elephants have structures with functional purpose. Hence, they both have interests in their structures performing their functional purposes. Hence, they both are morally considerable.

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[76] Note that the clause "the car battery is there because it supplies power to the car" could be rewritten as a longer causal sequence that employs more immediate causal factors to explain in greater detail just why the car's battery is there. For example: "The battery is there because a designer put the battery there and the designer put the battery there because that seemed to be the best location for it and it seems to be the best location for it (immediately) because the battery supplies power to the car's engine."

[77] We could construct a similar, more-detailed explanation of what it means to say "the elephant's trunk is there because it siphons water". We could rewrite that clause to say, "The elephant's trunk is there because it was adaptive to the elephant's ancestors and it was adaptive to the elephant's ancestors because it allowed those ancestors to have sufficient hydration and it allowed them to have sufficient hydration because it siphons water."

Clause ii of Wright's criteria is known as the 'etiology clause' in that it attempts to give some kind of historical, causal explanation for why a structure is where it is. This particular clause, however, does not distinguish functions brought about by designers and their intentions and functions brought about by non-teleological processes like natural selection. It merely states that some structure X is there because it performs some function Z. Since clause ii applies equally to the function of a car battery (an object produced by a teleological process of human design) and to the function of an elephant's trunk (an object produced by the non-teleological process of natural selection) a distinction between human-designed functions and naturally-selected functions cannot be made. And since no etiological distinction between those functions can be made, the biocentrist would have to regard artifact functions to be of the same kind as those of living things. As Christopher Boorse writes, "one would assume that regardless of whether organisms or artifacts are in question, any ordinary sort of etiological explanation of X by X's effects will support a function statement" (Boorse, 1976, p.71).

Wright's criteria, of course, will not help Varner in distinguishing artifacts from living things. In order to avoid the implication that both biological structures *and* designed structures could have functional purposes that the things *have interests in*, Varner provides a further explanation of what clause ii of Wright's criteria could mean so that the functions of living things can be distinguished from the functions of designed artifacts. He claims that the functions of living things are only produced by a process of natural selection.[78] He writes, "One thing that

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[78] Natural selection, however, should not be regarded as a teleological process. A teleological process is one that is goal-directed in some way with specific aims, purposes or ends. For example, car batteries are produced by a teleological process in which the battery's designer built it to achieve a particular functional end. Non-teleological processes, on the other hand, are unguided and do not involve any forethought or planning. Natural selection is regarded by many scientists and philosophers to be non-teleological. Ernst Mayr, one of the leading voices in evolutionary biology, holds such a view. He writes,

distinguishes organisms from artifacts is that the former but not the latter are the result of natural selection." (Varner, 1998, p. 69). On this view a structure has a biological function only if it came about by natural selection.

Here Varner makes an *etiological distinction* between the functions of artifacts on the one hand and the functions of organisms on the other by appeals to what he calls the 'biological theory of welfare'. According to this theory things with *biological functions* also have *biological interests* in those functions being performed. This is illustrated in the third part of his theory of interests. Varner writes,

> "…an individual *A* has an interest in *X* if and only if
> (1) *A* actually desires *X*,
> (2) *A* would desire *X* if *A* were adequately informed and impartial across all phases of *A*'s life, or
> (3) *X* would fulfill some biological function of some organ or subsystem of *A*, where *X* is a biological function of *S* [an organ or subsystem] in *A* if and only if
> (a) *X* is a consequence of *A*'s having *S* and
> (b) *A* has *S* because achieving *X* was adaptive for *A*'s ancestors" (Varner, 1998, p. 68).

Parts 1 and 2 of this account of interest possession covers cases of desire interests or

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> "[Natural] selection is not teleological (goal-directed)...[Natural selection eliminates unfit mutants without regard to end goals] Selection does not have a long-term goal. It is a process repeated anew in every generation. The frequency of extinction of evolutionary lineages, as well as their frequent changes in direction, is inconsistent with the mistaken claim that selection is a teleological process" (Mayr, 2001, p. 121).

Also Jerry Coyne, another prominent figure in evolutionary biology writes,

> "…to the best of our knowledge evolution, like all natural processes, is purposeless and unguided. After all, scientists have no problem saying that the melting of glaciers, the movement of tectonic plates, or the decay of atoms are processes that are unguided and purposeless...There seems to be no direction, mutations are random, and we haven't detected a teleological force or agent that pushes it in one direction. And it's important to realize this: the great importance of Darwin's theory of natural selection is that an unguided, purposeless process can nevertheless produce animals and plants that are exquisitely adapted to their environment. That's why it's called natural selection, not supernatural selection or simply selection" (Coyne, 2012, p.1).

preference interests that rely on sentience or consciousness. But the instrumental criterion for separating artifacts from living organisms is found in clause 3b. This criterion claims that artifacts do not have interests (whether biological or not) but that plants do because plants have biological functions whereas artifacts do not. Sub-clauses a and b jointly attempt to define what a biological function is. Since biological functions only belong to structures found within naturally evolved, living things and since all living things have those structures because they were adaptive for their prior ancestors, artifacts, which do not have a causal history involving ancestors, do not have biological functions. Craig Delancey reiterates this point when he writes, "Contemporary artifacts arguably do not have ancestors and so they fail to satisfy condition (3b)" (Delancey, 2004, p. 176).[79] Since artifacts do not fulfill this condition, they do not have biological functions. And since they do not have biological functions they also do not have biological interests. Thus, biological functions can be separated from artifact functions on the basis of differences in their etiology.[80]

Varner gets his notion of biological function from Ruth Millikan's etiological explanation of "proper function". In her paper "In Defense of Proper Functions" Millikan argues that a natural selection account for the adaptedness of a structure is what identifies the functional purpose or "proper function" of that structure.[81] Thus, she endorses a view of proper function

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79 The use of the term 'ancestor' here is meant to denote a *biological* ancestor, one that is tied to a thing's descendants via a process of genetic reproduction of some kind. We may speak of artifacts having certain 'ancestors' however it should be recognized that such usage is metaphorical. For instance, we might say that the 1967 Corvette was the 'ancestor' to the 1968 Corvette. But all this means is that the 1967 Corvette contained some feature(s) that were retained by the 1968. It doesn't mean that the 1968 was, literally, a genetically-reproduced descendent of the 1967.

80 An "etiology" is simply a causal story that explains how some structure or feature came into existence.

81 Proper functions of biological structures are claimed to be the "purposes" of those structures. As Millikan writes, "...the things that have "proper functions" do seem to coincide with things

that is etiological. Millikan's defines a proper function in the following way:

> "It does not seem to be so much the details of the definition of "proper function" that need defense as its basic form or general plan, *which looks to the history of an item to determine its function* [my emphasis] rather than to the item's present properties or dispositions. At any rate, it is this historical turn in the definition that I propose to defend...The definition of "proper function" is recursive. Putting things very roughly, for an item *A* to have a function *F* as a "proper function", it is necessary (and close to sufficient) that one of these two conditions should hold. (1) *A* originated as a "reproduction" (to give one example, as a copy, or a copy of a copy) of some prior item or items that, *due* [her emphasis] in part to possession of the properties reproduced, have actually performed *F* in the past, and *A* exists because (causally historically because) of this or these performances. (2) *A* originated as the product of some prior device[82] that, given, its circumstances, had performance of *F* as a proper function and that, under those circumstances, normally causes *F* to be performed by *means* [her emphasis] of producing an item like *A*. Items that fall under condition (2) have "derived proper functions", functions derived from the functions of the devices that produce them. Because the producing devices sometimes labor under conditions not normal for proper performance of their functions, devices with derived proper functions do not always have normal structure, hence are not always capable of performing their proper functions-a fact, I claim, that is of considerable importance. (Millikan, 1989, p. 288).

Varner applies the first part of Millikan's definition of proper function to identify the functional purposes of biological structures. Because of this I will set aside discussion of whether the second condition also pertains to the proper functions of biological structures. Items of designed contrivance as well as biological structures can have proper functions under the first condition of Millikan's above definition. In a later chapter, I will address the subject of artifact proper functions in the context of condition (1) of Millikan's definition.

(omitting God) that have, in ordinary parlance, "purposes." (Millikan, 1984, p. 18). Proper functions are also what others have called "normative functions". I argue that Millikinian proper functions are not functional purposes in section VII of chapter four.

[82] It is not entirely clear what Millikan means by the term "device" here. She does, however, claim that one type of device is a "language device" which consists of "words and syntactic forms" (Millikan, 1989, p. 289). It is not obvious that Millikan thinks that artifacts are likewise "devices". But most of us would probably think that they are devices.

Natural selection etiologists, like Varner and Millikan identify biological functions[83] by recourse to some undirected, selection etiology, most notably natural selection.[84] Presumably, those structures that have proper functions acquired their functional purposes by reproduction and natural selection. So on this view the heart has the proper function of pumping blood because that heart once pumped blood in the past for one or more ancestors that also had a heart, and those previous instances of blood pumping aided in the survival and reproduction of those ancestors. As Jay Odenbaugh writes,

> "Consider your heart. It has the function of circulating blood through your body. That is, this is what it is *supposed to do* [my emphasis]. It came to have this function because it was this effect for which it was selected against other heritable variants. Insofar as your heart does not circulate blood it is malfunctioning. Thus, one strategy of reducing normativity to natural properties is through evolutionary biology" (Odenbaugh, 2015, p. 2)

Millikan is credited with providing a definition of proper function that can identify those functions that a biological structure is "supposed" (in an impersonal or nonpsychological sense) to perform. She writes, "Having a proper function is a matter of having been 'designed to' or 'supposed to' (impersonal) perform a certain function. The task of the theory of proper functions is to define this sense of 'designed to' or 'supposed to' in naturalist, nonnormative, and nonmysterious terms." (Millikan, 1984, p. 17). So, on this understanding, the proper function of the heart is to pump blood and is "supposed to" pump blood because the heart originated as a

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83 Which in this section I will also call "proper functions".

84 Millikan is *not* claiming that the existence of a proper function entails the claim that such a function *ought* to occur, nor that living organisms *have interests* in the performances of these functions, nor that having such functions makes a living thing valuable in and of itself, only that it is a certain function that a structure was 'designed to' or 'supposed to' perform. Varner, on the other hand, makes the ethically normative transition from having a biological function (which is a proper function) to the goodness or moral standing of the living thing bearing the structure that has that function by equating the fulfillment of a biological function with what is in a living thing's *interests*.

reproduction of some prior structure that, due in part to possession of the properties reproduced, had actually performed pumping blood in the past. And the heart exists now because of these past performances. The purposive nature of this function is, as she puts it, defined “in naturalist, nonnormative” terms.

Ruth Millikan’s definition of proper function is meant then to explain the functional purpose of a structure, as opposed to those functions that are not proper or accidental. She writes,

> “The definition of "proper function" is intended as a theoretical definition of function or *purpose* [my emphasis]. It is an attempt to describe a unitary phenomenon that lies behind all the various sorts of cases in which we ascribe purposes or functions to things, which phenomenon normally *accounts for* [her emphasis] the existence of the various analogies upon which applications of the notion "purpose" or "function" customarily rest” (Millikan, 1989, p. 293).

Thus, the proper function of an elephant’s trunk is also the *purpose* of the trunk. The elephant’s trunk is for (has the purpose of) drinking water and if it failed to perform that function we should say that it is malfunctioning or that it is not functioning properly. Those functions that are not proper functions are ones that do not have the right kind of selection-based history to make them proper and are ones which the structure in question was not selected to do.

It is for this reason that etiologies are an important feature of arguments on behalf of the claim that all living things have interests but that artifacts do not. Artifacts, and their functions, have a different etiology than natural living things. Only biological functions are the result of an etiological process of natural selection. Artifact functions, however, are the result of a different etiological process, one of intentional design or artificial selection.[85]

IV. A Survey of Etiological Accounts of Living Organisms

[85] As I will illustrate in chapter five artifact functions can also be proper functions and can have functional purposes.

Before proceeding I want to provide an overview of four different types of etiology that are relevant to the existence of living organisms (See Figure 1 below).

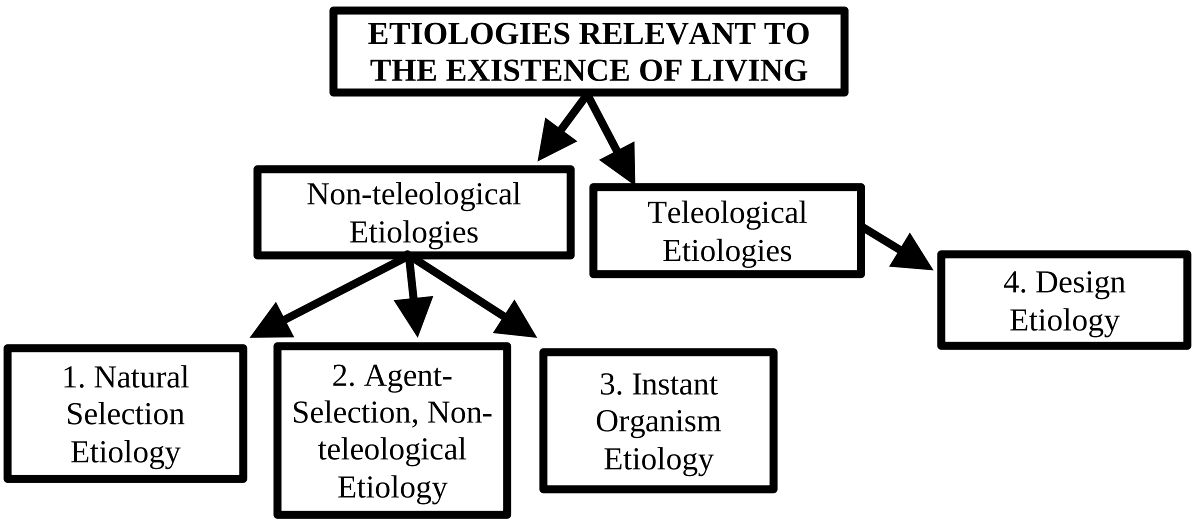

Figure 1. Four categories of etiologies for living things

The above list of the different etiologies is not a listing of all etiological account *of interests*. Rather this list is given in the hopes of identifying all of those etiologies relevant to the existence of living things.

Etiological accounts of interests claim that etiologies are *relevant* to the existence of interests. All etiological accounts of interests reference some kind of causal process that is thought to be responsible for the existence of a thing along with its interests. The causal processes identified are in turn claimed to be relevant in determining whether something produced by that causal process also has interests. In other words, etiological accounts of interests all refer to some kind of etiology to explain why something exists which is in turn claimed to explain why it has interests. They all do so by showing how a thing acquired its interests in the light of the process that brought it about.

An etiological account of the interests of a butterfly, for example, would say that a butterfly has an interest in its structures performing their functions because of the way its structures were produced. Those structures were produced in the same basic way that the butterfly itself was produced. Etiological accounts of interests as a whole do not claim that any one particular etiology is necessary for having interests only that *having* an etiology bears on the question of whether a thing will have interests.

There can exist numerous, etiological accounts of interests that invoke each of these etiologies, but all of these accounts would share a common feature in that they all would make reference to some etiological process for how a living thing was brought into existence.

For the remainder of this section I will explain the above five etiologies. Since biocentrists are mainly concerned with accounts of interests for *living* things my discussion of these etiologies will be limited to a discussion of how those etiologies could have produced living things. I do not, however, wish to claim that the above list is entirely exhaustive. These possibilities are the only ones that I could think of and which seem to be the only ones relevant to the existence of living things. There may be other possibilities but I am not aware of them.

These possible etiologies are 1) a natural selection etiology[86], 2) an agent-selection, non-teleological etiology, 3) an "Instant Organism" etiology, or 4) a design etiology.

So, for example, a natural selection etiology is referenced in all natural selection etiological accounts of interests. All natural selection etiological accounts of interests will make reference to a natural selection etiology in determining whether a living thing has interests. On these accounts the process of natural selection is claimed to be relevant in determining whether a living thing has interests. Anything that has a natural selection etiology and has structures produced by that etiology will have interests in their structures performing their functions. An

[86] Other writers such as Delancey use the term "evolutionary etiological account".

agent-selection non-teleological etiological account of interests, on the other hand, would claim that being the product of that etiology would be relevant in determining whether a living thing has interests. This would go for the other three etiological possibilities.

The first three possible etiologies are what I classify as "non-teleological" or "non-design" etiologies. These etiologies, as opposed to teleological or design etiologies, do not make reference to any intentional forethought, planning or design. That is they are “blind” when it comes to the question of whether a living thing and its structures were planned out in some way in advance. These three possible etiologies are a natural selection etiology, an agent-selection non-teleological etiology and an “instant organism” etiology.

The first etiology, a natural selection etiology, refers to a causal history that explains the emergence of a living thing and its biological structures entirely by recourse to an unguided, natural process involving reproductively-favored, variant organisms produced by random mutations. This type of etiology does not make any reference to conscious agents, be it God or human beings, as the cause for some organism, or its biological structures and their functions. All that is needed is some kind of non-teleological, process whereby some variant organisms are more capable in passing their own genes on to successive generations than others. Nature then non-teleologically "selects" those variants that are more successful at reproducing themselves.[87]

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[87] Natural selection, like all natural processes is blind and undirected. For example, the view that natural selection, a kind of natural process, is “blind” has been espoused by Richard Dawkins when he writes,

> “All appearances to the contrary, the watchmaker in nature is the blind forces of physics, albeit deployed in a very special way. A true watchmaker has foresight: he designs his cogs and springs, and plans their interconnections, with a future purpose in his mind’s eye. Natural selection, the blind, unconscious automatic process which Darwin discovered, and which we now know is the explanation for the existence and apparently purposeful form of all of life, has no purpose in mind. It has no mind and no mind’s eye. It does not plan for the future. It has no vision, no foresight, no sight at all. If it can be said to play the role of watchmaker in nature, it is the *blind* [his emphasis] watchmaker.” (Dawkins, 1986, p.5).

Natural selection involves the work of natural law-like regularities which occur in the form of randomly-generated mutations combined with the unguided selection of favored variants.[88]

Some, however, might claim that *any* kind of natural process could be a process of natural selection.

For example, some might claim that the assortment of rocks along a stream bed were also the product of natural selection. An assortment of rocks along a streambed follows a gradient from large boulders to very small pebbles. This gradation in the arrangement of rocks can easily be explained as an outcome of simple, natural, law-like processes along with some initial condition that occur when water moves over a collection of differently-sized rocks. Over time the rocks are sorted out based on differences in size and weight. But this is not a form of natural selection. Although we might say that the rocks were "selected" based on their size, those rocks were not the result of some prior reproduction and rock are not reproductively-favored variants generated by random mutations. Rocks are not capable of having genetic mutations and do not have offspring at all. Compared to a simple gradient of rocks, living things and their structures are much more functionally complex and integrated. Their structures require some kind of continuous selection mechanism which 'selects' those randomly-produced genetic variants that are more successful of leaving offspring over time. This is why natural selection-type

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The undirected nature of natural selection also has ramifications for what one could predict if the evolutionary history of life on earth could be “rewound” and played again. The aimless contingency of the evolutionary process is famously illustrated by Stephen J. Gould in the preface to his book *Wonderful Life*. He writes,

> “…the ‘pageant’ of evolution [is] a staggeringly improbable series of events, sensible enough in retrospect and subject to rigorous explanation, but utterly unpredictable and quite unrepeatable. Wind back the tape of life to the early days of the Burgess Shale; let it play again from an identical starting point, and the chance becomes vanishingly small that anything like human intelligence would grace the replay” (Gould, 1989, p. 14).

[88] Many biocentrists, including Varner, appeal to this etiology in order to explain the existence of interests relevant to all living things.

explanations for the existence of living things are typically made on the basis of *both* law-like regularity, in the form of numerous, random genetic mutations, *and* some sort of process that selects those genetic mutants that are more successful at reproducing than other mutants.

The second possible etiology for the existence of a living thing is an "agent selection, non-teleological" etiology. This etiology involves one possible way in which all living things could have come about. An etiology of this sort involves selective choices made by an agent but in which those choices were not directed towards some particular specified end by that agent. These etiologies are instances of selection by an agent, but not of *design* or deliberation by that agent. Here is an example of an agent selection, non-design etiology for a functioning system.

> *Tom lives just outside of a parts manufacturing plant. On a daily basis random parts are discarded by the plant through a large, garbage chute. Some of those parts collect in a huge pile from which Tom can remove individual pieces. Tom does not put individual pieces together but only removes some pieces that he thinks are undesirable. Tom decides which parts to remove based on what he thinks is advantageous or interesting at the very moment he makes the choice. Tom has no end goal in mind as to what he wants the final collection of parts to be for. However, by happenstance one day Tom notices that a particular random arrangement of parts allows rainwater to flow into his favorite bucket which he then uses to water his garden. If some part from the plant's chute landed in his pile that either stopped or diverted the rain water away from his bucket he would remove that piece from his collection. When Tom's friends come to visit him Tom explains that the pile of parts is "for collecting rainwater". That is to say its function is to collect rainwater.*

This is a non-teleological account for the existence of Tom's rainwater collector. The important thing to recognize about this etiology is that although Tom's collection of parts was *selected by* Tom, we would not say that the rainwater collector was *designed* by Tom to collect rainwater. Tom had no prior plans to create an object that collected rainwater. And all along the way his selection process did not work toward that particular goal just in the same way that natural selection does not "select" for the fulfillment of some future goal. So although the collection of parts ended up collecting rainwater that collection of parts was not *designed* for that function. This is basically analogous to Richard Dawkins' "Blind Watchmaker". Tom, in this scenario, is not himself acting purposefully *in order to* bring about a rainwater collector as a predetermined structure in accordance with his desires or intentions.

The above example is simply meant to illustrate what a basic agent-selection non-teleological etiology might look like for the existence of a simple, functional structure. But an agent-selection non-teleological account of interests would claim that the existence of interests for a living thing would depend on it being brought about in that sort of way.

The third way in which a living thing could have come about is by recourse to some kind of inexplicable and sudden natural event. This etiology is one of unforeseen and inexplicable happenstance.[89] This is what I will call an "Instant Organism" type of etiology. If it were the case that a living thing, or perhaps even all living things, suddenly sprang into existence by a highly improbable, instantaneous natural event then we can ask if having that etiology would make a difference in whether those things would have interests.

The remaining etiological possibility is teleological.

The fourth, and final, etiological possibility for the existence of a living thing is a design etiology. A living thing could have been the result of some forethought, planning or *design* on the part of an agent. A design etiological account of interests would claim that having a design etiology is relevant to whether a living thing has interests. This etiology makes reference to one or more designers and their intentions or plans in bringing about some living thing and its

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[89] The appearances are also regarded as rather sudden. See Ruth Millikan's discussion in this chapter regarding the mysteriously appearing double or Donald Davidson's (1987) example of "Swampman" in his paper "Knowing One's Own Mind". These are both example cases of "Instant Organisms" that have a nonselection etiology. The primary means of accounting for the interests of "Instant Organisms" is a non-etiological approach. A non-etiological account of interest attempts to define what an interest is independently of whatever etiology or history produced those interests. I critique this view in the next chapter.

biologically-relevant structures and functions.[90]

These seem to be the only possible ways in which a living thing could have come about. Whether *all* living things came about any one of these etiologies, however, is not a question that I will attempt to address. Also, whether an account of interests is also able to establish that the identified interests are *morally considerable* is another matter. In this dissertation I will use the etiologies listed here in addressing the question of whether those etiologies are capable of producing living things that have interests which are morally considerable, that is interests that would give someone a reason to value or care about living things non-instrumentally.

V. Non-etiological Account of Interests

Some biocentrists claim that whether a things has interests does *not* depend on its etiology. Those who accept this basic view appeal to "non-etiological" accounts of interests[91] for living things. Those who embrace a non-etiological account of interests argue that having interests does *not* depend on a things etiology or causal history. Instead they argue that having interests is a matter of having one or more structures that perform integrated functions that work towards the overall maintenance of the whole system in which those structures are found. On these accounts having interests is a matter of having a certain kind of internal organization regardless of causal history.[92]

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[90] In section I of chapter five I provide an account of what being "designed" means.

[91] Before I continue I would like to provide a note of clarification. While there may exist non-etiological accounts *of interests*, there cannot exist non-etiological accounts *of living things*. All living things must have some kind of causal history or explanation for how they were brought about.

[92] I will address non-etiological accounts of biological interests in chapter three and will confine my discussion of non-etiological accounts of interests to those advanced by Delancey and Holm.

If it really is the case that etiology is completely irrelevant in determining whether a living thing has interests then a non-etiological account of interests should be in order if one wants to show that a living thing has interests despite whatever etiology it might have.

With this background knowledge in hand let us return to a discussion of Varner's natural selection account of biological interests, most notably Craig Delancey's criticism of Varner's account.

VI. Craig Delancey's Criticism of Varner's Etiological Account of Interests

Craig Delancey has criticized Varner's etiological account of interests. He thinks that efforts to connect the existence of biological functions[93] to having *interests* in those functions can be problematic. First, Delancey argues that it is possible to discern what an organism has an interest in independently of the organism's etiology. Second, Delancey argues that biological functions, *as Varner defines them*, are not always for the good of the organism.

First, Delancey thinks that a knowledge of what is of interest to a living thing, can be acquired independently of any knowledge of that living thing's etiology or causal history.

For example, Delancey thinks that in order to determine whether an elephant *has an interest* in its trunk siphoning water we would normally only need to invoke a very weakly possibly future event to explain that current interest (such as what the near-future siphoning of water would bring to the elephant). On that basis we can know what *would* be of interest to the

[93] Some have also called biological functions "teleofunctions". They are essentially the same thing since both are used in the literature to refer to functional purposes of organs and subsystems of living things. So, the biological function of the heart is the purpose of the heart which is to pump blood and the teleofunction of the heart is also to pump blood; See Delancey, 2004. A teleofunction is a function that an organism possesses if it both enables and compels possible future events available to the organism bearing it (hence the "teleo"). I will use the term "biological function" and "teleofunction" interchangeably.

elephant. But a thoroughly scientific, natural-selection explanation of the actual historical development of the elephant's trunk invokes a long, causal explanation for why that trunk has that function. An explanation of that sort, however, does not tell us anything about why that function would be *of interest* to the organism. Much of the scientific or Darwinian accounts of biological function simply do not refer to 'very weakly possible future events' in the explanation of present functional purposes. Instead they refer to very ancient states of affairs regarding how those functions arose as a result of a long history of natural selection.[94]

Delancey wants to suggest that having an interest in a structure performing a function is not really a matter of having a natural selection etiology at all.[95] On Delancey's view a plant could have an interest in its phloem transporting sugar even if the phloem's function of transporting sugar were not the product of natural selection.[96] So we could then ask further questions such as "Couldn't a plant have an interest in its phloem transporting sugar even if it's phloem isn't performing a *biological* function but is instead performing some other kind of

[94] Natural selection is a very long process that for all appearances has very little to do with an organisms daily existence or way of life. The history of living organisms on earth is generally thought to span a period of 4.5 billion years. But the lifetime of most plants and animals does not exceed a few hundred years at most. Most speciation events take millions of years to complete, but the lifetime of most individual organisms can be measured in years or decades. Also, natural selection starts with existing living things and preserves those variants that happen to survive. So there is no direction to the evolutionary process. It is important to remember that the mutations that occur in DNA, and which then give rise to the various biological structures found in living things, are randomly generated. Hence, there is no directionality or planning that goes into what will be of biological interest to living things. The ancient mutations that gave rise to the first heart, for example, were themselves random and undirected. These kinds of changes occurred without any concern for what might be or will be of interest to the current or future living things that live on the earth. See also Delancey, 2006.

[95] Or of *any* etiology as we will see later.

[96] I put the term "biological interest" in quotes here because this usage of the term would be in violation of Varner's definition of what a biological interest is. What the term "biological interest" here means is having an interest in some biological structure or sub-system performing a function that is conducive to its self-regulation.

function? Couldn't a plant have an interest in some structure performing a function that it actually doesn't *have* or even that wasn't particularly adaptive for its ancestors?" Or "Couldn't a plant have an interest in its phloem transporting sugar even if it were a plant that had no ancestors at all?"

For Delancey, these questions point to a difficulty for equating biological interests with whatever performs biological functions as defined by Varner. It seems reasonable to think that we can identify what a living thing has (or would have) an interest in (whether we want to call it *biological* or not) regardless of what its selection history was. And if this kind of assessment can be made, then references to etiology are not necessary in order to speak about what is (or would be) of interest to a living thing.

I will call this problem "the problem of etiology-independent interests" in that there can exist instances of structures that perform functions that are in a living thing's interests but that do not or are not required to have any particular etiology in order for those structures to be of interest to a living thing.

Delancey makes this kind of point in a different way. He argues that external, remote explanations that invoke historically-long processes such as natural selection are simply not necessary to explain the actual *usefulness* that a structure can make in the life of an organism. As he puts it,

> "The difficulty with the historical etiological account can be seen in a powerful common sense criticism: it fails to explain how actual field biology works. An ethologist, confronted with a new organism, is not stumped to explain what it is up to in its everyday behavior. Rather, she observes its activities, and ascribes to them purposes based on her understanding of organisms more generally… Biologists and the biological sciences do not posit teleofunctions as historical, external entities, but rather as activities, generally of internal structures, that have *current utility* [my emphasis] to the organism. If we can link a structure with its teleofunction without reference to (distant) history, and if our determining criteria are (or can be) sufficient to explain the existence of the teleofunction, then the

history is not essential to the property of being a teleofunction" (Delancey, 2006, p. 74)

Delancey thinks that this problem can be solved by simply pointing out how an existing structure actually contributes to a system's self-regulation not in how that structure arose by natural selection. He thinks that the functions of structures, their normative functions, are not *essentially* a matter of their history but a matter of how those structure fit together with each other to construct a self-regulating type of system.[97]

Second, Delancey argues that under Varner's account it turns out that there could exist biological functions that are positively, *antagonistic* or harmful to living things. Delancey uses the example of "oncomice" as a real-world illustration of such a problem.

Oncomice are a genetic strain of mice that are artificially bred to be highly susceptible to cancer formations. These mice are used by scientists for cancer research. They contain a spliced gene known as an "oncogene" that facilitates cancerous tumor formation. Mice with the oncogene are purposefully selected by scientists for sexual reproduction. Based on Varner's account, these mice possess a gene with the biological function of producing cancerous tumors because 1) cancer-production is a result of the mouse's oncogene and 2) the oncogene is there because cancer-production was adaptive for the mouse's ancestors.

These mice, according to Varner's definition of a biological function have a gene that has the biological function[98] of cancer-production. Subsequently, we would also have to say that

[97] This is what is known as the "systems-based" account of interests. The "systems-based" account, as I will describe in the next chapter tries to give an explanation for what the normative functions of structures are not as a matter of the history or etiology of those structures or the systems that have those structures.

[98] This function, of course, would be one that was artificially-selected by a lab designer not naturally-selected. Varner's etiological account, however, makes no distinction between artificially-selected functions and naturally-selected functions.

these mice must also have a biological *interest* in their oncogenes producing cancer. They would have an interest in getting cancer. But, it should be easy to understand that getting cancer is not really good for the mouse. Cancerous tumors interfere with other systemic, biologically functional processes that contribute to the overall self-maintenance of the mouse. Thus, under Varner's account it looks like the mouse would have an interest in having an oncogene even though it looks like having an oncogene is not really *in* the mouse's interests. The reason why having an oncogene is not in the mouse's interest is because it interferes with the other biological processes that the mouse needs in order for it to regulate itself.[99]

But these kinds of problems don't just exist for artificially-selected forms of life.

Artificial selection of this kind is just like natural selection in that both of these selection processes are not ultimately concerned with what contributes to, or would contribute to, the health of an individual living thing. This is why there can arise problematic instances of structures or behaviors that are "selected" by these processes but that are not really in the interest of the individual organism that has those structures or exhibits those behaviors. Instead these processes produce organisms for utilitarian purposes separate from their own biological needs or what would be "good for" them. The process of artificially-selecting the oncomouse's gene is a historical, etiological process aimed at breeding and reproducing mice that have a certain kind of gene. They are bred for their utilitarian value. But natural selection does this same kind of thing too! It too "selects" those mutants that happen to be instrumentally better at reproducing their genes than other mutants. Only those organisms that happen to be successful in spreading their genes get to survive.

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99 This, of course, does not mean that cancer formation would be the *only* interest of the mice, merely that cancer formation is one of the things that *would be* of biological interest to the mice. They have other interests, both preference and biological, in addition to this one.

Take the following as an example of how natural selection produces a Varnerian biological function that is not really in the interest of an individual living thing. The gall aphid, *Nipponaphis monzeni*, ruptures its own body wall in order to release its bodily fluids as a means of patching up its plant gall shelter. This results in suicide for the individual aphid. Such a behavior, on Varner's account would have a biological function. As such the aphid would then have an interest in rupturing its own body wall. But this does not appear to be in the individual aphid's biological interests at all.[100]

Elliot Sober, addresses this kind of problem in the following way,

> "For virtually any trait you please, there can be environments in which that trait is selected for, or selected against. Diseases can be rendered advantageous, and health can be made to represent a reproductive cost. And even, if we restrict our attention to historically actual environments, we still encounter difficulties. A perfectly healthy phenotype may be historically nonexistent; *the optimum actually attained might still be some diseased state* [my emphasis]" (Sober, 1980, p. 377).

The "optimum" for the aphid might include a behavior that results in its suicide (if we are to think of suicidal behavior as being sufficiently "disease-like"). Likewise the "optimum" state for an oncomouse might be (or, more strongly, *is*) its possession of the oncogene. The point here is to stress that even if a natural selection etiology produces structures with proper functions it does not mean that those functions are also in the biological interests of the individual living thing. Natural selection ultimately produces living things that are capable of reproducing and spreading their genes. States that happen to be detrimental to or harmful to living things themselves do not matter as long as genetic fitness is not compromised. So individual biocentric flourishing and interests seem to be more of an "afterthought", one that cannot always be squared

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[100] See, "The suicide plasterer's - aphids that repair their homes with their own bodily fluids" from the *Not Exactly Rocket Science* blog (Ed Yong, 02/25/09): http://blogs.discovermagazine.com/notrocketscience/ 2009/02/25/the-suicide-plasterers-aphids-that-repair-their-homes-with-their-own-bodily-fluids/#.U-pubvldWSo

with the findings of evolutionary theory.[101] And if that is the case then naturally-selected proper functions or purposes in themselves cannot be sufficient to account for the existence of interests.

I will call problematic cases such as these instances of "harmful, selected functions" in that under a natural selection etiology there can exist cases of naturally-selected functions that are not in and individual living thing's interests.

Those who would still like to endorse some kind of natural selection etiological account of morally considerable interests might try to find a way of addressing these problems. For example, they could adopt an altered view of Varner's original account of interests, one that prevents harmful, selected functions from making it onto the list of biological functions and thus of what an organism would have an interest in. Such a modified, Varnerian view might be something like the following:

> …an individual *A* has an interest in *X* if and only if
> (1) *A* actually desires *X*,
> (2) *A* would desire *X* if *A* were adequately informed and impartial across all phases of *A*'s life, or
> (3) *X* would fulfill some biological function of some organ or subsystem of *A*, where *X* is a biological function of *S* [an organ or subsystem] in *A* if and only if
> (a) *X* is a consequence of *A*'s having *S* and
> (b) *A* has *S* because achieving *X* was adaptive for *A*'s ancestors and
> (c) the performance of *X* is good for the organism.

The addition of clause (c) under part three of Varner's account of interests could help the natural selection etiologist deal with the problem of harmful, selected functions. For example, since the function of tumor production is not good for the oncomouse, those mice can then be claimed not to have an interest in having the oncogene. On this modified view the oncogene would not have a biological function. Thus, the mouse would not have an interest in producing cancerous tumors.

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101 I expand on this point later in this chapter in my discussion of the "genetic selectionist view"

But such an amended account would still be open to the problem of identifying what is "good for the organism". For example, some might say that having an oncogene could actually be in a mouse's interests after all. They could argue that even though the gene itself reduces the mouse's long-term prospects for self-regulation these mice nonetheless do live longer when compared to the other mice that do not have the oncogene. Supposing that a team of research scientists selectively killed off all mice that did not possess the oncogene it seems reasonable to think that *under these circumstances* having an oncogene really would be good for the organism that bears it. Thus, it would still be the case that an oncomouse would have an interest in producing cancerous tumors after all simply because having that gene enables them to live longer!

On the one hand, it looks like an oncomouse would not have an interest in getting cancer because cancer is detrimental to its overall biological self-maintenance. But on the other hand it looks like there could exist some circumstances under which having an oncogene could be in the mouse's interest after all.[102]

Thus, even on an amended Varnerian, etiological account of interests the problem of the oncogene, as a harmful, selected function, could only be solved if one adopts a particular definition of what the "good of the organism" means.

Another possible problem remains for the amended Varnerian view. It looks as if clause c, taken in isolation, *already* tells us what we need to know about what would be in an

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[102] I will address this problematic case further in the next chapter. Roughly, there is a distinction between what would be in the mouse's "teleofunctional interests" and what would be in (what I call) the mouse's "life-expectancy interests". Basically, having all teleofunctional interests met is much more important to an organism than having all of its "life-expectancy interests" met. Some teleofunctional interests are so vital to an organism that if they were not met the organism in question would expect to have "zero life expectancy" meaning that it would die instantly.

organism's interest. If there exists some structure that is "good for the organism" to have then it would seem rather straighforward to think that having such a structure would be in the organism's interest. If there exists some structure that is "good for the organism" to have, then why think that the organism should meet any *other* condition for it to have an interest? In other words, why think that clauses a and b add of an amended Varnerian account tell us anything *significant* about what would be in an organism's interest? What's the *motivation* for their inclusion?

This lack of genuine motivation seems to be the problem for Varner's account.

Delancey has pointed out that we can know what is, or what would be, in a living thing's interest without having to know anything about its etiology.

Consider the following case as an example of how a structure can have a Varnerian biological function, but that does not necessarily contribute to a living thing's interests. Human beings get “goose bumps” by contractions of small muscles that are located under the skin. These muscles are known as arrector pili and they connect each hair follicle to an underlying layer of connective tissue. When the muscle contracts it creates the characteristic goose bumps seen on our skin.

The contraction of the muscle is its biological function. We inherited the arrector pili muscles from our ancestors who presumably utilized them as part of a defense mechanism. Their arrector pili raised their body hair, which in turn made them appear larger to would-be predators. We inherited that functional characteristic from our ancestors and these muscles perform that function in us because of these past instances of performing that same function. Thus, our arrector pili serve a biological function. But does it follow that we have a biological *interest* in our arrector pili performing this function? More to the point do we have a *need* for that function?

Is the functioning of our arrector pili “good for” us in that sense? Is it "bad for" us? It doesen't look like the functioning of our arrector pili is either "good for" or "bad for" us. So what would *motivate* us to think that we would have an interest in the functioning of our arrector pili? Clauses a and b do not provide this motivation because they cannot give us guidance on what counts as being "good for" an organism and what count as not being "good for" an organism.

VII. Conclusion

As we have seen a natural selection etiology is not a sufficient condition for the existence morally considerable interests. In particular, Varner's etiological account of biological interests is subject to two significant problems.

This account suffers from counterexamples in which some living organism could have a biological structure that performs a biological function that is itself not in the biological interest of the individual living thing that has that structure. The oncomouse rejoinder is the biggest problem for Varner's view. The problem is that there can arise structures that have a selected biological function which fits within an organism’s ancestral heritage, but which the selected function in question might not appear to be in a living thing’s interest.

Varner’s etiological account of biological interests does not distinguish between artificially selected functions and naturally selected functions in terms of what can bring about biological functions. Varner’s account, however, is intended to serve as a natural selection etiological account of biological interests. But as I have previously argued natural selection etiological accounts of biological interests are not sufficient to account for the existence of morally considerable biological interests. Natural selection can produce biological functions that are just as harmful to the organism as any artificially selected biological function.

Thus, a biocentrist should reject this account of interests as a means of grounding the claim that naturally selected functions indicate what a living thing has an interest in.

Because Dalancey thinks that the whole notion of normative functions or purposes of individual living things should be abandoned in light of what evolutionary theory really tells us. He argues instead that functions should be characterized by reference to a “systems-based account”, an account which, according to him, is not one of identifying normative functions based on etiological considerations but merely of functional contribution to some larger system. This account of function makes no references at all to what some structure was "selected" to do based on any past reproductive success but rather to what some structure *is* doing in contributing to the maintenance and further functioning of some larger system of which it is a part. This account of function does not explain *why* some structure exists where it is and has the function it does. Nor does it even attempt to identify the historical or causal processes that could have brought those structure and their functions about. In other words, for Delancey, there is no point in talking about the history of the heart. Instead, we should talk about the actual functional role that the heart plays in the systemic maintenance of the living thing that has it.

At this point the biocentrist trying to find and account of morally considerable interests can choose between one of two options. Either, she can appeal to some other account of interests or she can appeal to a non-etiological account of interests.

In the next chapter I will consider the latter option and its implications.

CHAPTER THREE
The Systems-Based Account and a Definition of Interests

In the previous chapter I highlighted some of the problems for Varner's etiological account of interests. These problems have led Delancey to drop etiological accounts of interests altogether.

Authors such as Delancey and others, have offered an account of what biological functions, or teleofunctions, are that does not define the normativity of functions by recourse to an etiology. For them naturally-evolved structures don't acquire their normative, functional status *because* they evolved by natural selection. Rather normativity of function arises because of the way in which a structure performs a function that is integral to the self-regulation of the entire system of which that structure is a part.

In the first section of this chapter I will provide an explanation of Delancey's non-etiological, "systems-based" account of interests. This account claims that living organisms have interests by recourse to their teleofunctionality not their etiology.

In the second section I will bring further clarification to the definition of interests that I provided in chapter one. I will use this section to present a comprehensive, unified definition of interests. This amended definition will take into account the insights gathered from Delancey's systems-based account.

In the third section I will defend the claim that given Delancey's systems-based account of interests it turns out that *any* teleofunctional system, including any artificially-produced teleofunctional system, would be a candidate for having interests. The systems-based account, if applied by the biocentrist, cannot rule out systems of artificial contrivance as long as those systems are teleofunctional. Specifically it cannot rule out non-biological, artificial contrivances.

If the biocentrist accepts a systems-based account of interests they must also accept the proposition that all teleofunctional systems, whether biological or not, have interests.

In light of the fact that artifacts cannot be excluded from having interests I will, in the fourth section, provide a defense of the claim that the term "biological functions" should be replaced with the term "teleofunctions" and that the term "biological interests" should be replaced with the term "teleofunctional interests" when describing the kinds of functions and interests that belong to *all* living things. Since all living things are teleofunctional systems and all teleofunctional systems have teleofunctional interests in their structures performing their teleofunctions, then the kinds of functions that would be of interest to *all* living thing are teleofunctions. The use of these terms is also consistent with another implication of a systems-based view in that the functions that are integral to the self-regulation of a teleofunctional system need not be specifically *biological* in nature. These functions need not be regarded as "biological" in the sense that teleofunctional structures can belong to non-biological or inorganic beings. Sophisticated robots, for example, could turn out to be teleofunctional systems, even though they are not biological or organic beings.

In the fifth section I will consider some of the criticism's that have been made against the systems-based view of interests. I will argue that all of these criticisms fail to show that all teleofunctional systems do not or cannot have interests. I will also appeal to Sune Holm's response to Varner's criticism. Holm argues that artificially-produced living things have interests regardless of the fact that they were not produced by natural selection.

In the sixth section I will examine some criticisms of the view that artifacts could have interests and provide some responses to the criticisms. In this section I explain the motivating factor that lies behind these criticisms. Arguments against the moral value of artifacts are partially motivated by the basic assumption that whatever is artificial is inferior and that whatever is "natural" is superior. This assumption is motivated by what John Basl calls a "central dogma" of environmentalism. This dogma claims that anything that is artificial or artificially-produced is inferior to what is "natural" or naturally-produced. This distinction is then employed in support of the argument that only "natural" or naturally-produced things can have interests. I will argue that this distinction cannot be maintained because there can exist some natural things that are bad or morally repugnant and other things that are artificial that are good or morally commendable.

In the seventh section I provide a description of the current status of synthetic life research. Here l show that current artificial life research is continually getting closer to generating new, artificial forms of life from scratch. As such the "threat" of artificial forms of life is a reality that is not as far off as some environmentalists might think.

In the eighth, and final, section I conclude that a non-etiological or systems-based view of interests will not help the biocentrist in making any distinction between artificially produced forms of life, naturally-evolved forms of life or "instant organisms" that suddenly "sprang" into existence with regard to whether they have interests. The systems-based account would claim that *all* of these teleofunctional systems have interests. What this means is that the systems-based approach is quite adept at identifying systems that have interests, particularly teleofunctional interests. Whether teleofunctional interests are morally considerable is another question, one that I will address in the chapter four.

I. Delancey's Systems-Based Account of Interests

According to a natural selection etiological account, the functional *norms* of naturally-selected structures are not specified by reference to the ongoing, systemic, integral role that those structures play in the self-regulation of a larger system. All that is needed is that the structure in question be a reproduction inherited from an ancestor that had that same structure and where that structure was previously adaptive. But on a systems-based view, functional norms for structures are specified by the integral, functional roles that those structures actually play in the overall self-regulation of some larger system of which they are a part.

According to Delancey, an integral function that contributes to a system's overall self-regulation is known as a *teleofunction*. A teleofunction is a function performed by some structure that is itself part of a whole system of other structures that all work together to bring about a living thing’s self-maintenance and regulation.

Delancey prefers to use the term “teleofunction” instead of the term "biological function" as used by Varner. He departs from the use of the term "biological function" largely because biological functions are defined on the basis of their etiology. Delancey thinks that teleofunctions do *not* depend, and hence should not be defined, on the basis of, their etiology. But, just as Varner thinks that biological functions are normative, Delancey also thinks that teleofunctions are normative.

Many writers use the terms “biological function” and “teleofunction” interchangeably. But Delancey uses the term *teleofunction* to emphasize of an important aspect of its connection to interests, namely that teleofunctions serve the needs of living things, most notably their need for self-regulation and maintenance. Varner, on the other hand, attempted to define biological functions in purely etiological terms not in terms of a living thing’s self-maintenance. In the second section of his paper “Teleofunctions and Oncomice” Delancey writes,

> “To make sense of the notion of an organism having purposes arising from its own biological form, we need to identify what it is for that organism to have

> *teleofunctions* [his emphasis] (I use the term from here on to avoid any confusion with the use of function in its other senses, and to recognize that such functions need not be biological). Let us suppose that one of the teleofunctions of a mouse is foraging, and that a mouse cannot flourish if it cannot forage (or at least play at foraging). We might say that the mouse “wants” to forage, but doing so is likely to obscure the issue. The claim is not that the organism must have a mental state to have a teleofunction. Rather, although the mouse may indeed desire (e.g., have some affective state which drives it) to forage, the point is that the life of a mouse under normal conditions is in part composed of foraging, and that the organism *cannot have a full life without foraging* [my emphasis].” (Delancey, 2004, p. 173)

In this passage Delancey links teleofunctions not just to what a living thing in some sense “wants” (nonconsciously) to do, or to those functions that its structures actually perform, but to what would bring about a “full life” for the living thing. I take it that Delancey is saying that unless an organism performs its teleofunctions that it will not have a full life.

There can exist some biological functions that are not teleofunctions. The arrector pili is an instance of a structure that has a biological function, but since it is not situated in the context of the organism's overall self-maintenance, it might not be entirely appropriate to call the function that it performs a teleofunction. The arrector pili in human beings is not necessary for their continued self-maintenance.[103] In other words, I want to suggest that what is *clearly* a biological function is not likewise clearly a teleofunction. The arrector pili's function is a case in point.

We should also be aware that a full life does not *only* consist in the performance of teleofunctions. The proposition that Delancey wants to advance is only that the performance of teleofunctions is necessary for such a life. For example, there are certain reproductive behaviors that upon inspection are not themselves teleofunctional. They do not contribute to the self-regulation of the system that performs those behaviors. But they are still *necessary* for what we

[103] Although it could have been necessary for the self-maintenance of the *ancestors* of human beings.

might think would be a full life. For example, the behavior of a bird laying an egg is not itself a teleofunctional behavior. Laying eggs does not contribute to the individual bird's self-regulation. Yet laying eggs is nonetheless something that is in the bird's interest to do. It is good for the bird to lay eggs because it is good for the propagation of its species.

In any event Delancey is, I think, identifying a necessary condition, although not a sufficient condition, for what having an interest should mean. When it comes to teleofunctions it means performing functions that meet the necessary requirements for one's own self-maintenance. Without these requirements being met an organism cannot live a full life nor could it reproduce. If those requirements are met then the organism benefits in some way.

Structures that perform teleofunctions, are what Delancey calls *teleofunctional structures*. Living organisms are comprised of numerous, teleofunctional structures. These structures allow living things to regulate themselves along a wide array of physiological parameters. The kinds of systems that possess numerous, teleofunctional structures are what I call *teleofunctional systems*. Living organisms would, thus, be prime examples of teleofunctional systems.

Delancey describes living things as instances of self-regulation in the midst of unpredictable, external conditions. Living organisms are teleofunctional systems because they involve a great number of diverse, interconnected structures, teleofunctional structures, that all function in tandem with one another to keep the organism alive.

He writes,

> "An organism is a complex system that has certain capabilities which we identify as teleofunctions because they maintain certain features of the system. Prima facie, biological organisms are adaptive and self-organizing complex systems. The notion of a self-organizing system is not, unfortunately, very easily defined. But we do not need it to be. What matters instead is that such systems do exist, and that biological organisms are surely examples of them. That such systems exist is most obvious when we consider homeostasis, a necessary feature of any complex self-organizing system. The process of evolution produces systems

> which act in their environments in a way that maintains a stable range of values on many parameters of the organism: body temperature, water levels, physical integrity (e.g., some avoid being broken in two), and many others. These homeostatic functions are in part demonstrable in a simple empirical way. Given the opportunity to drink water, many organisms will do so in a way that maintains a range of the quantity of water in their bodies. Many organisms maintain a constant narrow range of body temperature, and many also, when given the opportunity to walk along a temperature gradient, will seek a place that allows them easy thermoregulation, and so on. Of course, all organisms depend upon their environment for stability on some dimensions. Thus, some organisms will eat too much food if food is available in excess of what would normally be the case in their environment. Organisms also have limited abilities to respond; they can only travel a particular distance, or thermoregulate in a particular range of external temperatures, etc. But within certain parameters, which can be expected to be close to those in which they evolved, organisms demonstrate homeostasis for much of their lives…the relevant parameters will only be maintained in particular ranges which we can in principle empirically identify (a mouse heated to 200º centigrade is not going to thermoregulate, or maintain its internal water levels, and so on); we can identify independently the ranges of environmental conditions in which the organism will succeed in various kinds of homeostasis. Conversely, we can know as an experimentally demonstrable fact that an organism will die if it does not stay in these ranges" (Delancey, 2004, p. 181).

This, for Delancey, illustrates a hallmark feature of a system that is teleofunctional. It is its ability to regulate itself in the environment in which it is found.

But that is not all. Delancey thinks that teleofunctional systems must be *complex*. This means that a teleofunctional system must contain *numerous*, teleofunctional structures in order to count as teleofunctional.

> "…we identify those systems as having teleofunctions that have components which operate not as a simple, but rather as part of *complex*, [my emphasis] application of laws of nature…Certain structures perform activities which support other structures of the organism and their activities, which in turn, typically very indirectly, support that original structure or other instances of that kind of structure. That is, many of the parts of an organism are supporting each other – that is an essential part of what it is to be a self-organizing *complex* [my emphasis] system" (Delancey, 2004, pp. 182-183).

So a teleofunctional system must have a certain amount of complexity before it can be capable of regulating itself to at least the same degree as living organisms can.

Delancey also thinks that there should be a certain amount of *functional independence* between the parameters regulated by the teleofunctional structures that a complex system has. This independence is not absolute but rather involves partially-overlapping processes that, while independent from each another to some degree, still support each other in other ways. As Delancey writes,

> "Another way of recognizing that a teleofunctional system must be complex is to note that the parameters that we identify as demonstrating the effects of teleofunctions need to be, to some degree, *independent of each other*[104] [my emphasis]." Delancey, 2004, p. 182)

But what relevance does Delancey's notion of systems that are teleofunctional have to do with the claim that those systems have interests?

A straightforward answer is found in understanding the vital role that teleofunctional structures play in the self-regulation of a teleofunctional system.

According to Delancey's systems-based account, a living thing has, or would have, an interest in its teleofunctional structures performing their teleofunctions, those functions that are integral to its self-regulation.

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[104] Here Delancey footnotes p. 273 of Ernst Nagel's paper "Teleology Revisited: Goal Directed Processes in Biology" in which Nagel gives an illustration of this kind of independence. For instance, water maintenance in human beings is achieved by dual processes that are teleofunctional. The kidneys absorb water from the bloodstream while the muscles and skin of the body release stored water into the bloodstream. The variable for the amount of water that the kidneys absorb and the variable for the amount of water that the muscles and skin release are in Nagel's words "independent of (or "orthogonal" to) each other, in the sense that within certain limits the value of either variable at a given moment is compatible with *any* value of the other variable at the *same* moment." Kidneys indirectly contribute to healthy muscle and skin by removing the body's waste products (thus keeping the body alive) and the muscles and skin indirectly contribute to healthy kidneys in that they move the body and protect the body which also function in keeping that body alive. But many more subsystems can be at work. As Nagel further writes,
"Although in this example the goal is the product of a homeostatic mechanism, and only two variables were assumed to be relevant to the realization of the goal, the analysis can easily be generalized to cover other types of goal-directed processes involving any number of variables" (Nagel, 1977, p. 273-274).

For example, we can say that a plant, has an interest in its leaves gathering sunlight *because* its leaves are teleofunctional structures. Its leaves are structures that are functionally integrated into the whole, complex, teleofunctional system that is the plant itself. The leaves of the plant have the teleofunction of absorbing sunlight which in turn contributes to the plant's production of sugars which in turn contributes to the plant's ability to make more leaf tissue along with others tissues that it needs. Absorbing sunlight is good for the plant. It is vital to the self-regulation of it. If the plant's leaves were severed from it then those leaves would be incapable of contributing to the plant's overall self-regulation. The plant would thus be harmed if its teleofunctional structures were to be damaged or removed. Thus, the plant *has an interest* in its leaves performing the teleofunction of gathering sunlight.

On this view teleofunctional structures have normative functions, functions that in some sense they are "supposed to" perform or "have the purpose" of performing in that if they fail to perform these functions the teleofunctional system as a whole will not regulate itself and hence will either become diseased or die. As Delancey writes,

> "…teleofunctions are had by structures that perform certain kinds of sustaining activities in kinds of systems. Their *normative nature* [my emphasis] comes from the fact that (portions of) the systems that they constitute cannot exist or continue without those activities. Systemic teleofunctions have a kind of *normative force* [my emphasis] then akin to a Kantian hypothetical imperative. The structure in question *should* [his emphasis] do such and such activities *in order to* [again, his emphasis] maintain (some portion of) the complex system to which it belongs" (Delancey, 2006, p. 80)

So on Delancey's view teleofunctional systems, of which living organisms are the prime example, have interests because those systems have teleofunctional structures that have functional purposes of contributing to the life and self-regulation of the system itself.

II. Further Clarification on the Definition of Interests

With the above understanding of what a teleofunctional system is and why it has interests I will now turn to a discussion about the definition of interests that was previously presented in chapter one. In this section I will attempt to provide a comprehensive definition of what an interest is.

In chapter one I defined an interest as:

> X has[105] an interest in Y (Y is an interest of X's) if and only if Y is good for X where "Y is good for X" means that:
> 1) If X does not have Y then X is harmed and 2) If X has Y then X is benefited.[106]

Some at this point may wish to object to the notion that having interests means being capable of being harmed or benefited because there can exist some things that can be harmed or benefited but that do not seem to have interests. A clock, for example, can be harmed if someone damages its springs. But this does not mean that the clock has interests. If we go by the previous definition of what constitutes having interests we would have to say that clocks have interests because it is something that can be harmed.

So how exactly can this problem be solved? I want to suggest that relatively simple objects such as clocks are not capable of being harmed in a kind of way that other things that do have interests can be. Since things like clocks cannot be harmed in this way they do not have interests.

Teleofunctional systems are capable of being harmed in a way that is distinctively different from other kinds of objects such as clocks. Teleofunctional systems, unlike most artificial contrivances, must engage in numerous, internal, self-regulating processes that if

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105 Non-psychologically 'has'.

106 Please see the definition of interests in section VII of chapter one for particular examples of how this definition applies to cases of harm and benefit.

interrupted cause either a complete cessation of their self-regulation or a substantial impedance in their ability to self-regulate. Clocks, it might be suggested, have a number of self-regulating structures, but they do not have *numerous*[107] structures. Hence, they are not teleofunctional. Teleofunctional systems are the kinds of systems that can be harmed in this way. They are harmed whenever one of their numerous, teleofunctional structures are damaged. This kind of damage results in its *self-regulation* being either diminished or destroyed altogether.

For example, if someone were to damage a teleofunctional system such as a single cell by puncturing its membrane, that organism would suffer from an inability to regulate various physiological parameters that contribute to its self-regulation. The puncturing of its membrane would cause, for instance, further changes in its effectiveness at maintaining its own internal osmoregulation or in its ability to synthesize DNA. These changes would immediately affect the cell's overall ability to maintain its self-regulation. The cell can be harmed in such a way that if one of its teleofunctional structures or parts were damaged it would either be incapable of maintaining its own self-regulation or its self-regulation would become greatly restricted or impeded in some way (in a case, for example, in which one of its genes were to be removed).

This kind of harm is what I call *systemic harm*. Systemic harm as an instance of a harm that brings about either an impedance of a teleofunctional system's self-regulation or a complete cessation of that system's self-regulation. Clocks and everyday ordinary objects cannot be systemically harmed because they are not teleofunctional systems. They do not engage in numerous, integrated self-regulatory processes. They cannot be harmed in this way because they are not teleofunctional systems.

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[107] Exactly how "numerous" the structures have to be in order for a teleofunctional system to be capable of self-regulation I do not know. I do know that the number of structures that go into the makeup of the simplest forms of life is at least in the thousands, if not hundreds of thousands.

Teleofunctional systems can also be subjects of *systemic benefit*. A systemic benefit is a kind of benefit that *sustains* the overall, self-regulation of all aspects of the teleofunctional system but does not positively enhance that system's growth or self-regulation beyond what is necessary for its self-regulation. A properly-operating proboscis, for example, brings about a systemic benefit to the butterfly. It systemically sustains the life of the butterfly as a whole self-regulating system by delivering nectar to it. The proboscis sips nectar and nectar is a rich food source for the butterfly. This food source is then utilized by the butterfly to maintain its biological integrity and self-regulation in numerous ways. If the butterfly's proboscis were to be damaged then it would not receive a systemic benefit but would instead be systemically harmed.

To that end I would like to provide a replacement for the previous definition of interests provided in chapter one that is able to account for the existence of interests of all teleofunctional things.

> X has an interest in Y (Y is an interest of X's) if and only if Y is good for X where "Y is good for X" means that:
> 1) If X is denied Y then X is *systemically harmed* and 2) If X is not denied Y then X is *systemically benefited*.

All living things have an interest in avoiding systemic harm and in acquiring systemic benefit. Teleofunctional systems, like all living organisms, are systems that are capable of being systemically harmed and benefited and so on the above definition all systems of this type will have interests.

But there might be other interests besides these interests that a teleofunctional system can have. For example, there can exist cases were something, Y, can be good for X but in which if X were denied Y, X would not be systemically harmed but would be benefited in some way other than a systemic benefit. For example, a little bit of extra fertilizer might be good for a plant. But if the plant is *denied* that little bit of fertilizer it is not systemically harmed. A little bit of extra fertilizer, does contribute beyond what is necessary for the plant's growth and self-regulation. So it seems reasonable to think that the plant has an interest in receiving a little bit of extra fertilizer.

That little bit of extra fertilizer, however, does not systemically benefit it. Instead the plant is benefited in a different way, in such a way that we might say that the plant is "enhanced" by a little bit of extra fertilizer. The plant has an interest in being enhanced in this way. Even though a little bit of extra fertilizer does not systemically benefit it, it still has an interest in it. So it looks as if the plant really does have an interest in getting a little bit of extra fertilizer.

What might we call *these* kinds of interests?

I will term these kinds of interests "systemic enhancement interests". A "systemic enhancement interest" is an interest in receiving what is beneficial above and beyond what is necessary for the overall self-maintenance and regulation of a teleofunctional system. If a plant does not receive a little bit of extra fertilizer it is not harmed in any way, either systemically or otherwise. But if it does receive it, it is benefited in such a way that its growth and self-maintenance are enhanced. I will call this kind of benefit a "systemic enhancement". All teleofunctional systems that receive something that brings them a systemic enhancement are *systemically enhanced* by that thing.

To that end I provide the following definition of what a systemic enhancement interest is.

A systemic enhancement interest is an interest in acquiring a systemic enhancement.

Let us call the type of interests that all teleofunctional systems have *teleofunctional interests.* All teleofunctional systems have an interest in avoiding systemic harm, acquiring systemic benefit and in acquiring a systemic enhancement.

To that end I would like to provide the following as a definition of a teleofunctional interest:

> X has a teleofunctional interest in Y (Y is an interest of X's) if and only if Y is good for X where "Y is good for X" means that:
> 1) If X is denied Y then X is *systemically harmed* or 2) If X is not denied Y then X is *systemically benefited* or 3) If X is not denied Y then X is *systemically enhanced*.

From the standpoint a teleofunctional system it is much more important for it to receive a systemic benefit than it is for it to receive a mere systemic enhancement. For example, it is more important for a plant's phloem to transport sugar properly than it is for that plant to receive a little bit of extra fertilizer. If its phloem cannot transport sugar properly then the plant will die. But if a plant is denied a systemic enhancement in the form of a little bit of extra fertilizer the plant will not die. The plant in all likelihood will continue to live and thrive. It only means that the plant will not grow more than it might have otherwise.

Avoiding systemic harm and acquiring systemic benefit are *essential* to the overall self-regulation of a teleofunctional system. Those teleofunctional interests in avoiding systemic harm and in acquiring system benefit are thus what I will call "essential, teleofunctional interests".

Acquiring a systemic enhancement, however, is not essential to the overall self-regulation of a teleofunctional system. A little bit of fertilizer, for example, is not essential to a plant's self-regulation. A plant can continue to maintain itself if it is not given a little bit of extra fertilizer. Thus I will call the teleofunctional interest in receiving a systemic enhancement a "non-essential, teleofunctional interest". So, this means that all non-essential, teleofunctional interests are systemic, enhancement interests.

All living things have both essential and non-essential, teleofunctional interests. I, however, will not specifically refer to non-essential, teleofunctional interests in my discussion of the biocentric case for inherent worth. Biocentrists are more concerned with what can damage or kill a living thing or reduce its effectiveness at maintaining its own basic integrity than in what might bring it a systemic enhancement. A little bit of extra fertilizer might be in a plants teleofunctional interests, but for the biocentrist it is more important that the plant not die or be subjected to a reduction in its overall self-regulation.

The above definition of teleofunctional interests should not be interpreted to mean that there cannot exist *other* interests besides teleofunctional interests. The above definition of interests, however, is meant to apply to all *teleofunctional* beings. And since all living things are teleofunctional things the above definition applies to all living things.

Indeed there are other interests, besides teleofunctional interests, that can belong to some, but not all, living things. An example of such an interest would be a "preference interest".[108] Preference interests belong to psychological beings such as ourselves that are also teleofunctional, in that we are capable of having psychological states such as desires or wants in pursuing various projects. Having a preference interest means at least having intentions, plans, forethoughts or goals. And since only psychological beings can have preference interests, only psychological beings can have intentions, plans, forethoughts or goals. But not all living things are psychological beings. A plant, for example, has no psychological states such as desires.

On the other hand, my dog is a psychological being. He is capable of having psychological states such as desires or wants for various things. For instance, to say that my dog has[109] an interest in going outside is to say that my dog *desires* to go outside, or that he "purposes" to go outside or that my dog intends to go outside. And I can tell that he has this desire or intention by observing his attentive stare and waging tail. My dog intends to go outside in large measure because he gets some happiness out of it. Likewise, a person can have a

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108 Preference interests, also known as, 'desire interests' were previously discussed in the section II in chapter two.

109 The use of the term "has" in this paragraph means having a certain preference or desire. On this understanding, my do dog *psychologically* has an interest.

preference interest in writing poetry and intend to write poetry. All else considered equal it is wrong to prevent a being from pursuing their own intended purposes especially if pursuing those purposes makes that being happy. Likewise, if I were to prevent my dog from fulfilling his intention to go outside, and such an intention of his is not in conflict with any other beings' interests, such an action would be wrong. On the other hand, it would be right to allow my dog to fulfill his intention of going outside, again assuming that his going outside would not interfere with some other being's interests.

We can then provide a definition of preference interests as:

> X has a preference interest in Y (Y is a preference interest of X's) if and only if X intends to bring about Y and Y is good for X where "Y is good for X" means that: 1) If X were denied Y then X would be non-systemically harmed or 2) If X were not denied Y then X would be non-systemically benefited in some way.

Instances of "non-systemic harm" might include things such as anxiety, frustration, depression, sadness, anger, being deceived, being insulted, etc. These kinds of harm come about whenever a person's desires, intentions or plans are frustrated. Instances of "non-systemic benefit" might include things such as happiness, contentment, elation, satisfaction, etc. These kinds of benefit come about by the fulfillment of a person's desires, intentions or plans.

The basic problem for this definition of preference interests is that there can exist some cases where a person may have a *preference* in undertaking an activity that is actually *bad* for her. An example of this is illustrated by Gary Varner in his description of the case of "Maude". He writes,

> "…consider the case of Maude, an unusually intelligent and generally farsighted young adult who has a strong desire to smoke. Concerned for her welfare, we bring to her attention the fact that the best available evidence indicates that this smoking will shorten her life by a certain number of years. Suppose that Maude really takes this fact to heart, that the consequences of her conduct are accurately foreseen and adequately realized in her imagination at the present time, but that she nevertheless goes right on smoking…[but] Maude's smoking is *bad for her* [my emphasis] – that is, that it is contrary to her interests" (Varner, 1998, p. 58).

What Varner is saying here is that some of our preferences or intentions might not be consistent with what is actually *in* our interests. The reason why Maude's consummate smoking is bad for her is because it could lead to systemic harm to her body. That is, her preference interest in smoking is contrary to her teleofunctional interests. Smoking causes lung cancer, emphysema and other health-related problems that are not good for her lungs. Her lungs are teleofunctional structures that she has (non-psychologically 'has') a teleofunctional interest in performing their teleofunctions *even if* she happens to have (psychologically 'have') a desire to smoke or even if she happens to have a psychological aversion to smoking. In other words, a person's *preferences* are not always consistent with their *teleofunctional interests*. Even if we were to say that Maude "had a preference" in smoking it would still be the case that smoking really is not *in* her interests in that she would actually be *systemically harming* herself regardless of whether she had a psychological preference to smoke or not.

So on this understanding we can say that Maude might have a *preference* in smoking, but she does not have an preference *interest* in smoking.

With this information in mind I propose the following definition of a preference interest.

> X has a preference interest in Y (Y is a preference interest of X's) if and only if X intends to bring about Y and Y is good for X where "Y is good for X" means that: 1) if X were not denied Y then X would not be systemically harmed by Y *and* 2) if X were denied Y then X would be non-systemically harmed.

Given this definition of a preference interest we can construct a definition of interests that unifies our understanding of both preference interests and teleofunctional interests, one that can also handle the case of Maude. This definition is the following.

> X has an interest in Y (Y is an interest of X's) if and only if Y is good for X where "Y is good for X" means that:
> 1) X has a teleofunctional interest in Y or 2) X has preference interest in Y where a) if X were not denied Y then X would not be systemically harmed by Y and b) if X were

denied Y then X would be harmed non-systemically.

This definition would claim that Maude does not really *have* (non-psychologically) an interest in smoking because the proposition “Smoking is good for Maude” means that "Maude has a teleofunctional interest in smoking *or* Maude prefers smoking where if Maude is not denied smoking then Maude is not systemically harmed by smoking *and* if Maude were denied smoking then she would be harmed non-systemically." The first disjunct of that statement is false. Smoking is not a teleofunctional interest of Maude's because it causes her systemic harm. The second disjunct of that statement is also false because on the above definition Maude does not have a preference interest in smoking. She does not have a preference interest in smoking because if Maude is not denied smoking then it is not the case that Maude would not be systemically harmed. Maude would be systemically harmed. Since both of these disjuncts are false, the entire disjunctive statement is false. Thus, it is also false that "Smoking is good for Maude" which means that Maude does not have a preference interest in smoking which also means that she does not have an interest in smoking.

There may also exist still further interests beside teleofunctional interests or preference interests.

There exists another type of interest which also belongs to some, but not all, living things. This type of interest belongs to beings which are capable of feeling pain or pleasure more generally. Beings that are capable of feeling pain or pleasure are what I call "sentient beings"[110].

[110] The use of the term "sentient" here may be somewhat non-standard. Sentience is generally defined as the ability to have some perceptual awareness. The Merriam-Webster dictionary defines sentience as "the ability to feel, perceive or experience subjectively". But there can exist some beings that might be capable of having some perceptual awareness but that are not capable of experiencing pain. For example, jellyfish seem to have some rudimentary perceptual awareness but they do not have experiences of pain. Nonetheless I will use the term "sentient beings" in this dissertation to refer to those beings that can have experiences of pain or pleasure.

Sentient beings "have an interest" in avoiding experiences of pain and/or pleasure.

Most, if not all, psychological beings are also sentient beings. But not all sentient beings are psychological beings because some sentient beings cannot experience the same kind of non-systemic harm such as distress, anxiety, sadness, etc. that psychological beings can experience. Nonetheless they can experience pain that is more commonly associated with being physically harmed or damaged. For instance, some invertebrate animals are incapable of having intentions or goals for various things yet are still capable of experiencing pain. Even though these beings do not have preference interests, because they do not have desires, they do have interests in *avoiding pain*[111]. They have an interest in not experiencing pain. I will call all instances of an experience of pain "sentient harm" and instances of an experience of pleasure "sentient benefit". Pain causes sentient harm to sentient beings. Sentient harm and sentient benefit are types of non-systemic harm and non-systemic benefit respectively.

Let us call these kinds of interests, interests in avoiding pain, *sentient interests*. All beings that are capable of experiencing pain or pleasure have a sentient interest in not experiencing pain and a sentient interest in experiencing pleasure. All else being equal experiences of pain are bad for them and experiences of pleasure are good for them.

Some living organisms are capable of having sentient interests and teleofunctional interests, but not preference interests. A crab, for instance, has a sentient interest in avoiding pain. It is good for the crab to avoid that pain.[112] But it also has a teleofunctional interest in

[111] I'm using the term "avoid" here in non-psychological terms. Many animals that can experience pain try to "avoid" it by behaving in various ways to get away from the perceived source of the pain. The ability to detect and perceive potential sources of pain is known as "nociception". See, for instance, "Pain experience in hermit crabs" by Elwood and Appel, 2009.

[112] Some might argue, however, that the crab "prefers" to avoid pain. This use of the term "prefer" does not make reference to psychological states such as desires or intentions. On my definition of what it means to have a preference, however, crabs do not have preferences because

keeping all of its legs intact. If one of the crabs legs were to be removed the animal would experience systemic harm in the form of having one of its teleofunctional structures removed. It would become less efficient at maintaining its own self-regulation.

Other living beings are capable of having teleofunctional, sentient and preference interests. This is especially true for many of the higher forms of life. For instance, if someone were to cut my hand off I would experience pain. I would experience the physical pain of having a body part damaged. Thus I have a sentient interest in keeping my right hand. But I would also experience some psychological distress or anxiety if my right hand were removed. I intend for my hand to remain attached to my body. Thus, I also have a preference interest in keeping my right hand attached to my body. But I also have a teleofunctional interest in keeping my hand attached to my body. If my hand were cut off I would be the subject of a systemic harm in that the removal of my hand would cause me to be less efficient at maintaining my own self-regulation. I would, for instance, be less efficient at feeding myself or at managing other daily activities.

Still other living things have teleofunctional interests but not sentient interests.

This is true of many of the lower forms of life found in nature that are incapable of experiencing pain at all. I will refer to all beings that are incapable of experiencing pain or pleasure as well as being incapable of having desires or preferences "non-sentient" beings. Plants, for example, are non-sentient beings. They are incapable of experiencing pain or of intending various states of affairs to come about. So these beings cannot have sentient interests nor preference interests. But they do, however, have teleofunctional interests. In fact *all* living

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they do not have desire-like psychological states. In order to have a preference one must be a psychological being.

things have teleofunctional interests.

With the final addition of sentient interests we can further amend the above definition of interests. This *unified definition of interests* is the following.

> X has an interest in Y (Y is an interest of X's) if and only if Y is good for X where "Y is good for X" means that:
> 1) X has a teleofunctional interest in Y or 2) X has preference interest in Y where a) if X were not denied Y then X would not be systemically harmed by Y and b) if X were denied Y then X would be harmed non-systemically or 3) X is not a psychological being and Y brings about an experience of pleasure for X.

For the remainder of this chapter I will refer only to teleofunctional interests and specifically only *essential*, teleofunctional interests. All teleofunctional systems, including all living things have essential, teleofunctional interests. These systems are all comprised of numerous, teleofunctional structures that must function properly if those systems are to maintain their own self-regulation and avoid systemic harm. In the next chapter I will address the question of whether any of the interests mentioned in the above unified definition are also morally considerable.

III. Artifact Inclusion

As I have previously documented, some biocentrists what to argue that all artifacts cannot have interests. Given Delancey's systems-based account of teleofunctions we can then inquire as to whether that account will serve a biocentrist's attempt to ground the existence of interests for all living things while at the same time excluding them from human-designed artifacts.

It turns out that it cannot.

Delancey himself thinks that it is *possible* for there to exist other teleofunctional systems besides living organisms such as human artifacts that can have interests. But he argues that since living organisms seem to be the only, or at least the primary, examples of teleofunctional systems in existence *biocentric individualism* should still hold and that there is no need to invoke a broader "teleocentric individualism" that acknowledges the interests of *all* teleofunctional systems be they biological or not. In a footnote he writes,

> "...we might best amend [sic] the term biocentric individualism to something like *"teleocentric individualism,"* [my emphasis] but since I argue...that there are as yet no known nonbiological systems with the kind of complexity that I believe is needed for interests, my concern remains biological organisms, and I continue to use the established term of biocentric individualism." (Delancey, 2004, p. 173)

I argue that this basic position, although advanced for perhaps pragmatic reasons, cannot ultimately be maintained.

The systems-based approach allows that some possible future artifacts could be regarded as having interests if those artifacts are teleofunctional systems. While it is true that many currently-existing, human-designed artifacts are nowhere near as complex as even the simplest of living creatures, and thus could not be regarded as teleofunctional, it is true that many artifacts could have numerous, structures and subsystems that perform teleofunctions that contribute toward their self-regulation. Thus, human-designed artifacts *could* become complex enough to be teleofunctional.

The prospect of future-designed technologies makes it more probable that even greater levels of complexity, and quite possibly teleofunctional complexity, can be achieved by human beings. As such there can be no *fundamental difference* between a possible, future teleofunctional artifact and a living thing when it comes to the question of whether they would both be possessors of teleofunctional interests. Delancey himself recognizes this when he writes,

> "There is no in-principle distinction between plants and any possible artifact. But it is a contingent fact that there is no earthly artifact that is as complex in the appropriate ways as even the most basic organisms. The self-regulating features of even our most complex machines are incredibly simple compared to those of a bacterium. The greatest successes of AI fail to manage to recreate the autonomy and motor competency of a small insect – arguably even of a single-celled organism…it is empirically true that there is a profound difference between a

> plant and any present human artifact; however, the difference is merely contingent, since future artifacts might be so complex…*I consider it acceptable that some future machine, with highly complex self-regulating capacities, may have teleofunctions* [my emphasis]. Furthermore, note that the criterion that appears to rule out artifacts in the evolutionary etiological account – the ability to self-reproduce – is one which future artifacts may have…It is not that an *exogenous* [my emphasis] cause for the existence of some structure rules out its operation being a teleofunction" (Delancey, 2004, p. 184)

The criteria that Delancey advances for identifying teleofunctional systems could reasonably apply to artificial, biological systems, such as "synthetic organisms", to non-biological systems, such as sophisticated robots, or to naturally-evolved organisms.

For instance, take the example that Delancey uses of the mouse "heated to 200° centigrade"[113]. It is possible for us to independently identify the range of temperatures that a naturally-selected mouse can tolerate. We know that mice cannot tolerate such thermal conditions. But we could do the same thing for a sophisticated teleofunctional robot's central processing unit. We can independently identify the ranges of temperatures that it can tolerate too. We know that both the robot and the mouse cannot tolerate being heated to that temperature. We could do the same thing for a lab-designed, artificial mouse, one that is biologically identical to a naturally-selected mouse. A synthetic mouse that mimics natural mice in every way is just as subject to the damage of a 200° C fire as a non-synthetic, naturally-selected mouse. Hence, we can independently and objectively identify the environmental conditions that are good for any teleofunctional system be it an artificial cell, a sophisticated robot or a naturally-selected living thing.

According to Delancey, a teleofunctional system must be complex so that it can maintain its own internal, *self-regulation*. There are some currently-existing, designed systems that fit that

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113 See the previous quote from Delancey on page 7 of this chapter.

description. An example of such a system is a high-wattage amplifier. Amplifiers are designed in accordance with the known laws of physics regarding electricity, conductivity, electromagnetism, etc. to be capable of maintaining their own internal temperature. Many high-wattage amps are capable of generating enough heat to damage their own internal components. As such they require the assistance of mounted fans that switch on and off in response to these conditions. The fan cools the interior of the amp which in turn keeps the internal circuitry of the amp functional which in turn keeps the fan operating properly. If these parts are damaged the amp will not function properly.

But are systems like amplifiers really *teleofunctional*? Most likely Delancey would not think so. Although designed contrivances such as amps are arguably simple and unsophisticated *compared to* complex, living organisms, they nonetheless illustrate the prospect that teleofunctional capacities could exist for possible future-designed systems.

Let us take it for granted, however, that there simply are no currently existing human-designed artifacts endowed with what Delancy calls "*highly* complex self-regulating capacities". For instance, some may say that objects such as amps are 'complex' in some sense but not 'highly complex'. That is they are not *complex enough* to be teleofunctional.[114]

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[114] Delancey footnotes Ernst Nagel as providing an example of a system that is obviously not complex but that does maintain the equilibrium of a parameter (and, thus seems to be "homeostatic" to some degree). Nagel writes,
"When a ball at rest in hemispherical bowl is displaced from its equilibrium, restoring forces come into play that in the end bring the ball to rest at its initial position. Is this a goal-directed process, whose goal is the restoration of equilibrium?...On purely "intuitive" grounds, however, the answer to the question just raised is negative – an answer that is also in accordance with the orthogonality requirement. For the controlling variables of the ball's motion are *not* independent of each other, since the restoring force is proportional to the magnitude of the displacement force, though oppositely directed" (Nagel, 1977, p. 274).
But the amp case doesn't seem to suffer from this counterexample. The variable of the fan's speed is not proportional to the variable of the amount of heat generated by the amps internal components. So does the amp pass Nagel's test?

What follows from this? Well, it may be argued that even if it turns out that currently-existing technologies are not as complex as even the simplest of bacteria, it does not follow that future-designed artifacts will not be so. Furthermore, the only thing that matters from a systems-based perspective is that designed artifacts could in principle be that complex and thus would have teleofunctional interests in their teleofunctional structures performing their teleofunctions even if no currently-existing artifact is complex enough.[115]

In any event what this means is that the biocentric individualism that Delancey is advocating is based on a rather contingent fact that at the moment there simply aren't other systems, besides living organisms, that happen to be teleofunctional. The basic problem is that Delancey's systems-based account of teleofunctional interests cannot exclude *possible, future designed artifacts* as bearers of interests. As such a consistent position must ultimately be one of "teleocentric individualism" regardless of the current contingent fact that living organisms seem to be the only teleofunctional systems in existence. In other words a position of teleocentric individualism holds regardless of whether living organisms *at the moment* happen to be the only instances of teleofunctional systems. The advocate of the systems-based view would do better to simply say "I believe that all teleofunctional systems have interests. Thus I am a teleocentric individualist. However, the only systems that at the moment qualify as teleofunctional systems are living organisms."

This means that if the systems-based account were true the biocentrist would no longer be able to limit the discourse of what has, or could have, interests to *living* things. They must give up their allegiance to *bio*centrism. Biocentrism must give way to some kind of teleocentric

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115 Later in this chapter I will address the issue of the role that complexity plays in accounting for teleofunctional interests.

individualism.

IV. Replacing the term "Biological Functions" and "Biological Interests" with "Teleofunctions" and "Teleofunctional Interests"

At this point I will argue that we should simply dispense with the term “biological” when referring to the functions that all living things have an interest in and instead simply to refer to teleofunctions as the functions that all living things have an interest in.

All teleofunctional systems, including all living things, have essential, teleofunctional interests in avoiding systemic harm. But, not all teleofunctional systems are *biological* systems.

Most of us might be willing to accept the proposition that an artificial cell is a “living” thing. But, the claim that a sophisticated, teleofunctional robot should likewise be considered a “living” thing might seem a bit odd to some. Sophisticated robots are not *biological* beings. They do not possess DNA, are not made of complex proteins and do not engage in cellular respiration. And because of that it seems improper to call their interests and their functions *biological*. If teleofunctional robots were to exist, they would have essential, teleofunctional interests.[116] As such we can easily imagine a teleofunctional robot losing its ability to regulate one of its own physical parameters if one of its teleofunctional structures were removed or damaged.

However, some might want to suggest that even if sophisticated robots are not *biological* beings they still might be regarded as "alive" in some sense.[117] They might claim that what makes something “alive” is its behavioral complexity or how it interacts with its environment,

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[116] This should not be taken to mean that robots cannot have preference interests or sentient interests as well.

[117] Some, however, may want to claim that an artificially-produced system is not “natural” or naturally-produced and hence is not "alive" on that basis. Only naturally-produced organisms can be regarded as "alive". This line of argumentation is based on the claim that "natural" things are superior to "artificial" things. I will discuss this claim in a later section of this chapter.

not whether it is a "biological" thing. Take, for instance, the following commentary from Ian Steadman about a new development in robotic intelligence in which a Lego robot had been programmed to behave like a living organism, the nematode *Caenorhabditis elegans*. He writes,

> "Since 2012, coders and computer scientists have been collaborating on the OpenWorm project to simulate the entire biological existence of a specific, very small worm known as *Caenorhabditis elegans*. It's about capturing the life of this worm in software: 959 cells and 302 neurons, running in silicon...sticking a simulation of the worm's neurons into a Lego robot made it act like a C. elegans worm…When we consider something to be "alive" we often look to a set of key behavioural attributes that distinguish, say, a tree from the mountain that the tree grows on. It [the robot] doesn't have cells, but it does respond to stimuli, and if it had a solar panel to provide energy then *it wouldn't be too different from a plant* [my emphasis]. Reproduction isn't that insurmountable a challenge, either, as there are plenty of machines out there which can make their own replaceable parts, or even of making superior parts to the ones that they themselves use" (Steadman, 2014).

Steadman is suggesting here that the concept of "life" as opposed to "non-life" may not simply be a matter of whether that thing has cells, proteins or even DNA for that matter. All that is really needed for a thing to be counted as "alive" is an incredibly high number of integrated, multi-functional structures that contribute to its self-regulation as evidenced by its behavioral ability to interact with the environment in characteristic ways. To put it yet another way, something is "alive" if it is a teleofunctional system.[118]

The above concerns regarding what is "alive", and what is not, have implications for whether we should call the teleofunctional interests of sophisticated robots "biological" interests or something else entirely. I take it that while future sophisticated robots might someday be regarded as "alive" by many, it does not make equal sense to call them *biological* beings.

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[118] It is sufficient to count something as alive if it is a teleofunctional system. This should not be interpreted to mean that being a teleofunctional system is a necessary condition for something to be alive. A disembodied spirit, for example, might be regarded as "alive" even though it is not a teleofunctional system.

Likewise, it would not make much sense to call the kind of interests that they have *biological* interests.[119]

Robots are not “biological” in the everyday understanding of what that term means. Robots do not possess DNA, they are not made of proteins, lipids or complex carbohydrates, they do not metabolize sugars and they do not perform any of the other integrated biological functions we normally associate with most, biological entities. It is not, however, farfetched to think that sophisticated teleofunctional robots might one day exist that are, or could be, regarded as "alive" at some future time.[120]

In any event it is really beside the point whether artificial cells or sophisticated, teleofunctional robots are regarded as "alive" by us. The main point is that these would have teleofunctional interests because they are teleofunctional systems.

For these reasons I will henceforth refer to the interests that belong to all teleofunctional systems, including all living things, as *teleofunctional interests*. Likewise, I will regard the kinds of functions that the teleofunctional structures of teleofunctional systems can perform as *teleofunctions*.

V. Criticisms of a Systems-based View and Some Responses

Gary Varner has made some criticisms against the proposition that artificially-designed systems could have interests.

Varner argues that while artificially selected functions could end up *replacing* some

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[119] Although, as I have mentioned previously, robots could possibly have preference interests or sentient interests.

[120] Regardless of the current status of robotics research I will show in section VII of this chapter that the current status of *artificial life research* suggests that the prospects for future, forms of synthetic life are genuine.

biological functions, only naturally-evolved living things can have interests. Artificially-designed systems, according to Varner, cannot have interests. Varner claims that this is true because artificially-selected functions are simply *not as numerous* as naturally selected functions. The vast majority of functions that exist in the natural world belong to naturally-selected living things. Artifact functions are only a very small fraction of those functions that a living thing could have.[121] Hence, artifact functions don't pose a real challenge to the view that only naturally-selected functions are what living organisms have interests in. He claims that artificially-selected functions are,

> "a very limited sort…neither selective breeding nor currently foreseeable genetic research constitutes a significant challenge to the claim that all and only living organisms have biological interests, where these interests are identified with the fulfillment of the biological functions of their component subsystems and where these functions are in turn identified using a standard[122] etiological account." (Varner, 1998, p. 70).

Varner gives an example of what such a limited case of artificial selection looks like. A good example of an artificially selected function is the large breast muscles of selectively bred turkeys. Varner writes,

> "...suppose that a strain of domestic turkey is produced with breast muscles so large that they cannot fly...In such a case I admit these turkeys' breast muscles have lost their original biological function due to selective breeding...in such a case, it is true that the breast muscles have in the process acquired an artificial function. Farmers' getting more profit out of each turkey is a consequence of the turkeys' having larger breast muscles, and the larger breast muscles are there precisely because farmers wanted more profitable turkeys." (Varner, 1998, p.70).

The large breast muscles exist in these turkeys because their ancestors were selected by breeders for their large muscles. And the turkeys that have large breast muscles have them

[121] Note, that a previous objection to the existence of artificially-designed teleofunctional systems is that they are not as *complex* as biological systems and their functions. This objection is different. This objection claims that artificially-selected *functions* are not as *numerous*.
[122] By "standard" here I take it that Varner means a natural selection or evolutionary account.

because that selected, desirable trait was possessed by their ancestors.

Although Varner writes of such cases of artificially-selected functions as being “very limited” he, is silent on the question of whether such cases might constitute an actual *biological function*, one that would be of interest to an individual living thing. However, if we have nothing more to go on than Varner’s own definition of biological interests and his above argument we would have to say that he would deny that any artificially-selected function could be a function that a living thing could have an interest in.

The first problem with this kind of defense is that according to Varner’s own criteria we would have to say that the artificially-bred turkey really *would* have a biological interest in having large breast muscles because it has (under Varner’s own definition) a function that was acquired under the conditions needed to have a biological function.[123] So whether an artificially-bred turkey has a function that was brought about by artificial selection, as opposed to natural selection, is irrelevant when it comes to the question of whether such a turkey would *have an interest* in that function.

The second problem with this kind of defense is that in principle artificial selection, or design, *could* bring about structures that fulfill the same functional role[124] that naturally-selected structures do. Whether artificially-selected functions are *as numerous* as evolved functions is really beside the point. Delancey illustrates this problem with the following thought

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[123] Although Varner admits that the turkey has an artificially-selected function that *replaces* a biological function he does not admit that the turkey has a biological interest in that function, nor does he admit that the turkey’s artificially-selected function should be counted as a *biological* function.

[124] Recall that teleofunctions are, according to Craig Delancey, “biological purpose[s] and other kinds of normative functions” (Delancey, 2006, p. 69). So, teleofunctions, biological purposes, normative functions and proper functions all describe what the functional purpose of some structure is. For purposes of my discussion these terms are roughly synonymous.

experiment:

> "Suppose two strains of an organism arose, one which was *bred* [artificially selected] to have a structure which enabled and motivated it to exhibit behavior *B*, and one which by sheer chance *evolved* [naturally selected] a structure which enabled and motivated it to exhibit behavior *B*. There is no reason to suppose that the structure in the former has no teleofunction, while the latter does, when they could have no relevant internal differences" (Delancey, 2004, p.179-180).

That is, artificially-selected structures can be just as teleofunctional as those structures that arose from some undirected process of natural selection. Both are appropriately teleofunctional in Delancey's terms and both have teleofunctional structures. And both would have a teleofunctional interest in those structures performing their teleofunctions.

Sune Holm also criticizes Varner's etiological account of interests for the same sort of reason. He thinks that Varner's account ignores those artificially-selected functions that for all appearances really are, or would be, *in the interest* of the organism that has them. He poses the following thought experiment:

> "Consider Arto, an artefactual[125] organism[126] produced along the lines suggested by protocell researchers, except that it has not been programmed to do anything, but is able to survive and reproduce in a petri dish by virtue of having a physical boundary delineated by a membrane, the capacity to transform energy and grow (a metabolic network inside the boundary), and a genome that controls metabolism and enables replication. One of Arto's traits is its membrane, which plays a crucial role for Arto's survival and reproduction because it acts as a selective filter that allows only certain kinds of matter to enter and exit the cell…Imagine that at some point Arto's membrane is "damaged" in such a way that it is no longer able to control the inflow and outflow of matter to the degree required for Arto's survival, including Arto's capacity for maintaining the membrane itself. The aetiological[127] theory [of Varner] entails that Arto's

[125] The term "artifact" can be spelled as either 'artifact' (the American spelling) or 'artefact' (the British spelling). The term 'artefactual' is similarly synonymous with the American spelling of 'artifactual' which is similar in some regards to the term 'artificial'. I will use the spellings "artifact" and "artifactual" interchangably throughout this dissertation. For a discussion of these different spellings see http://www.world widewords.org/qa/qa-art1.htm.

[126] In the next section I will argue that synthetic organisms pose other problems for natural selection-etiological accounts of interests.

[127] The word 'aetiological' is an alternative British spelling while the typical American spelling

> membrane would not have a biological function because Arto is an organism whose parts have not been shaped by natural selection, even if, in a purely descriptive sense, this is what it does. This means that, according to Varner's theory, Arto does not have a biological interest in the filtering of matter by its membrane…Since Arto's membrane does not have "filtering" or any other effect as its biological function, it is not a case of biological *malfunction* [my emphasis] when it ceases to have that effect" (Holm, 2012, p.535-536).[128]

Arto, does not have structures with biological functions because Arto did not evolve from an ancestral population. Arto has no ancestors. Hence, Varner would have to say that it cannot have a *biological* interest in its membrane performing that function.

But this doesn't mean that Arto doesn't *have an interest* in its membrane performing that function. If anything it looks as if Arto's biological integrity really is, or at least would be, frustrated under conditions of malfunction or damage to its membrane. Damaging Arto's membrane is bad for it. So given that Arto has its own complex, self-regulating organization, and this organization is teleofunctional in nature, it has a teleofunctional interest in its teleofunctional structures performing the jobs that they do.[129]

John Basl, a critic of a systems-based account of interests, holds the view that if something has interests it also must have some kind of coherent, selection etiology.[130] The title

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as 'etiological'.

128 Although Arto has a design etiology, Holm uses the example of Arto to show that his non-etiological approach can cover cases of teleofunctional interests for both artificially-produced living things and natural living things. Holm does *not* use the example of Arto to show that Arto has interests *because of* its design etiology.

129 This should not be construed as implying that *all* structures of designed systems, including designed forms of life, must have teleofunctions. Arto, for example, could have been designed to produce a reddish hue by inserting a gene into it that makes a red protein. The red protein performs the function of making the cell appear red. But the protein itself has no teleofunction. The function of the red protein does not contribute to the other cellular processes of Arto that are integral to its continued self-regulation.

130 Not to be confused with a natural selection etiology. Here Basl simply means to refer to etiologies that involve some kind of selection process whether it be natural selection or design.

of his article, “Nothing Good Will Come from Giving Up on Aetiological Accounts of Teleology” succinctly describes his position. This article, written in response to Sune Holm’s organizational account[131] of interests, claims that etiologies are crucial for identifying whether a thing has interests.[132] Holm and Delancey, on the other hand, maintain that etiologies are not needed in order to determine whether a system has interests.

Basl provides two criticisms of Holm’s non-etiological view.

First, he responds to Holm’s claim that "instant organisms" could have interests.

Holm suggests that "instant organisms" are useful in illustrating why etiological accounts of interests are insufficient and he references the example of “Swampman” as presented in Donald Davidson's article “Knowing One’s Own Mind”. In it Davidson considers the prospect of an instantly generated being (Swampman) with no apparent selection etiology whatsoever. Swampman is a complex “instant organism.” Davidson writes,

> “Suppose lightning strikes a dead tree in a swamp; I am standing nearby. My body is reduced to its elements, while entirely by coincidence (and out of different molecules) the tree is turned into my physical replica.133 My replica, the

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131 An “organisational account”is roughly the same thing as Delancey’s non-etiological “systems-based account”. As Holm writes, “According to the organisational approach, the teleological and normative dimensions of biological function ascriptions are analysed in terms of the organisational features of organisms and not with reference to their origin in natural evolution.” (Holm, 2012, p.536-537). Holm’s organisational account of biological interests is that “Non-sentient organisms have a biological interest in X if and only if X contributes to the organism’s self-maintenance.” (Holm, 2012, p. 538).

132 The etiological accounts that concern Basl are *selection*, etiological accounts. Basl does not use the term "selection, etiological account" and he does not draw a distinction between selection etiological accounts and non-selection, "instant organism" type of etiological accounts. Selection etiological accounts involve some kind of causal history of selection to account for the existence of a thing and its functions. But this should *not* be interpreted to mean that "instant organisms" have no etiology. They do have an etiology. Their etiology is one of a singular, random event rather than a causal history of selection.

133 Davidson’s use of the term “replica” here should not be construed as meaning that some causal process was at work in generating Swampman out of some mechanism that replicates Davidson. It, however, should not be construed in that way because there is no causal connection

> Swampman, moves exactly as I did; according to its nature it departs the swamp, encounters and seems to recognize my friends, and appears to return their greetings in English. It moves into my house and seems to write articles on radical interpretation. No one can tell the difference" (Davidson, 1987, p. 443)

Holm argues that Swampman is just as much of a challenge to a natural selection etiological account of interests as is Arto. Swampman has no selection etiology yet appears to have various interests. Swampman breathes, walks, homeostatically regulates its own body temperature, and can track down its own food. The processes that allow it to pursue these goals and goods are just as intricately and teleofunctionally connected as any of the processes that take place in the body of a normal human being. And if Swampman were to acquire a disease that shuts down its liver then it would be reasonable to say that its life would be endangered.

But on a natural selection etiological view it seems as if we would have to say that Swampman has no interests in its structures performing their functions because none of its structures have proper functions or Varnerian "biological functions". Its structures were not inherited from a previous ancestor. On this view Swampman could not have a *malfunctioning* liver because it doesn't have a liver that has functions to begin with. Swampman's liver *performs* various functions but it does not *have* those functions. Thus, Swampman cannot have an interest in the performance of functions that its "liver" *has*.[134]

Basl, however, does think that instant, *conscious* beings, such as Swampman do have

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between Swampman's physical body and Davidson's body. Swampman just happened coincidentally to be the same thing as Davidson in terms of its physical resemblance to Davidson.

[134] The claim I am making here is not that Swampman is morally considerable, but only that Swampman has interests. As I will address later, the question of whether a thing has interests and the question of whether a thing has interests *that are morally considerable* are two separate questions. The natural selection-etiological view claims that Swampman would not have biological interests and hence it could not be morally considerable by recourse to biological interests. On this view Swampman does not have biological interests *because* it does not have a natural selection etiology.

interests that would make it morally considerable, even if these interests are not, in Varner's terms *biological*. He writes,

> "…it is worth noting that instant organisms with a psychology will have as much claim to *psychological interests* [my emphasis] as any other similarly constituted organism. This means we shouldn't be turned off by thinking that it won't be bad, for example, to torture an instant or swamp "dog" because the dog lacks biological interests. That just isn't so." (Basl, 2012, p. 545).

In other words, the reason why it would be wrong to torture an instant, swamp "dog" or Swampman is not because they have Varnerian, biological interests, but because they have preference interests or sentient interests.

While such a response allows instant, sentient forms of life to count as having interests, it does not allow instant, *non-sentient* beings to have interests. For Basl, such instant beings, despite all appearances to the contrary, would not have interests.

We should remember, however, that biocentrists defending the concept of inherent worth claim that *all* living beings have interests and not just sentient ones. So, if they believe that any instant organism is a *living* being, and that all living beings have interests, then they must reject the specifically etiological view of interests as endorsed by Basl. Hence, Basl's response here is not likely to satisfy them.

But, Basl's second criticism of Holm is more interesting and noteworthy. This criticism attempts to draw a parallel between instant, non-sentient organisms and what he calls "instant artifacts" in order to show that all non-sentient entities produced by an "instant organism" type etiology do not have interests. He writes,

> "I think a similar example having to do with artifacts is equally, if not more, compelling. It is the purpose of or end of a clock to tell time; there are things that promote that end and things that frustrate that end. However, let's imagine that while digging through a box of gears in search of a tool I had lost I throw a series of parts behind my head that, completely by chance, fall into place in an order that gives rise to something identical to a clock (perhaps a sun-dial is more probable). This "instant clock" is not a clock at all. It is not teleologically organized to tell

time. Its failing to be wound does not frustrate the end of telling time; it has no such end. Insofar as in both cases teleology is grounded in a selection process, instant organisms are like instant artifacts [both lack any kind of selection process]; they both lack teleological organization and, thereby, interests" (Basl, 2012, p. 545).

Basl's argument is basically the following:

1) If instant non-sentient organisms can have interests, then instant artifacts also can have interests.
2) But instant artifacts, such as 'instant clocks', cannot have interests.
3) Therefore, instant non-sentient organisms cannot have interests.

I want to argue that Basl is incorrect regarding the claim that all artifacts produced by an "instant" or haphazard etiology[135] do not have interests. Let us look more closely at Basl's instant clock thought experiment.

Basl wants to say that the instant clock has no interests. On the face of it this seems to be a reasonable conclusion. However, even if we were to grant that the instant clock does not have interests, it would still be a factual matter as to whether any randomly-generated object could have highly integrated and complex teleofunction(s) which contribute to its overall self-maintenance. If there were to exist such a complex and integrated instant "clock" we would be able to recognize when its spring (for instance) ceased contributing to the clock's ability to tell time. We would be able to make that determination even if that "clock" were not particularly complex at all. Whether a clock has interests should be a matter of its level of complexity and integration, not how it was produced. But if we are not concerned about the level of complexity that this clock has we would have to say that it has interests.

For many of us the claim that clocks could have interests seems rather strange. The reason why we might be skeptical of such a claim may have more to do with our normal

[135] Again, when Basl talks about an etiology he is really talking about a *selection etiology* of some kind, an etiology that selects a structure *for the purpose* of performing a particular job.

understanding of what clocks are. Most clocks, if not all clocks, do not possess the requisite degree of *teleofunctional complexity* and functional integration that could make them true interest bearers. They are much less complex that even the simplest of living things. Recall that on the systems-based view an entity with an interest is one that has a high enough level of complexity so that its structures contribute to its self-regulation and in which the larger system in turn contributes back to the further functioning of those very structures.

For example, Swampman has an interest in possessing a "heart" that performs the functions of pumping blood because the pumping of blood by that structure contributes to its self-maintenance in a highly integrated and complex way. Swampman's other teleofunctional structures (also supported by its "heart") in turn contribute to the maintenance of that same structure. Clocks, on the other hand do not have teleofunctional structures that are integrated in that way. A clock's spring, for example, conduces to the further function of its ability to tell time, but the clock itself does not contribute back to the maintenance of the spring. On a systems-based view an instant clock can have interests only if it were to have functions that work together in numerous, complex ways to contribute to its self-maintenance which in turn contributes to the future functioning of its own structures.

Swampman, although a product of sheer chance, has very complex functions that are conducive to its continued self-maintenance. There is a non-trivial difference in functional complexity between Swampman and an instant clock. However, this difference in complexity is not brought out in Basl's thought experiment. The functional processes that contribute to Swampman's self-maintenance and integrity run across multiple levels of organization that support one another as well as the larger system. Swampman has organ systems comprised of organs that are further comprised of tissues that are made up of cells that require their own subcellular structures, etc. The higher one goes up the organizational hierarchy of Swampman the more interconnected the various lower levels become. So for example, Swampman has an interest in a having a "heart" that pumps blood because the pumping of blood circulates oxygen, which in turn contributes to healthy muscle tissue, which in turn contributes to the formation and sustenance of healthy heart muscle cells that in turn work collectively to pump blood. An instant clock on the other hand is incapable of doing the myriad of physiological processes that Swampman can. It cannot regulate its own internal temperature, cannot pump blood, cannot metabolize sugar and has no sense perception. It cannot perform these multi-level functions because it does not possess the relevant teleofunctional structures that enable such interactive and self-supporting functions. It has virtually no complex teleofunctional processes in common with living things at all.

My main objection to Basl's instant clock argument is this. The reason why the instant clock scenario seems to be a persuasive rebuttal to the view that instant non-sentient organisms can have interests may (at least in part) be because the functional complexity of things like clocks does not faithfully represent true teleofunctional complexity as is found in even the simplest of non-sentient, living things.

Cases of instant, non-sentient organisms and instant artifacts need to take these *differences in complexity* into consideration. To that end I propose the following thought experiment that levels the playing field of teleofunctional complexity:

> *Imagine that a scientist, while rooting around in his reagent cabinet for a pipette, haphazardly throws various vials of nucleic acids, peptides, lipids, enzymes and carbohydrates randomly behind his head. As the vials hit the floor they break spilling their contents onto the floor in random patterns. The chance mixing of all of these chemicals generates an instant organism, "Instant Arto". Instant Arto is a single-celled living organism that has the exact same amount of complexity and biological functionality as the original, lab-designed Arto. Both are capable of significant self-maintenance and have various metabolic processes that are*

independent yet partially-supportive of each other. The metabolic functions that Instant Arto performs are the same for Arto.

Instant Arto has all of the same functions that Arto has except its functions came about by an etiology of sheer chance as opposed to conscious selection. Yet despite their differences in causal history they both seem to have the same teleofunctional interests in their structures performing the functions that they do. Arto has a teleofunctional interest in its membrane performing its teleofunctions. Instant Arto also has a teleofunctional interest in its membrane performing the same teleofunctions. If either of their membranes were to be punctured their self-regulation would come to an end.

Thus, instant non-sentient organisms have teleofunctional interests that do not depend on their etiology[136]. If we grant that both Arto and Instant Arto have teleofunctional interests it must not be because of some selection etiology. That is, a natural selection etiology is not a sufficient condition for something to *have an interest*. But, neither is a design etiology either. A clock is surely *designed* but that fact alone has nothing to with whether or not it has teleofunctional interests. The interests of instant organisms, of designed organisms, and of naturally selected organisms, are grounded in the nature of the kind of complex, teleofunctional systems that they are, not in how they were produced.

If we take the case of Instant Arto to be analogous to Basl's case of the instant clock then we should count both Instant Arto and the instant clock to be examples of 'instant artifacts' because they both were produced by the random movements of some agent or person as a causal factor in their construction.

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[136] I will, however, argue that the possession of *morally significant* interests does depend on etiology and that the moral significance of interests is tied to an etiological story involving the intentions of one or more designers.

The problem with Basl's thought experiment is that it doesn't make a distinction in teleofunctional complexity between the clock and the living cell.[137] We could ask the following question as a means of clarifying the implications of Basl's thought experiment: "Is instant Arto an instant *artifact* or an instant *organism*?" At first blush it seems reasonable to think that Instant Arto is *unlike* any regularly-produced artifact that has ever been contrived by human beings. Its high level of teleofunctional complexity suggests that we should instead put it in the category of "organism" and not in the category of "artifact". This is because most, if not all, current artifacts are simply not as complex as organisms are. Hence, the distinction that Basl makes between an artifact and an organism is off the mark.

But, there is another, more substantial reason for thinking that Instant Arto is not a true "artifact", but that Arto is.

Some might claim that an instant clock is not really an instant *artifact* at all because it did not come about by the careful planning of a designer. They might claim that the instant clock *looks* like an artifact but it isn't *really* an artifact. Basl's instant clock came about by the random movements of a human being. But so did Instant Arto. There was no intentionality or design involved in the production of either of them. An instant clock could just as well have been produced by the random movements of gears brought together by a passing tornado. So why did Basl insist on calling the instant clock an instant *artifact*? The likely reason may lie in the fact that we would normally think that an instant clock would have the same general level of functionality, complexity and overall appearance as normal, human-designed clocks.

What we, of course, should realize is that a haphazardly-produced instant clock, however

[137] This is not to suggest that complexity is the only thing that matters to what makes a system a teleofunctional one. It is, however, a necessary condition.

similar it might be to human-designed clocks, is not *designed* at all even though some person was involved in 'bringing it about'. The random movements of the gears and other parts that eventually came together to make the clock were brought about by some person but those movements were not *directed by* that person, in accordance with their intentions or plans for a final end product. Genuine *artifacts* don't come about that way. They are constructed on the basis of some design plan. Hence, we should say that neither Instant Arto, nor an instantly-produced clock should be regarded as artifacts in the true sense of the word since both were not made in accordance with some plan or purpose.

Basl's instant clock thought experiment, however, is meant to draw some parallels between instant clocks and instant organisms as a means of implying that neither of them should count as possessors of interests.

However, once we set aside the deceptive term "artifact" and instead focus on teleofunctionality there remains a substantial difference between an instant clock and an instant, non-sentient organism that can be appealed to in arguing that one, but not the other, has teleofunctional interests.

In terms of their integrated, functional complexity they are not similar.

Instant Arto operates at a much higher level of functional complexity than an instant clock. It is a teleofunctional system that has many more functionally integrated structures than normal artifacts that human beings routinely produce[138]. If anything, Instant Arto is more like Swampman and less like an instant clock in this regard.

But Basl's instant clock scenario hides this difference. The argument seems to undermine

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[138] However, the prospect of human beings routinely generating living organisms would undermine this normal view of what biological designers are capable of.

the systems-based account of function by suggesting that an instant organism is like an everyday artifact in a significant way when in fact they are not.

This kind of oversight has also made its way into *other* arguments against non-etiological views regarding proper functions or functional norms. For instance, Ruth Millikan and Karen Neander have directed their criticisms toward Cummins' non-etiological account of functional analysis.[139] These criticisms are similar to Basl's in that they claim that non-etiological accounts of functions can impute functional purposes to very simple systems that by most appearance have no functional purposes at all.

Holm is up front about this kind of trouble for his own non-etiological view. He writes,

> "Perhaps surprisingly, the organisational account also claims that flames are teleological systems. By virtue of causing the combustion of gasses in its vicinity, a flame continues to create the conditions under which it is capable of performing that very activity…there are certain effects that a cell *or a flame* [my emphasis] is *supposed to* [my emphasis] bring about in order for it to persist" (Holm, 2012, p. 537).

Millikan and Neander do not address the question of whether simple systems can have *interests*. Rather they think that simple systems, such as flames, cannot have structures that perform proper functions.[140]

The critiques from Millikan and Neander claim that a systems-based approach to functions cannot account for proper functions because it unduly allows for problematic cases such as clouds, flames or geological plate movements to count as structures that have proper functions, or in Delancey's terms, teleofunctions.

This leaves the defender of the systems-based account open to the charge that instant

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[139] Cummins is regarded by many to be one of the first defenders of the account of systemic-capacity functions which is very similar to Delancey's systems-based account.

[140] As a reminder, many biocentrists think that having interests *requires* the possession of structures that have proper functions.

organisms, instant clocks, clouds and flames could have structures that perform proper functions or have proper teleofunctions. The problem for the systems-based view, it is argued, is that virtually *any* system that has some self-sustaining function would turn out to have structures with proper functions, even those structures that upon reflection don't really seem to have functions at all.

For instance, Millikan criticizes Cummins' systems-based approach to functions in the following way. She writes,

> "…according to Cummins' definition[141] it is, arguably, the *function of* [my emphasis] clouds to make rain with which to fill the streams and rivers, this in the context of the water-cycle system, the end result to be explained being, say, how moisture is maintained in the soil so that vegetation can grow. Now it is quite true that, in the context of the water cycle, clouds function to produce rain, *function as* [my emphasis] rain producers: that is their function in that cycle. But in another sense of "function", the clouds have no function at all – because they have no purpose" (Millikan, 1989, p. 294).

In a similar vein Karen Neander argues that Cummins' approach allows geological plate movements to count as having functions while everyday common sense suggests that they do not have functions. She writes,

> "According to one important theory of functions, they are causal contributions to complexly achieved overall activities of the containing organism or system (Cummins 1975). According to this theory, functions are relative to our interests, and both the boundaries of the containing system, and which of its overall activities we focus upon, will vary with our current concerns. Now instant lions[142] could be analyzed as complex causal systems, in effect organized toward the achievement of certain activities – like hunting, consuming deer, birthing cubs, and so on. So instant lions would have proper functions if this theory accurately described what proper functions were. But note that this kind of causal analysis can be done on any complex causal system (plate movements that

141 Cummins defines a function as, "x functions as a ϕ in s (or: the function of x in s is to ϕ) relative to an analytical account A of s's capacity to ψ just in case x is capable of ϕ-ing in s and A appropriately and adequately accounts for s's capacity to ψ by, in part, appealing to the capacity of x to ϕ in s" (Cummins, 1975, p. 762).

142 I will address the problem of "instant organisms" for a systems-based account of interests in a later section of this chapter.

> culminate in earthquakes, intergalactic motions, for examples). So, this theory bestows proper functions on instant lions only at the expense of bestowing them upon a vast range of systems to which we do not normally attribute to them" (Neander, 1991, p. 180-181).[143]

I now argue that both Millikan and Neander have not taken the teleofunctional complexity of relatively simple systems such as clouds and flames into consideration in their criticism of a non-etiological view of proper teleofunctions. Things such as clouds or plate tectonic systems are rather simple entities that exhibit very low levels of integrated complexity. As such they cannot have the same kind of multi-functional integration that is needed for them to have teleofunctional interests. A cloud simply isn't complex enough in itself to count as a teleofunctional system. That is, clouds and other simple entities like them, do not have interests because they do not have *numerous* structures that are multi-functional and integrated.

In response to these kinds of criticisms Delancey writes,

> "The systematic account will require that the relationships be *complex* [my emphasis]; this will include that the various interdependent teleofunctions will be of distinct kinds…the systemic account alone offers a clear explanation of how to interpret these trivial or degenerate cases [cases such as instant clocks, clouds, etc.] in such a way that they are not successful examples of a *reductio ad absurdum* [his emphasis]" (Delancey, 2006, p. 85)

However, it could be reasonable to think that clouds might be capable of beings parts of some larger, teleofunctional, atmospheric system. Clouds make rain, which in turn contributes to providing moisture to the soil, which contributes to evapotranspiration, which contributes back to cloud formation. But clouds don't just make rain. It might be argued that clouds are multifunctional[144] not in the sense that they themselves have numerous, integrated,

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143 One small note of clarification: The question of this dissertation, of course is not whether *lions* (instant or otherwise) have functions, but whether *the structures of lions* have functions.

144 Multifunctionality, although a controversial prospect for things such as clouds or plate-tectonic interactions, is not controversial at all when it comes to living organisms. The living world contain a variety of structures and systems that make many different functional

teleofunctional structures, but in the sense that they can fulfill different teleofunctional roles within a larger teleofunctional system. Clouds have many different functions. They regulate global temperatures, recycle nutrients, influence whether patterns and regulate a whole host of other atmospheric conditions. If clouds are functionally analyzed in this more comprehensive, multi-functional context, rather than in the context of a simple water cycle, then perhaps they *could* be conceived as being part of a teleofunctional system. The presence of their integrated functions in that context could be used to argue that an entire atmospheric system could have teleofunctional interests.[145]

Mossio et al. in their response to critics of a systems-based view of interests differentiate

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contributions to organisms and cells. As Christensen and Bickhard write,
"Empirical examples are not hard to come by. Amundson and Lauder point to the vertebrate jaw as an example (1998). In hamsters the medial extended amygdala is known to play roles in the control of sexual behavior, maternal behavior, grooming, and aggression (Newman, 1999). Multifunctionality is highly prevalent in cellular physiology: A great deal of protein evolution occurs through variations in the assembly of complex macromolecules out of pre-formed subunits. In other words, just as a chair may be used either for sitting on or as a platform for reaching a book on a high shelf, a particular protein domain that in type of enzyme acts to catalyze and a digestive reaction may in another enzyme facilitate blood clotting…extracellular signaling molecules typically act on multiple target cells and have different effect in each type of target cell. Acetylcholine, for instance, acts in skeletal muscles cells to stimulate contraction, but serves to *decrease* [his emphasis] the rate and force of contraction in heart muscle cells (Alberts et al., 1989, p. 684)". (Christensen and Bickhard, 2014).
Also, multifunctionality has been documented for some *species* as components of communities or ecosystems. According to Roger Findlay, mycorrhizal fungi make multiple functional contribution to the biotic community of which they are a part. Regarding his research Findlay writes,
"As we have acquired greater knowledge about fungal species diversity, so we have become more aware of the potential *functional diversity* [my emphasis] of mycorrhizal fungi. The new multifunctional perspective includes mobilisation of N and P from organic polymers, possible release of nutrients from mineral particles or rock surfaces via weathering, effects on carbon cycling, interactions with myco-heterotrophic plants, mediation of plant responses to stress factors such as drought, soil acidification, toxic metals and plant pathogens, as well as a range of possible interactions with groups of other soil microorganisms." (Findlay, 2004, p.91).

145 This is simply meant to serve as a thought experiment. Whether or not an entire atmospheric system really has teleofunctional interests is not a claim I wish specifically to defend.

teleofunctional systems from other systems that are not teleofunctional by means of appealing to major differences in their “organisational differentiation”. They defend this way of thinking as a means of determining whether simple systems such as flames can have proper functions. They write,

> “…functional attributions to components of the flame, as well as to all dissipative structures, are not meaningful. It is for this reason, we argue, the we do not attribute functions to *simple forms* [my emphasis] of self-maintaining systems, whatever their material complexity may be…A self-maintaining system is organizationally differentiated if it produces different and localizable patterns or structures, each making a specific contribution to the conditions of existence of the whole organization” (Mossio et al., 2009, p. 826).

Sune Holm also thinks that organisational differentiation and complexity can make a crucial difference between objects that have teleofunctional interests and others that do not. He, like Mossio et al., thinks that organisational differentation is what can allow the proponent of a non-etiological view of interests to claim, on the one hand, that some, but not all, possible artifacts can and should be regarded as having interests. He writes,

> “To begin with, I agree that we should recognize that being an artifact does not rule out having interests, but I think my organizational account does a better job discriminating between artifacts that do and artifacts that do not have interests of their own. While the organizational account does not exclude artifacts from having interests of their own, as is clear from the case of Arto, it does not entail that *all* [my emphasis] artifacts such as cars and parking lots have interests of their own either. It thus avoids the apparently absurd consequence that a parking lot can be said to have an interest in being cleared of snow, an interest that might be frustrated even if there was no agents around who took an interest in using the parking lot. Instead of claiming that all artifacts have interests, the organizational approach can recognize that some, e.g. artifactual organisms and self-maintaining robots[146], will have interests of their own. That is to say, the organizational approach can accommodate future living technologies as bearers of interests, without ascribing interests to hammers and anvils, because interests are generated

146 A good example of a present-day teleofunctional robot is the famous “PETMAN” from Boston Dynamics. This robot can self-regulate its own movements in response to external forces such as being pushed to one side. The robot “corrects” its stride in response to being pushed. For more information see the article from Nelson et al. (2012) “PETMAN: A Humanoid Robot for Testing Chemical Protective Clothing”.

by the organizational capacities of the entity, not by its origin." (Holm, 2013, p. 248)

Before proceeding I wish to make a few additional comments regarding the conditions necessary for a system to count as teleofunctional.

A system can have *numerous* structures in it yet not have teleofunctional interests. A collection of items in a typical garbage heap, for example, has numerous parts to it. But garbage heaps do not have structures that are functionally integrated in such a way that they contribute to the self-regulation of the garbage heap. So having numerous structures, is only a necessary condition for a thing to have teleofunctional interests. It is not a sufficient condition.

A system can be *self-regulating* yet also not have teleofunctional interests. There can exist some things that have some degree of self-regulation yet not have interests. The "flame" example from Neander above is a case where there exists something that is self-regulating in some sense, but that doesn't have teleofunctional interests. So, self-regulation is also a necessary, though not a sufficient, condition for a thing to have teleofunctional interests.

Something can also be multi-functional or have structures that are multi-functional yet not have teleofunctional interests. For example, a simple bowling ball could be regarded as multi-functional. A bowling ball can be used as a doorstop, a paper weight, a ball bearing or a weapon. But a bowling ball does not have interests. Also, multi-functional structures can be *integrated* with other structures yet still not result in a system that has teleofunctional interests. For example, a door has hinges that can serve multiple, different functions such as a plank for a mouse trap. And a door contains a doorknob that could also be used as a paper weight or even a weapon. Hinges and doorknobs are multi-functional. Both the hinges and the doorknob work integrally to contribute to a functioning door. But this does not mean that the door itself has teleofunctional interests.

VI. Criticisms of, and Responses to, "Artifact Interests"

Defenders of natural selection etiological account of interests, such as Varner, want to exclude all artifacts as possessors of interests. They do this by making an etiological distinction between naturally-selected functions and artificially-selected functions. They claim that only the process of natural selection can generate biological functions and that living things can only have interests in their structures performing their biological functions. They argue that processes of artificial selection cannot generate structures that perform biological functions and hence the living things produced by that process cannot have interests in their structures performing those functions.

Advocates of the systems-based view, however, regard Varner's natural selection etiological approach to be insufficient in accounting for interests. As mentioned in the previous chapter, Varner's account, 1) allows for certain cases of living organisms to have biological interests in a function that clearly is not in the organism's interests (i.e. 'oncomice', etc.) and 2) it does not provide a compelling defense against the criticism that some artificially-selected structures (such as Arto's membrane) can nonetheless still be regarded as being genuinely functional (and, indeed, teleofunctional) and also in some living thing's interest.

But biocentrists who want to switch to a non-etiological account of interests, must be willing to accept the implication that even artificially-produced teleofunctional systems, including artificial forms of life, can have interests. But if a biocentrist accepts that claim *and* they also accept the claim that having interests entails having interests that are morally considerable, then that biocentrist must also believe that artificial, teleofunctional systems have inherent worth.

But many biocentrist do *not* believe that artificial systems can have interests that are morally considerable. Thus, those biocentrists who believe that interests are inherently morally considerable are not willing to accept the implication that teleofunctional artifacts have interests.

But *why* should a biocentrist be unwilling to accept *that* view? And more importantly what is the *motivation* behind this unwillingness?

An answer lies in what John Basl has called a “central dogma” of environmentalism.

This dogma, endorsed by many environmentalists, claims that only *natural* things can have interests. *Artificial* things cannot. This why many environmentalists favor natural selection etiological accounts of interests. Natural selection is a *natural* process and those who favor natural selection etiological accounts of interests think that living entities that are produced by artificial means, i.e. have a design etiology, cannot have interests because they were not produced by a natural process. Naturally-evolved living organisms are the only proper candidates for moral value because they are produced by a natural process. John Basl claims that this dogma of environmental ethics is grounded on the view that “…there is some fundamental difference between artifacts and organisms such that the latter have goods or interests of their own that are due moral consideration while the former do not” (Basl, 2012, p. 543).

The basic environmentalist argument against the claim that artificial forms of life can have interests is something akin to the following:

1) Anything that is artificial is inherently inferior to what is natural.
2) Anything that is inherently inferior in this way doesn't have interests.
3) Thus, artificial forms of life do not have interests.

I will call this argument the "natural interests" argument.

In order to evaluate this kind of argument we need to address the question of whether premises one and two are true. Premise one gives voice to the central dogma. So in evaluating premise one I will in turn be evaluating this central dogma. If it turns out that the central dogma is correct then we are still left with the question of whether premise two is correct. However, if both of these premises are true then things that are artificially-produced cannot have interests. If so, then much of what is typically regarded as artificial life simply cannot have inherent worth no matter how much they might be "like" natural living things.

I will assess this argument by addressing premise two first.

Some environmentalists find the prospect of artificial life disconcerting. To them it is another instance of anthropocentric tampering with the natural order. But as the technology and the means to create various complex forms of synthetic life get more sophisticated, such prospects have a greater chance of becoming reality.[147]

Environmentalists might say that they find synthetic biology repugnant because it involves the practice of consciously *manipulating* already existing living organisms for the benefit of some human designer.[148] Synthetic biology treats these living organisms as a mere means. Such a practice should be discouraged because it interferes with the goals and goods of

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[147] The ethical implications of synthetic biology are now being widely discussed. See Gutmann's 2011 article "The Ethics of Synthetic Biology: Guiding Principles for Emerging Technologies." as well as Schmidt et al.'s 2008 commentary "SYNBIOSAFE e-conference: online community discussion on the societal aspects of synthetic biology." Many environmentalists view manipulative ventures such as synthetic biology and GMOs to be particularly risky. They say that these kinds of endeavors might lead to harmful forms of life that cannot be contained. They say that synthetic biology violates the 'Precautionary Principle" which states that if there is some intended action in which the unknown but possible ramifications could be catastrophic or dire, one should take much 'precaution' regarding that action and not run headlong into that project without a deep awareness of its possible future effects. That sentiment is captured by Schmidt et al. as
"We may think that we can accurately predict the consequences of our actions with respect to living organisms - but history tells a different story. Hence a sensible degree of respect for the precautionary principle should remain...Can we pull the plug? Can we stop our project before it spirals out of control? That is an ethical question." (Schmidt et al., 2008, p. 8).
For a further discussion of the Precautionary Principle as it applies to synthetic life see Attfield's (2012) "Biocentrism and Artificial Life."

[148] Other environmentalists have argued that synthetic biology amounts to "playing God". For criticisms and discussions of that issue see Dabrock, 2009, van den Belt, 2009, and Link, 2013.

natural, living organisms. The practice of synthetic biology, according to these environmentalists, is an inherently unethical tampering with the natural order. Hence, the *products* of synthetic biology are inferior and likewise without moral standing.

However, even if one were to grant that the *practice* of synthetic biology routinely and unethically manipulates existing living organisms, it is not true that manipulated forms of life are likewise without interests. Forms of life that donate their DNA through genetic manipulation are just as capable of being helped or harmed as the manipulated recipients of that DNA.

Consider the following thought experiment:

> *A research scientist wants to see if one bacteria, "B", can acquire another bacteria, "A's", ability to rapidly metabolize sucrose. A can metabolize sucrose a little more rapidly than B can because of a gene that it has but that B does not have. The scientist deletes B's sucrose metabolizing gene, removes A's sucrose metabolizing gene, and then splices it into B's DNA. During the splicing process, A is needlessly killed. The scientist could have kept A alive but instead he carelessly punctured A's membrane just after its gene was removed. While the gene from A is being inserted into B, B is neither harmed nor killed. The spliced gene from A enables B to metabolize sucrose a little more rapidly than it could before. It thus benefits from having A's gene. Does B have an interest in having A's gene perform the function of rapidly metabolizing sucrose? It certainly seems as if it does. B had interests before receiving A's gene and B has acquired new interests after receiving A's gene. The fact that one of B's interests came about by an (arguably) unethical process of manipulating life in which A was killed needlessly does not show that A did not have an interest before being needlessly killed or that B itself does not have a newly-acquired interest after A's gene was given to it.*

On a systems-based view, designed artifacts with sufficient complexity and self-maintenance could qualify as interest-possessors. Hence, even if some designed artifact were brought about by an unethical process of manipulation, that in and of itself would not disqualify that artifact from having interests.

This kind of argument also applies to cloned human beings.[149] A cloned human being

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[149] Many argue that the practice of human cloning is prima facie unethical. See the Council of

has just as many interests, needs, etc. as any naturally-produced human being untampered by the hand of other human beings. A cloned human being has just as much ‘dignity’ as a "natural" human being. As Bearnard Baertschi addresses this,

> “…human dignity is not something that can be lost because of human intervention; human dignity is an intrinsic value grounded on intrinsic properties, and the properties relevant to the moral status of a child remain the same, be it procreated by cloning or by sexual intercourse (or by IVF)” (Baertschi, 2012, p . 14).

This same kind of argument can be made for the claim that all artificially-produced sentient beings have interests in avoiding pain. As Eliot Sober has recognized, most animal welfarists think that sentient creatures, whether ‘natural’ or artificially-bred, are just as able to feel pain hence they both have an interest in avoiding pain. He writes,

> “…environmentalists think that the distinction between wild and domesticated organisms is important, in that it is the preservation of “natural” (i.e., not created by the “artificial interference” of human beings) objects that matters, whereas animal liberationists see the main problem in terms of the suffering of any organism – domesticated or not” (Sober, 1986, p. 175).[150]

But that is not all. An artificially-produced bacterium, for instance, has a teleofunctional interest in its membrane serving as a selective barrier because if that membrane were damaged the cell would be subject to a systemic harm. Having its membrane punctured is bad for it. Even non-sentient, artificially-produced forms of life can have interests. An artificially produced bacterium would have this interest regardless of whether it was made in the lab or evolved by natural selection. As Ronald Sandler puts it,

“What is determinative of a nonsentient entity’s good (and a psychologically

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Europe’s (1998) position, “…the instrumentalisation of human beings through the deliberate creation of genetically identical human beings is contrary to human dignity and thus constitutes a misuse of biology and medicine.” I do not wish to debate this issue only to point out that it is a contentious one.

[150] For further discussion of animal welfarism and the interests of sentient beings see also J. Baird Callicott’s (1980) “Animal Liberation: A Triangular Affair.”

> complex entity's biological good) is whether and how they are teleologically organized, not the mechanism by which they came to be that way. The derivativeness of artifactual organisms – that is, that they are *the product of human intentions or created to be used by us* [my emphasis] – does not justify denying that they have a good of their own." (Sandler, 2012c, p. 191).

Thus, any kind of living organism that was designed has just as many interests as their equally-complex "natural" counterparts.[151]

For the above reasons we can be fairly confident in thinking that premise two of the "natural interests" argument is false. Even if something is made by an unethical process, that does not mean that it has no interests.

Showing that premise two is false is enough to show that the "natural interests" argument is unsound and hence does not pose a substantial challenge to the advocate of a systems-based understanding of interests.

Nonetheless, I will address the problems for premise one next.

The root of many of the environmentalist's criticisms of synthetic biology is found in the central dogma. Environmentalists, wedded to this dogma want to say that Holm's Arto, or cloned human beings, or any other artificial forms of life are simply not eligible for moral consideration under an environmental ethic because they did not come about by a purely natural process. For them Arto is without interests not because it is without an etiology, but because it has the *wrong kind* of etiology, an unnatural etiology that invokes a human designer.

For the purposes of clarifying our understanding of the central dogma I will provide an overview of the various issues which bear on the natural/unnatural distinction that are of concern to the environmentalist.

The project of synthetic biology, according to Christopher Preston "usurps" Darwinian

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[151] Whether those interests are morally considerable is another matter.

selection which, up until the advent of modern biotechnology, was the sole explanation for the existence and form of *all* living organisms including their interests. He writes,

> “The idea that synthetic biology usurps Darwin is true only in the sense that lab-built organisms will henceforth exist that inherited none of their actual DNA through Darwinian processes. In those specific organisms, Darwinian explanations of the physical origin of an organism’s DNA will play no part. It is in this very restricted sense that Darwinism is usurped. So the threat to Darwinian processes is, at best, simply a threat to its ubiquity as an explanation for the genomes of existing organisms” (Preston, 2013, p. 111).[152]

Markus Schmidt, Malcolm Dando and Anna Deplazes echo the basic point that modern synthetic biology has now made untenable the claim that naturally evolved DNA is the only kind of DNA that can exist. They write,

> "Those who think of naturally evolved DNA as an unalterable biological axiom will be surprised by recent efforts to release life (as we know it) from its evolutionary constraints." (Schmidt, Dando and Deplazes, 2011, p. 324).

This prospect is troubling to some environmentalists. Biocentrists, such as Varner, believe that etiologies that invoke design processes, such as human manipulation, are not etiologies that can generate interests because they do not invoke a purely natural process (such as natural selection) to explain them. Somehow design etiologies just cannot generate living beings with interests.

Many environmentalists think that the processes of human design are inherently suspect, meddlesome and too different from natural processes to be regarded as praiseworthy. Bernard Baertschi summarizes this view when he writes,

> “Frequently, we hear claims about the goodness of what is natural and the badness of what is synthetic, chemical or artificial. Such claims are in general not voiced in relation to status, but to agency. Nature does good, but human beings do

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152 Preston also writes that “…living organisms have until now enjoyed a category of being entirely separate from machines” (Preston, 2013, p. 109). That is, synthetic biology invites the view some “living” organisms can really just be sophisticated machines.

> not[153]. Since 'artificial' denotes a mode of production *and* [his emphasis] its product, the negative evaluation associated with the first contaminates the second" (Baertschi, 2012, p. 10)[154].

Hence, designers of artificial life cannot produce living things with morally considerable interests because the manipulative hand of the designer has either compromised or corrupted the "true" biological function that a living thing ought to have.

But what is it about synthetic biology that environmentalists object to? Presumably it is because the teleofunctional capacities of living artifacts aren't the result of a natural process. The interests of these manipulated forms of life are ultimately just extensions of whatever some designer's interests were. Natural history's relevance in determining what the normative functions of what a living thing's structure are is threatened. Christopher Preston describes the situation in the following way,

"These biotic artifacts [synthetic organisms] depart from a core principle of

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153 An advocate of this negative view of man's presence in the natural order is Jean-Jacques Rousseau. In his book *Emilie* he writes,
"God makes all things good: man meddles with them and they become evil. He forces one soil to yield the products of another, one tree to bear another's fruit. He confuses and confounds time, place, and natural conditions. He mutilates his dog, his horse, and his slave. He destroys and defaces all things; he loves all that is deformed and monstrous; he will have nothing as nature made it, not even man himself, who must learn his paces like a saddle-horse, and be shaped to his master's taste like the trees in his garden" (Rousseau, 2007, p. 6).

154 Baertschi mentions some examples as instances in which the natural/non-natural distinction is used as a debating point in discussions of controversial environmental issues. These are: the "classic medicine" vs "natural medicine" debate, the "GMO" vs "natural/organic farming" debate and the debate over the moral status of biotechnological practices. Regarding the biotechnology debate Baertshi writes,
"In a study concerning genetic engineering, Rob De Vries states that, in the Netherlands, 57 per cent of the respondents think that biotechnology is non-natural, and consider that it constitutes a problem; and these respondents were not lay people, but people involved in biomedical science" (Baertschi, 2012, p. 10, see also De Vriend, 2006, pp. 218-220).
Another debate, not mentioned by Baertschi, is the debate of whether environmental mitigation is best handled by human beings actively engaging in the restoration of damaged habitats [where human beings try to "fix" an environmental problem of some kind] or whether humans should take a completely 'hands off' approach to restoring environmental integrity, one in which nature "fixes" itself.

> Darwinian natural selection – descent with modification – leaving them with no causal connection to historical evolutionary processes. This departure from the core principle of Darwinism presents a challenge to the normative foundation of a number of leading positions in environmental ethics. As a result, environmental ethicists with a commitment to the *normative significance* [my emphasis] of the historical evolutionary process may see synthetic biology as a moral 'line in the sand'…With the threat provided by these technologies looming, those for whom the ideas of 'nature' and the 'historical evolutionary process' comes with any kind of normative punch have some serious self-reflection to do." (Preston, 2008, p. 23).

For many environmentalists the concept of 'nature', and of man's apartness or separateness from nature, provide grounds for the protection and valuing of natural living things.[155] Aldo Leopold, one of the founders of modern environmentalism, claims that the 'natural' should start taking precedence in the lives of men over the 'unnatural' as a means of focusing our conscience away from resource use and towards respect for the land. In 1949 he writes, "Perhaps such a shift of values can be achieved by reappraising things unnatural, tame, and confined in terms of things natural, wild, and free" (Leopold, 2013, p. 4). Accordingly, we should regard the unnatural objects of man's own creation and manipulation as being utterly different and inferior to those things that comprise the "wild".

Environmentalists such as Robert Elliot, Eric Katz, Bill Throop and Ned Hettinger all argue in one form or another that a large part of the moral appeal to what is natural stems from its *independence* from man. That is nature is valuable if it has not been blemished by the hand of man. To put it another way, nature has value *because* it is independent from man and his

[155] Some environmentalists think that *anything* that is natural has intrinsic value. The main reason is that they claim that naturalness itself is the central, morally significant property that makes a thing valuable. Teresa Kwiatkowska sums up this view when she writes,
"A central issue of various theoretical disputes and conservation/restoration practices revolves around the 'naturalness' of living organisms, species or ecosystems. Many argue that *natural* [her emphasis] things, whether they are organisms or inert mat[t]er, have intrinsic value that obliges humans to morally consider plants, animals and ecosystems" (Kwiatkowska, 2008, p.88).

modifications. Elliot writes, "We value the forest and river in part because they are representative of the world outside our dominion, because their existence is independent of us" (Elliot, 1982, p. 86)[156]. Similarly Katz writes, "Value exists in nature to the extent that it avoids modification by human technology" (Katz, 1992, p. 265). Hettinger and Throop write, "As we use the term, something is wild in a certain respect to the extent that it is *not humanized* [their emphasis][157] in that respect" (Hettinger and Throop, 1999, p. 12).[158]

Bill McKibben argues that the very idea or concept of nature is under attack.[159] He claims that the emergence of all kinds of new human technology and of man's widespread

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[156] To be fair, Elliot thinks that not all natural entities have value simply in virtue of their naturalness. He does, however, think that naturalness can be a value-adding property among other value-adding properties. He writes, "…within certain constraints, the naturalness of a landscape is a reason for preserving it, a determinant of its value…naturalness is one factor in determining the value of pieces of the environment" (Elliot, 1982, p. 87).

[157] As an aside, Preston documents how this natural/unnatural distinction ultimately finds its basis in an Aristotelian philosophy. He writes, "…environmental ethicists have put great stock in the distinction tidily made by Aristotle more than two thousand years ago. Aristotle characterized a natural object in *The Physics* as one which 'has within itself a principle of movement and of stationariness (in respect of place, or of growth and decrease, or by way of alteration' (1925b8-11) (Aristotle, 1941). Any change the object undergoes over time is determined from wholly within the object's nature…An artefact, by contrast, lacks 'the source of its own production…that principle is in something else external to the thing' (192b28). The external source to which Aristotle refers is the intentional action of a human" (Preston, 2008, p. 25). In his book *The Natural and the Artificial,* Keekok Lee summarizes the Aristotelian view of the 'natural' as

"whatever exists which is not the result of deliberate human intervention, design, and creation in terms of its material, efficient, formal, and final causes…The natural comes into existence, continues to exist, and goes out of existence entirely independent of human volition and manipulation…[B]y contrast, 'the artefactual' embodies a human intentional structure" (Lee, 1999, p. 82).

[158] One might also wonder if the value that nature has really intrinsic value as opposed to some relational or extrinsic value. If nature has value insofar as it is *not* humanized then the value that nature has is one based on its relationship with man. But this would then mean that nature does not have *intrinsic* value, but rather some sort of relational value. If nature had intrinsic value then it would still have value independently of its relation to man and of man's modification of it.

[159] The title of McKibben's book in which he argues for this view is entitled *The End of Nature*.

manipulation of the natural world, threatens the natural-artificial distinction. Due to man's presence such a distinction has become much more difficult to maintain[160] in that large portions of the biosphere have already been tainted by man's presence. As man exerts more of his own control over nature, the autonomy and separateness of nature becomes more absorbed into this new, artificial mode of existence. McKibben, thinks that the concept of nature means "the separate and wild province, the world *apart from* [my emphasis] man to which he adapted and under whose rules he was born and died" (McKibben, 2006, p. 41).

Another reason why environmentalists admire the natural is because the processes that produced species, land, ecosystems, etc. are very old or primordial. Nature has a certain *primeval* quality about it that should strike us a morally significant. Mountains, valleys, trees, rivers and entire species are all beautiful and splendid works of the natural order that were produced by the ancient, evolutionary processes that were at work long before man emerged on the scene and will continue to work long after man is gone. Eugene Hargrove puts a finger on this admiration for natural processes when he writes, "Nature aesthetically is not simply what exists at this point in time; it is also the *entire series of events* [my emphasis] and undertakings that have brought it to that point. When we admire nature, we also admire that history" (Hargrove, 1989, p. 195).

Environmentalists also like to appeal to the natural as a means of calling others to political action. Appeals to the natural tend to stir people up to speak out against those things that threaten earth's integrity. Christopher Preston points out the place of the appeal of the natural to political motivation when he writes,

> "As a matter of political reality, the idea that wild nature is morally significant is one that motivates millions. Images of polar bears prowling arctic ice-flows, humpback whales breaching in front of snow-capped mountains, and lionesses

160 For analyses of the claim that synthetic biology further blurs the natural/unnatural distinction see de Vriend, 2006.

> lounging with their young on the African savannah adorn the walls of bedrooms and boardrooms across the world. Denying the moral significance of the biologically natural is almost inconceivable for environmentalists[161]" (Preston, 2008, p. 26).

It is for these reasons that many environmentalists view the works of nature and its processes as awe-inspiring, original, authentic and pristine. The unnatural, on the other hand, as typified by human manipulation or alteration, can only attempt to replace what nature has already made or destroy it.[162]

With this background in mind I will now argue that the central dogma of environmentalism, what I also call the "natural/unnatural distinction" cannot be maintained. Accordingly, premise one of the "natural interests" argument, like premise two, is false.

There are some serious difficulties for the environmentalist's natural/unnatural distinction as a means of separating what is good from what is bad.

First, there is a rather obvious difficulty with this distinction in that human beings really seem to be just as much natural objects as nonhumans are. We, like the rest of the biological world, are the products of natural selection and have our own natural history as a species. Consequently, it's reasonable to think that everything that man does is in some sense 'natural' or an instance of natural processes of some sort. So, for example, when human beings design works of art, make skyscrapers and manufacture designer drugs these activities take place within the confines of the laws of nature that not only produced man but also his inclinations, abilities and

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161 An example of this view comes by way of Holmes Rolston III. He writes, “"No one has learned the full scope of what it means to be moral until he has learned to respect the integrity and worth of those things we call wild" (Rolston 1979, p. 25). I take it that what Rolston means by the term “wild” includes the “biologically natural” but it also includes non-biological entities such as soil, water, etc.

162 Keekok Lee makes a distinction between those technologies that simply mimic nature and those technologies that cause disruption or harm to the natural order. These are “nature-replacing technologies” and “nature-polluting technologies” respectively. (See Lee, 1999).

desires to embark on them.

This is what Christopher Preston calls a ‘paradox’ for environmentalism. How is it possible for man, who is himself a product of nature and natural forces, to embark on activities that can nonetheless be called ‘unnatural’? Furthermore, how can the works of man as products of these naturally-endowed abilities, be regard as ‘artificial’ as well? It ultimately doesn’t seem as if they can be. In 1885 John Stuart Mill highlighted the problems for this way of thinking when he wrote,

> “Art is as much Nature as anything else; and everything which is artificial is natural – Art has no independent powers of its own; Art is but the employment of the powers of Nature for an end. Phenomena produced by human agency, no less than those which as far as we are concerned are spontaneous, depend on the properties of the elementary forces, or of the elementary substances and their compounds…The corn which men raise for food, grows and produces its grain by the same laws of vegetation by which the wild rose and the mountain strawberry bring forth their flowers and fruit…Even the volition which designs, the intelligence which contrives, and the muscular force which executes these movements, are themselves powers of Nature” (Mill, 1885, p. 7-8).

Likewise, in 1666 Robert Boyle suggested that this distinction was unwarranted when he wrote,

> “I know not why all the productions of the fire made by chymists [chemists] should be looked upon as not natural, but artificial bodies; since the fire, which is the grand agent in the changes, doth not, be being employed by the chymist, cease to be and to work as a natural agent: and since nature herself doth, by the help of the fire, sometimes afford us the like productions that the alchymist’s art presents us” (Boyle, 1666, p.51)

Mill's and Boyle’s observations here puts the environmentalist’s distinction at risk.[163] In addressing Mill’s analysis Christopher Preston writes,

> “Mill’s recognition of this central paradox was just an early hint of a whole raft of problems for environmentalists’ use of Aristotle’s nature/artefact distinction. The

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[163] Teresa Kwiatkowska also writes, “Anything that humans do is natural, no matter whether better or worse. Warsaw skyscrapers are as natural as corrals feeding underwater off Australia shores” (Kwiatkowska, 2008, p. 91)

distinction cannot do the work modern environmentalists want it to do." (Preston, 2008, p. 26).

Second, even if one were to grant some version of the natural/unnatural distinction, there seem to be many cases of human actions that are not only natural but actually good for the environment. If we are to believe the claims of the central dogma then we should expect virtually every human intervention in the environment to be unnatural and hence bad for the environment. But this seems wrong too. There are a fair number of cases of human-designed artifacts that are actually good for the environment. Not all human intervention in the environment is bad. The problem is that there is considerable difficulty in finding some principled means for establishing why one act, such as preserving a wetland, for example, should be regarded as 'good' while some other act, such as damming a river for agricultural usage, should be regarded as 'bad'. Preston highlights this difficulty when he writes,

> "…human intention is clearly responsible for creating some artefacts that are environmentally harmful and others that are environmentally beneficial…A restored wetland[164] or an landscape created by a prescribed burn are clearly artefacts on Aristotle's terms, likely containing more human planning and theoretical sophistication than, say, a Walmart parking lot. Yet environmentalists will advocate for the restored wetland and forests while campaigning against the parking lot" (Preston, 2008, p. 26).

Also, human beings eat food and excrete wastes, but should we consider this to be unnatural? It doesn't seem to be. These activities are just as natural as the activities of snakes and birds eating their food and excreting their wastes.

Third, the very definition of the term 'natural' is simply too ambiguous to be very

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[164] Manipulated ecosystems such as restored wetlands, conservation areas, etc. have the same basic structure as unimpacted environs. According to Teresa Kwiatkowska "there is no evidence that unaffected pristine, or heirloom ecosystems exhibit properties of structure, function, or design, which differ from those of less 'natural' ones…the predicate 'natural' adds no new information" (Kwiatkowska, 2008, p. 88).

helpful.[165] John Stuart Mill distinguishes between four different definitions of what natural means in his essay “On Nature” (Mill, 1885). Teresa Kwiatkowska argues that when environmentalists use the term ‘natural’ they are very prone to use it equivocally between all of these different senses. If one is not careful to define nature with precision the term itself is likely to become confused. In addressing Mill’s distinctions on the different definitions of nature Kwiatkowska writes,

> “In one sense, nature is simply the totality of existing things, everything in the universe. In another, it is God’s handiwork, as distinct from humans, while in a third; it is that which is independent of human influence or contrivance. The fourth sense in which something can be natural is the sense of being authentic or true to itself”…Each speaker abstracts ‘nature’ out of the blooming [sic] buzzing confusion of myriads of encounters with whatever is actually out there” (Kwiatkowska, 2008, p. 91)

Since each person uses the term ‘nature’ so differently the term itself is likely to become ambiguous in normal discourse.

There is another reason to think that the program of producing artificial life is not entirely unnatural, or unethical. This comes from an insight that Christopher Preston made regarding man’s own history and his long-standing practice of manipulating nature. According to Preston, man has been

> “…creating biotic artefacts for thousands of years. The hybridization of crops and the domestication of animals is a perennial thorn in the side of those wishing to make deontological arguments against biotechnology” (Preston, 2008, p. 30).

How does the modern practice of synthetic biology substantially differ from the activity of genetically-manipulating crops or animals? Furthermore, human beings have always manipulated and rearranged the environment to some degree or other to suit their ends. So, why should genetic manipulation be seen as "unnatural" or different? Preston further writes,

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165 See Kwiatkowski's (2008) article “The Natural: So Ambiguous A Word.”

> “Rearranging naturally occurring materials whether these materials be carbon atoms or tree limbs, is something humans have been doing for millennia. Even if nanotechnology aims to change nature by working at the level of the atom or molecule rather than at larger, more familiar scales, it is not obvious why this should have any particular moral import” (Preston, 2008, p. 29).

Finally, Elliot Sober has made the observation that not only is the effort to domesticate living organisms ‘natural’ but so are all of the other instances of naturally-evolved living things that exploit other species for *their* benefit. He writes,

> “When we domesticate organisms and bring them into a state of dependence on us, this is simply an example of one species exerting a selection pressure on another. If one calls this “unnatural,” one might just as well say the same of parasitism or symbiosis (compare human domestication of animals and plants and “slave-making” in the social insects” (Sober, 1986, p. 180).

So, since human beings and all other living organisms on the planet are natural and exhibit natural tendencies to use other living beings for their own ends, the natural/non-natural distinction does not hold between human beings and other living organisms. Such a distinction is arbitrary at best.

Michael Shellenberger and Ted Nordhaus sum up the problem for a central dogmatists view when they write,

> “The concepts of ‘nature’ and ‘environment’ have been thoroughly deconstructed. Yet they retain their mythic and debilitating power within the environmental movement and the public at large. If one understands the notion of the ‘environment’ to include humans, then the way the environmental community designates certain problems as environmental and others as not is completely arbitrary" (Shellenberger and Nordhaus, 2004, p. 12).[166]

As such Steven Vogel exhorts environmentalists to simply give up on using the concept

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[166] Similarly, Elliot Sober writes, “It is the dichotomy between artificial (domesticated) and natural (wild) that strikes me as wrong-headed. I want to suggest that to the degree that “natural” means anything biologically, it means very little ethically. And, conversely, to the degree that “natural” is understood as a normative concept, it has very little to do with biology” (Sober, 1986, p. 180).

of ‘nature’ altogether. He writes,

> "I call for...an environmental philosophy that no longer employs the concept nature. First the term is too ambiguous and philosophically dangerous and second, McKibben and others who argue that nature has already ended are probably right - except that perhaps nature has *always* [his emphasis] already ended" (Vogel, 2002, p. 23)

For these reasons the central dogma that animates much of the reluctance of environmentalists to grant interests to designed teleofunctional systems including artificial forms of life cannot ultimately be maintained.

It is for these further reasons that we should regard premise one of the "natural interests" argument false. If the natural/unnatural distinction cannot be made then environmentalists must find some other way of arguing that forms of synthetic life do not have inherent worth. Designed forms of life can have genuine interests that are of biological relevance regardless of whether we might happen to call the processes that generated them ‘natural’ or ‘unnatural’.

According to Basl, if synthetically-produced forms of life are possible, then they would have interests too. He writes, “…there is no reason to think that the only aetiologies capable of grounding teleology and thereby interests are natural selection etiologies…natural selection is not necessary for teleological organization” (Basl, 2012, p. 544). So for Basl what makes it the case that both Arto and, say, a butterfly have interests is that both of them are products of an etiological process that specified their "teleological organization". He further writes,

> “For my own part, I’m unsympathetic with the central dogma. I believe that nonsentient organisms and artifacts are both capable of having interests or goods and that those goods or interests are non-derivative in both cases” (Basl, 2012, p. 544).

Hence, for Basl, both a design etiology and a natural selection etiology are capable of generating teleofunctional systems that have interests.[167]

VII. The Status of Synthetic Life Research

Some biocentrists at this point might argue, "Okay, I will grant you the point that artificially-produced living things can have teleofunctional interests. But, the prospect of actually generating artificial forms of life is so far out of the domain of what is possible I don't need to really worry about whether designed forms of life really would have interests."

This response might ring true for those environmentalists who see the entire field of synthetic biology as perhaps a futile attempt to mimic anything as grand as what nature has already made.

If the field of synthetic biology is some odd form of "fringe" science that has virtually no prospect of successfully creating new, living things then perhaps we might agree with the biocentrist and think that we shouldn't really be too concerned with the question of whether artificial forms of life could have interests. After all, realistically they cannot exist!

If, on the other hand, it turns out that the field of synthetic biology is *not* a form of fringe science, but an active research program that is well on its way to producing artificial forms of life, then the reluctant biocentrist will indeed have to worry about whether these forms of life have interests. She will have to consider this prospect whether she previously believed that such forms of life were possible or not.

So what exactly *is* synthetic biology?

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[167] Basl’s acceptance of such a view puts him at odds with much of the demands of many environmentalists. Later I will discuss design-etiologies vs natural selection etiologies in the debate regarding interests of living organisms. That debate centers on the problem of synthetic organisms like Arto.

According to Sune Holm, synthetic biology is the endeavor,

> "...to develop the ability to rationally design and fabricate organic systems or parts of such systems that have *no natural counterparts* [my emphasis]. Two approaches are standardly distinguished: a top-down approach that aims to create new forms of life by modifying extant life forms and a bottom-up approach which aims to create living systems from nonliving materials ("from scratch")" (Holm, 2012, p.532).

That is, synthetic biology attempts to design living things either de novo ("bottom-up") or by taking some existing form of life and modifying it in some way so that it performs a novel function ("top-down").

A good example of the bottom-up approach in synthetic biology comes from the emergence of 'protocells' and protocell research. Protocells are created de novo by mixing various organic and inorganic compounds together under very precise, laboratory-controlled conditions. Bedau and Parke describe protocells this way:

> "Protocells are alive; they are similar to single-celled organisms like bacteria, in that they grow by harvesting raw materials and energy from their environment and converting it into forms they can use, they sense and respond to their environment and take steps to keep themselves intact and pursue their needs, and they reproduce and ultimately evolve" (Bedau and Parke, 2009, p. 1)

Protocells, according to Holm, are a major step towards creating novel organisms that are capable of basically doing everything that other cellular forms of life can do. If protocell research is ultimately successful, we will have the emergence of artifactual organisms. These organisms, according to Holm,

> "will be self-assembling and self-organising systems which are complex enough to instantiate crucial life processes such as metabolism, replication and the capacity to evolve without relying on components of natural life forms" (Holm, 2012, p. 535).

Artifactual organisms like protocells are the result of a 'bottom up' approach to synthetic biology while "synthetic organisms" are the result of 'top-down' approach.

The vast majority of current, synthetic biological research is of the top-down variety.

Biologists are readily capable of splicing, transcribing and translating DNA. They are capable of removing and exchanging various other cellular components. And they are also capable of synthesizing DNA and inserting novel genes into various forms of life. The inserted genes enable the modified organism to perform new metabolic tasks such as “generating hydrogen for fuel or capturing excess carbon dioxide in the atmosphere” (Holm, 2012, p. 532).

But top-down research isn’t just interested in making novel, individual genes. It is also interested in synthesizing and creating whole new *genomes*.[168] A good example of a chemically synthesized genome is found in the collaborative work of synthetic biologists from the J. Craig Venter Institute.[169] These biologists sequenced the genome of a microbe, made a copy of it themselves by chemical means[170] and then inserted that same genome into a living cell that had its original genome removed (Gibson et al., 2010,).[171]

But is it really possible for top-down research to create an entirely new form of life? Consider these words form Michael Specter in a piece that he wrote for *The New Yorker* entitled, "A Life of Its Own: Where will synthetic biology lead us". He describes one of Venter's experiments in the following way. He writes,

> "In the mid-nineties, Craig Venter, working at the Institute for Genomic Research, and his colleagues Clyde Hutchison and Hamilton Smith began to wonder whether they could pare life to its most basic components and then use those genes to create such an organism. They began modifying the genome of a tiny bacterium called *Mycoplasma genitalium*, which contained four hundred and

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[168] A genome is the *entire* sequence of nucleotides that is found in a living thing’s DNA.
[169] Venter is also famous for being the first to sequence the human genome.
[170] For example, these researchers use existing synthesized DNA sequences with known properties in the synthetic process of constructing the genome. These sequences are known as ‘bio-bricks’.
[171] Other authors have discussed synthetic biology’s prospect using DNA samples to re-create either extinct forms of life or endangered forms of life. This topic is discussed in the ETC Group (2007) report “Extreme Genetic Engineering” as well as by scientists from the Frozen Ark Project; see www.frozenark.org.

> eighty-two genes (humans have about twenty-three thousand) and five hundred and eighty thousand letters of genetic code, arranged on one circular chromosome—the smallest genome of any cell that has been grown in laboratory cultures. Venter and his colleagues then removed genes one by one to find a minimal set that could sustain life...Venter called the experiment the Minimal Genome Project. By the beginning of 2008, his team had pieced together thousands of chemically synthesized fragments of DNA and assembled a new version of the organism. Then, using nothing but chemicals, they produced from scratch the entire genome of *Mycoplasma genitalium*. "Nothing in our methodology restricts its use to chemically synthesized DNA," Venter noted in the report of his work, which was published in Science. "It should be possible to assemble any combination of synthetic and natural DNA segments in any desired order." That may turn out to be one of the most understated asides in the history of science. Next, Venter intends to transplant the artificial chromosome into the walls of another cell and then "boot it up," thereby making a new form of life that would then be able to replicate its own DNA—the first truly artificial organism. (Activists have already named the creation Synthia.) Venter hopes that Synthia and similar products will serve essentially as vessels that can be modified to carry different packages of genes. One package might produce a specific drug, for example, and another could have genes programmed to digest carbon in the atmosphere." (Specter, 2009).

The top-down approach, though arguably not as ambitious as the bottom-up approach, is genuinely capable of generating entirely new forms of life. Holm describes the prospect this way,

> "…it is now possible for humans to initiate a lineage of cells with genomes descending from a synthetic genome. An implication is that this will result in organisms and forms of life that have never existed before, and depending on how we draw the distinction between modifications of existing life and the creation of entirely new forms of life, this may be technically true of [this research]" (Holm, 2012, p. 533).

That is, both entirely novel organisms, like protocells, and other forms of synthetic life could be brought about by the practices of synthetic biology. Accordingly, the designers of these forms of synthetic life would be capable of bringing about living, teleofunctional systems with teleofunctional interests that nature up until that point did not produce.

In fact, the main drive behind much of synthetic biology research is to find ways of creating new organisms that up until now natural selection had been *incapable* of producing. Synthetic biology, as it were, seeks to *direct* the production of novel forms of life that could then be used for various purposes. Synthetic biology, according to Christopher Preston, aims to

> "create an entirely new organism with DNA constructed in its entirety according to human plan. The products of synthetic biology do not borrow any genetic function from genomes produced by the historical evolutionary process. To the contrary, synthetic biology is guided by the idea of leaving evolution and existing genomes behind in order to do a better job of creation with human goals in mind." (Preston 2008, p. 33).

Given that protocells have already been synthesized in the lab along with the success of Venter's research program it is a genuine possibility that future scientists will bring about new forms of life that up until that point had not been produced by natural means. Synthetic biology is not an odd form of fringe science with no prospect of success. On the basis of its current status synthetic biology is capable of making artificial organisms that would be exemplars of novel teleofunctionality. They would be teleofuncional systems capable of having teleofunctional interests.

In any event, even if the prospect of artificial life turns out to be a failure. It would still be true that if such forms of life were to exist they would have teleofunctional interests.

VIII. Conclusion

In this chapter I have attempted to show that a systems-based account can be successful in explaining how all teleofunctional systems, most notably all living things can have teleofunctional interests. This approach to understanding what would be a living thing's interest adequately represent teleofunctional interests as a matter of a system's overall, internal organization. This account would claim that any appropriately teleofunctional system will have teleofunctional interests. Artificially produced teleofunctional systems, naturally-selected teleofunctional systems, "instant" teleofunctional systems all have teleofunctional interests because of their internal organization.

I have also attempted to show that attempts to keep designed, teleofunctional artifacts off of the list of interest possessors all fail. Artificially produced, teleofunctional systems have teleofunctional interests in the same way that naturally-selected, teleofunctional systems do.

In the next chapter I will attempt to address the question of what could make the interests of all living things morally considerable and whether, in the final analysis, all living things have interests that are morally considerable.

CHAPTER FOUR
The Moral Considerablity of Interests

In the previous chapter I attempted to show that a systems-based account of interests is quite capable of explaining how all living things can have interests. A systems-based account of interests would claim that any system that has numerous, interconnected teleofunctional structures that all contribute to the self-regulation of it is also a system that has teleofunctional interests.

I also attempted to show that living artifacts can have just as many teleofunctional interests as their naturally-selected counterparts. It is just as "good for" a designed teleofunctional system to be able to regulate itself as it is "good for" a naturally-evolved teleofunctional system to be able to regulate itself. I have also attempted to argue that the possession of teleofunctional interests requires the possession of numerous, multi-functional structures that contribute to a thing's self-regulation. Those structures that are integrated, multi-functional and contribute to the system of which those structures are a part are teleofunctional structures. The possibilities for artificial life as well as insights from the systems-based account have raised the prospect that teleofunctional interests can belong to *all* teleofunctional systems regardless of their etiology.

However, just because these teleofunctional systems all have teleofunctional interests it does not necessarily mean that those teleofunctional interests are also morally considerable. As Sune Holm writes, "…the fact that the organisational approach entails that inorganic systems are teleological[172] systems that have interests *need not* [my emphasis] commit us to the claim that

[172] The use of the term "teleological" here by Holm simply means that inorganic systems (systems that are not carbon-based) can be *teleofunctional*.

these interests are morally considerable” (Holm, 2012, p. 540). That is, should it turn out that some teleofunctional system (in this case a teleological “inorganic system”) has interests it is a separate question as to whether its interests are morally considerable.

Varner, on the other hand, claims that anything that has biological interests automatically has interests that are morally considerable. But, as I demonstrated in chapter two, there are good reasons to think that not all naturally-selected biological functions count as functions that would be in the interests of the individual organism.

In the first section of this chapter I wish to stress the importance of the moral standing for non-sentient living beings for biocentrism. In this section I will provisionally grant that the teleofunctional and sentient interests of sentient beings are directly morally considerable independently of etiology. Interests that are directly morally considerable are ones that give the possessor of those interests direct moral standing. Likewise I will grant that the preference interests of rational agents are directly morally considerable independently of etiology too. As such all conscious agents and sentient beings are granted to have interests that are directly morally considerable independently of their etiology.

In the second section I will address the question of what could make it the case that non-sentient teleofunctional beings can have directly morally considerable teleofunctional interests. Key biocentrists think a sufficient condition for a non-sentient being to have directly morally considerable interests is if it has a "goal of its own". These goals are directly morally considerable because they are self-directed goals. If there exists a being that has these self-directed goals then other agents have direct moral obligations to these beings not to harm them.

In the third section I will address the question of what would be a *necessary* condition for a non-sentient teleofunctional being to have a goal of one's own. I will argue that a necessary condition for having a goal of one's own is having teleofunctional structures that have teleofunctional *purposes*. Non-sentient beings that do not have teleofunctional structures with teleofunctional purposes are not one's that can have a goal of their own.

In the fourth section I will address the question of whether a non-etiological, systems-based account is capable of showing that the teleofunctional interests of non-sentient beings is morally considerable. According to a systems-based view a non-sentient teleofunctional living thing has an interest in its structures performing their teleofunctions because of the internal, functional role that its structures play in the self-regulation of it. Etiological explanations for how those structures acquired their teleofunctional purposes or functions are not required. I argue that under a systems-based view there can exist some cases of teleofunctional organisms that have teleofunctional interests that are not morally considerable because there can exist some cases teleofunctional beings that do not meet a necessary condition for having a good of its own namely the condition of having teleofunctional structures that have teleofunctional purposes. The systems-based account cannot discriminate between organisms that have that necessary condition for having a good of their own and those that do not have that necessary condition. As such I conclude that the systems-based approach cannot reliably be used as a means of identifying which living things have morally considerable interests and which ones do not. While the systems-based view of interests opens up the possibility that teleofunctional interests can belong to any appropriately complex system, it fails in providing explicit guidance on the question of just what could make the teleofunctional interests of non-sentient beings morally considerable.

Recall that in chapter two I presented some background information on four possible categories of etiologies for the existence of living things.[173] They were 1) a natural selection etiology, 2) an agent-selection non-design etiology, 3) a design etiology and 4) an "Instant organism" etiology.

In the fifth section I will address the question of whether non-sentient beings produced by an "Instant Organism" etiology can have a good of their own and thus have directly morally considerable teleofunctional interests. An "Instant Organism" etiology is one in which some teleofunctional system was brought about by an undirected, instantaneous natural event that occurred by happenstance or a series of such events. I will argue that the teleofunctional interests of instant organisms are not morally considerable. In short, organisms produced instantaneously do not have structures that have teleofunctional purposes. Hence, their teleofunctional processes are not ones that can be labeled as malfunctioning. Hence, no moral agent can cause these teleofunctional systems to malfunction. Hence, their teleofunctional interests are not morally considerable.

In the sixth section I will address the question of whether non-sentient, teleofunctional being produced by an agent-selection, non-design etiology could have a good of their own and thus have morally considerable teleofunctional interests. This etiology is one in which some agent is involved in the selection history of a complex, teleofunctional system but in which there is no actual directing, planning, forethought or design taking place by that agent.[174] This etiology cannot produce non-sentient, teleofunctional beings that possess morally considerable teleofunctional interests for the same reason that an "instant organism" etiology cannot produce non-sentient being that possess morally considerable teleofunctional interests. This etiology

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173 See also Figure 1 from chapter two.

174 As a reminder see the example of "Tom's rainwater collector" from chapter two.

cannot produce non-sentient, teleofunctional beings that have structures with teleofunctional purposes.

In the seventh section I address the question of whether a natural selection etiology can produce non-sentient teleofunctional beings that have structures with teleofunctional purposes. I will argue that a natural selection etiology cannot produce such organisms because it cannot select some teleofunctional structure for performing a teleofunctional task. As such, non-sentient teleofunctional beings produced by natural selection cannot have a good of their own because they lack structures that have teleofunctional purposes. Consequently, naturally selected teleofunctional interests of non-sentient, teleofunctional beings are not morally considerable. Thus, a natural selection etiological account of interests cannot succeed in showing that all naturally-selected, living things have inherent worth.

In section eight I take up the task of analyzing those arguments put forward for the claim that natural selection can generate non-sentient teleofunctional beings that have their own goals or a good of their own for reasons *other than* the claim that they have structures that have proper functions or functional purposes. Some claim that the process of natural selection is capable of generating non-sentient beings that have a good of their own because the process of natural selection is guided by some directionality toward an ultimate Aristotelian "telos" or final end or that nature itself has its own kind of purposefulness or preordination. I argue that these claims are inconsistent with the basic Darwinian view that life is the result of an unguided process of natural selection acting on random variation. As such the claim that natural selection is inherently teleological is false.

In the ninth section I consider the question of whether genes have some kind of inherent tendencies or goals that they seek to bring about. I argue that this claim is not support by biological data and that naturally-selected "genetic interests" in reproduction are not always in the interests of the individual organism.

In the tenth section I turn to a discussion of what the naturalistically-minded biocentrist must face if they accept the view that all living things arose by the process of natural selection. Here I argue that such a biocentrist cannot argue for the claim that all living things have a "good of their own" and as such they must appeal to some other reason for why we should think that naturally-selected, non-sentient teleofunctional beings have morally considerable interests.

In the eleventh section I argue that all non-sentient living things simply do not have goals of their own. As such they do not have interests that are directly morally considerable.

In the twelth section I argue that while non-sentient living things do not have goals of their own it is not true that their teleofunctional interests cannot be morally considerable. Although their teleofunctional interests are not directly morally considerable they can still be indirectly morally considerable. Their teleofunctional interests can confer upon them some kind of indirect moral standing if their teleofunctional interests are the subject of a rational agent's preference interests.

In the thirteenth section I address the question of whether all naturally-selected non-sentient living things could be guaranteed to have teleofunctional interests that are indirectly morally considerable. I argue that they would not because there is little reason to think that human beings are capable of having such preference interests in the teleofunctional interests of all non-sentient living things.

I then conclude with a brief recap of the chapter.

I. Granting Morally Considerable Interests to Conscious Agents and Sentient Beings

In chapter three I made a distinction between three different kinds of interests. They are 1) preference interests, 2) sentient interests and 3) teleofunctional interests. Many living organisms have all three of these interests. Others have both sentient interests and teleofunctional interests. Still others only have teleofunctional interests. But all living things, whether sentient or not, have teleofunctional interests. All living things are comprised of numerous interconnected parts that work together for their self-maintenance.

Typical examples of living things that have all three interests are human beings, primates and many other mammals. These are beings that have preferences for various states of affairs, can feel pain and have numerous interconnecting parts that all work together for their self-maintenance. Examples of living things that have both sentient interests and teleofunctional interests include such beings as insects and various other invertebrates. These beings have various forms of sense perception and also are comprised of numerous interconnecting parts that all work together for their self-maintenance. Examples of living things that have only teleofunctional interests are plants, single-celled organisms and sponges among others.

In order for the biocentrist to show that all living things have inherent worth they must be able to show that teleofunctional interests are morally considerable.[175] That is, they must show that teleofunctional interests provide a reason for why all moral agents should care about possessors of those interests non-instrumentally. It must be shown that these interests are ones that we, as moral agents, must take into account when deciding what the proper treatment of the beings that have those interests should be. A biocentrist project that attempts to show that all living things have inherent worth cannot succeed unless this requirement is met.

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[175] As a reminder, I provide a definition of inherent worth in section VII of chapter one. In short, something has inherent worth if it has interests that provided a reason to care about it non-instrumentally.

For the purposes of this dissertation I will grant that both sentient interests and preference interests are morally considerable independently of etiology. This is not an unreasonable concession. Most of us would probably think that it is just as wrong to torture or maim an "instant dog" as it is to torture or maim a naturally-selected dog. Both of them can equally feel pain. It seems reasonable to think that both of these animals have sentient interests in avoiding pain that confer upon them some degree of direct[176] moral standing and respect. Likewise most of us probably think that violating another being's preference interests is *prima facie* wrong regardless of how those beings came about[177] and that their preference interests give them some degree of direct moral standing too. One reason to think that preference interests are morally considerable is because preventing some other being from fulfilling their desires or wishes strikes many of us as being morally impermissible.[178] Likewise, it would be just as wrong to

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[176] It is direct in that sense that we have obligations *to* these beings not to cause them to feel pain for no good reason.

[177] Conscious agents are prime examples of beings that have preference interests. But this should not be interpreted to mean that they are the *only* beings that can have preference interests. It looks as if many types of animals are capable of having preference-like states such as goals or purpose. For example, Tyler Burge has commented on the existence of apparently goal-directed behavior of spiders in the genus *Portia*. These spiders have the ability to make plans and change routes when tracking down prey. Regarding these spiders Burge writes, "There is substantial evidence that Portia can set and hold in memory a detailed route [to capturing prey]. Following the route often involves extensive detour behavior. Portia commonly forages in a jungle tangle of branches and vines. In such an environment, detours are often necessary." (Burge, 2010, p. 515)

[178] Some might object to the notion that violating someone's preference interests would necessarily cause that person to be unhappy. For instance, a person could have a very slight preference interest in not having the bumper of their car scratched by another person. But having their bumper scratched wouldn't cause this person any significant unhappiness. Hence it seems like preference interests, if violated, don't necessarily result in unhappiness. This is probably because very slight or 'weak' preference interests (such as this person's interest in not having their bumper scratched) are not significant contributors to a person's happiness. On the other hand, 'significant' or 'strong' preference interests would cause a person to be unhappy if violated. Still someone could reasonably argue that even if a person has a very weak preference interest that violating that preference interest would cause that person to experience *some* unhappiness (however slight it may be) that they would not have otherwise experienced.

thwart the intentional plans of an instant, rational agent (such as "Swampman") as it would be to thwart the intentional plans of a naturally-evolved human being. Both beings have their own plans and intentions that confer upon them some degree of moral standing and respect.

For non-sentient beings, however, it is not true that if *their* teleofunctional interests are violated then their sentient interests are also violated. After all they have no sentient interests to violate! Also, non-sentient beings certainly cannot make plans or have intentional states like conscious agents can. So if their teleofunctional interests are violated their conscious plans and intentions cannot be violated either for the same reason. They have no intentional states. Non-sentient beings such as plants or single cells can be systemically harmed. But they cannot experience pain, nor can they make conscious plans that can be frustrated.

In order for the biocentrist's project in showing that all living thing have inherent worth is to succeed it needs to show why the teleofunctional interests of non-sentient living things should be regarded as morally considerable that is as providing reasons for why they should be cared about non-instrumentally.

II. A Sufficient Condition for Having a Morally Considerable, Teleofunctional Interest

To that end we should ask whether the teleofunctional interests of non-sentient beings are, like preference interests and sentient interests, morally considerable to the extent that they confer direct moral standing to non-sentient beings. If their interests are morally considerable *independently of etiology* then we do not need to assess whether any of the various etiological options presented in chapter two are relevant to their moral status. They would have moral standing independently of their etiology. But if the moral considerability of their interests is etiology *dependent* then we need to address the question of what necessary conditions these etiological options must fulfill in order for non-sentient beings with teleofunctional interests to have morally considerable teleofunctional interests.

So why should we think that the teleofunctional interests of non-sentient beings are, or could be, morally considerable? What condition, if any, would make the teleofunctional interests of non-sentient beings ones that all moral agents should take into account?

A good place to start is by examining what reasons other biocentrists have offered in defense of the claim that non-sentient beings, particularly plants, have morally considerable interests, the kind of interests that give them moral standing.[179]

Paul Taylor has argued that if some being can be meaningfully said to be *harmed or benefitted* then it has moral standing even if it cannot *consciously* value its own good. Taylor argues that all living things are the kinds of subjects that can either be benefited or harmed. Consequently, we should take their interests into account regarding our treatment of them.[180]

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179 The kind of moral standing that Paul Taylor has in mind is *direct*, moral standing. Direct moral standing is that moral standing that belongs to beings that we have direct obligations *to*. On this view, for example, we would have an obligation *to* a tree not to harm it because it has interests that give it direct moral standing.

As a side note others think that all living things have moral standing that is *minimal*. On this view if something has minimal moral standing then its interests should be taken into account where they deserve some basic, or minimal, level of moral regard. It is *minimal* in the sense that beings with this moral standing qualify for a degree of moral respect that is just enough to regard them as beings that ought not to be harmed especially if those beings are doing no harm to other beings or impeding their interests. The minimal level of moral standing is best expressed by what Kenneth Goodpaster calls "regulative moral consideration" which is distinct from what he calls "operational moral consideration". He writes,

"It seems to me that there clearly are limits to the operational character of respect for living things. We must eat, and usually this involves killing (though not always). We must have knowledge, and sometimes this involves experimentation with living things and killing (though not always). We must protect ourselves from predation and disease, and sometimes this involves killing (though not always). The regulative character of the moral consideration due to all living things asks, as far as I can see, for *sensitivity and awareness* [my emphasis], not for suicide (psychic or otherwise). But it is not vacuous, in that it does provide a ceteris paribus encouragement in the direction of nutritional, scientific, and medical practices of genuinely life-respecting sort." (Goodpaster, 1978, p. 324).

180 Taylor did *not* specifically endorse the view that non-sentient beings *had* interests per se but that they had a "good of their own" which gives them moral standing. As I have argued

He writes,

> "Concerning a butterfly, for example,…we would probably deny outright that it *values* [my emphasis] anything in the sense of considering it good or desirable. But once we come to understand its life cycle and know the environmental conditions it needs to survive in a healthy state, we have no difficulty in speaking about what is beneficial to it and what might be harmful to it. A butterfly that develops through the egg, larva, and pupa stages of its life in a normal manner, and then emerges as a healthy adult that carries on its existence under favorable environmental conditions, might well be said to thrive and prosper…Once we acknowledge that it is meaningful to speak about what is good or bad for an organism as seen from the standpoint of its own good, we humans can make value judgements from the perspective of the organism's life, even if the organism itself can neither make nor understand those judgments….We can intentionally act with the aim of helping a plant to grow and thrive, and we can do this because we have genuine concern for its well-being. As moral agents we might think of ourselves as under an obligation not to destroy or injure a plant. To do this would involve our using as the standard of evaluation the preservation or promotion of the plant's own good." (Taylor, 1986, p. 66-67)

Here Taylor is presenting the view that so long as we can talk about the conditions that can contribute to a living thing's health and other conditions that can harm it or degrade it independently of whether it comprehends those beneficial or harmful conditions, we should give consideration to its good in light of our understanding of what can harm or benefit it. We have obligations to all living things not to harm them.

But the basic problem with this kind of argument is that we can also speak about those conditions that can harm or benefit *artificially-produced*, non-living things that upon reflection we do not have direct obligations to. For instance, we can meaningfully talk about what can harm an automobile or degrade its functioning (such as removing its spark plugs) and we can also talk about what can benefit it (such as keeping it well-oiled). But most of us would probably not think

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elsewhere it is reasonable to talk about what is *in* a being's interest even if that being does not have an interest *in the sense of having a conscious awareness of what is good for it*. Taylor's use of the term "good of one's own" or "good of its own" is roughly synonymous with having an interest *in the sense of the definition of interest that I provided in chapter three* which describes interests as existing independently of whether some being has conscious awareness of its interests.

that we have an obligation *to our cars* to keep them well-oiled or not to harm them. Furthermore, it might likewise seem strange to think that we have obligations *to* non-sentient, teleofunctional robots to refrain from interfering with their teleofunctional processes if doing so would cause them systemic harm.

Taylor, however, argues that designed artifacts such as cars do not have the same kind of moral standing that living things do, not because those artifacts could not be *harmed*, but because those things are not goal-directed toward *their own* ends. According to Taylor, beings that are directed toward their own ends have direct moral standing. All natural, living organisms, it is argued, are goal-directed toward their own ends. A car, for example, is not organized to bring about its own end, but rather is organized *for the ends of human beings*. A living cell, conversely, is organized in such a way that it is goal-directed toward its own end, its own well-being.[181] On Taylor's view, beings that are goal-directed toward their own ends have "a good of their own". Designed artifacts such as non-conscious robots do not have "a good of *their own*" because they were not brought about with *their* goals in mind. Rather, they were programmed to bring about the goals of their designer.

Living organisms, Taylor claims, have a good of their own in that they did not acquire their goal-oriented activities from some source *external* to themselves. Their goals are "original" to them. He writes,

> "This point holds even for those complex mechanisms (such as self-monitoring space satellites, chess-playing computers, and assembly-line "robots") that have been constructed by humans to function in a quasi-autonomous, self-regulating manner in the process of accomplishing certain purposes. Though such machines are understandable as teleological systems, they remain in actual fact inanimate objects. The ends they are programmed to accomplish are not purposes *of their own* [my emphasis], independent of the human purposes for which they were

[181] Here I am not endorsing Taylor's view that all living things have goals of their own but rather analyzing his claim that all living things are goal-directed toward their own ends.

> made. This is not to deny in certain contexts *it is perfectly proper to speak of what is good or bad for them* [my emphasis]. These would be conditions that add to or detract from their effectiveness as instruments for bringing about the (human) ends they were made to serve. But it is precisely this fact that separates them from living things…The goal-oriented operations of machines are not inherent to them as the goal-oriented behavior of organisms is inherent to *them*. To put it another way, the goals of a machine are derivative, whereas the goals of a living thing are original... A living plant or animal...has a good of its own in the same sense that a human being has a good of its own. It is, independently of anything else in the universe, itself a center of goal-oriented activity. What is good or bad for it can be understood by reference to its own survival, health, and well-being. As a living thing it seeks its own ends in a way that is not true of any teleologically structured mechanism. It is in terms of *its* goals that we can give teleological explanations of why it does what it does. We cannot do the same for machines, since any such explanation must ultimately refer to the goals their human producers had in mind." (Taylor, 1986, p. 123-124)

Taylor does, however, think that should there exist some *artificially-produced* being that has *human-like consciousness* it would have a good of its own. He writes,

> "I should add as parenthetical note that this difference between mechanism and organism may no longer be maintainable with regard to those complex electronic devices now being developed under the name of artificial intelligence. Perhaps some day computer scientists and engineers will construct beings whose internal processes and electrical responses to their surroundings closely parallel the functions of the human brain and nervous system. Concerning such beings we may begin to speak of their having a good of their own independently of the purposes of their creators. At this point the distinction drawn above between living things and inanimate machines may break down" (Taylor, 1986, p. 124-125)

Thus, on Taylor's view, *conscious* robots *would* have a good of their own even though such conscious activity would be derivative of the designer's goal of creating such a being capable of conscious activity.[182] Taylor himself is silent on the question of whether an artificially-produced, non-sentient, teleofunctional being would have a good of its own. He does, however, suggest that the distinction between "living things and inanimate machines may break

[182] Note that this view of Taylor's is consistent with the provisional assumption that conscious agents have moral standing *independently* of whatever etiology brought them into existence.

down" in which case there could exist a case of an artificially-produced, non-sentient teleofunctional being that could have a good of its own.

On Taylor's view it appears as if the *real* difference is not between those beings that can be harmed and those beings that cannot be harmed but rather between those beings that have goods of their own and those that do not. A non-sentient being that is more machine-like would presumably not qualify as a being that can have a good of its own because machines cannot carry out their own goal-directed activities. Whereas, if something is more like an "organism" then it has a good of its own because it can carry out its own goal-oriented activities. For instance, heat-seeking missiles, it might be argued "have the goal" of seeking out sources of heat, but that is not a goal *of their own* because that goal is oriented toward an external state of affairs and not toward its own well-being. Heat-seeking missiles do not have goals of their own because they are not sufficiently complex and "organism-like" to carry out their own self-directed activities only those activities that have been assigned to them by an external designer.

Taylor thinks that since the non-sentient, living things that exist in the natural world have such *self-directed activities* then they do have goals of their own and that we should thus think of them as "striving", "trying" or "aiming" to do what is good for themselves. In order to have a good of one's own one must at least be *directed toward* some goal or at least be capable of being goal-directed toward its own well-being. According to Taylor, all living organisms are "teleological centers of life" in that they are goal-directed and direct themselves towards their own self-preservation and maintenance. Taylor writes that we should

> “…conceive of the organism as a teleological center of life, *striving* [my emphasis] to preserve itself and realize it good in its own unique way. To say it is a *teleological center of life* [my emphasis] is to say that its internal functioning as well as its external activities are all *goal-directed* [my emphasis], having the constant tendency to maintain the organism’s existence through time and to enable it successfully to perform those biological operations whereby it

> reproduces its kind and continually adapts to changing environmental events and conditions. It is the coherence and unity of these functions of an organism, all *directed toward* [my emphasis] the realization of its good." (Taylor, 1986, p. 121-122).

On Taylor's view all living things are in some sense active participants in sustaining their own well-being. This view of non-sentient living things as active, purposive, or goal-oriented is also espoused by other biocentrists as well. Robin Attfield, for example, writes that plants have "latent tendencies, direction of growth and natural fulfilments[183]" (Attfield, 1981, p. 49) that warrant the claim that they should have moral standing. Also, J. L. Arbor has written that

> "Trees, like animals and other plants, but unlike machines, *have end-states* [my emphasis] which are *not decided by human beings*. Given the right conditions and barring interference they will in the course of natural events reach this state." (Arbor, 1986, p. 337)

And finally, Albert Schweitzer, a defender of a life-centered ethic, also endorses the view that all living things are purposive, goal-directed beings and he uses the language of intentionality to describe them. He writes, "The tiny beetle lies dead in your path - it was a living creature, struggling for existence like yourself, rejoicing in the sun like you, knowing fear and pain like you." (Schweitzer, 1969, p. 115).[184]

The basic claim that is being promoted here is that trees, and other non-sentient living things, have some kind of intrinsic teleology that gives them their own natural end-states which

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183 Outside of the U.S. *fulfillment* is the preferred spelling while inside the U.S. the preferred spelling is *fulfillmen*t.

184 Some commentators argue that Schweitzer's use of this kind of intentionalist language unduly anthropomorphizes all living things by likening them to conscious, emotive beings, most notably human beings. Mike Martin made the following comments on the charge of anthropomorphism against Schweitzer. He writes,
"...Schweitzer is widely criticized for anthropomorphism (even as he renounces anthropocentrism), in personifying non-human organisms as literally possessing human qualities. Specifically, he shifts from (a) 'will to live' in the minimal sense of tendencies to survive and develop to (b) 'will to live' in the robust sense of having intentions, purposes, values and conscious experiences..." (Martin, 2007, p. 34).

are the goals that their biological processes are aimed at bringing about.

Some at this point may wonder whether *ecosystems* could have goals of their own too. They might use the following argument by analogy:

1) Single cells are teleofunctional systems with multiple, integrated parts and have goals of their own.
2) Ecosystems are likewise teleofunctional with multiple, integrated parts.
3) Thus, perhaps ecosystems also have goals of their own.

I do not wish to defend the conclusion that ecosystems have goals of their own. Nor do I wish to defend the claim that all single-celled organisms have goals of their own. However, there are at least some reasons to think that ecosystems could be *teleofunctional*.[185]

First, ecosystems are self-regulating to some degree. They are capable of maintaining feedback loops that contribute to stable nutrient availability and other environmental parameters. Bernard Patten and Eugene Odum have identified several such regulated aspects under control by ecosystemic processes. They write,

> "…in every ecosystem can be found a set of variables that are relatively time invariant or that change in repeatable temporal patterns (e.g., total system production, P, and respiration, R, P/R ratios, total chlorophyll, total biomass, ambient nutrient concentration, species diversity, population size, etc.)" (Patten and Odum, 1981, p. 889).

Second, ecosystems exhibit self-maintenance as a result of the various feedback loops that they produce and sustain. According to John Petersen, "Feedback control has received considerable recent attention as a result of its posited role in a variety of contemporary environmental issues, including global warming, introduced toxins, biodiversity, exotic species and periodicity in ecological dynamics" (Petersen, 2001, p.534). That is ecosystem processes keep constant a variety of higher-level environmental parameters that are regulated by the

[185] The claim here is not that ecosystems are *as teleofunctional* or are as teleofunctionally complex as living things are, only that ecosystems might be teleofunctional.

interactions of lower-level elements of the ecosystem.[186] This stability in turn facilitates a healthy environment at the organismic level.

Other environmentalists have pointed to the homeostatic or self-regulating nature of ecosystems as an important, note-worthy feature. Since, ecosystems have the ability to dynamically regulate the environment to some degree they contribute to the health of its constituent members as well as to overall biospheric stability. Disruption of one of the system's regulatory functions by human efforts could contribute to increased instability and further disruptions elsewhere in the system. As Don Marietta writes, "The integrity of the ecosystem is held to be a dynamic homeostasis which can be comprehended through ecological science. Ethical treatment of the environment requires that human beings not disturb this homeostasis..." (Marietta, 1979, p. 197).

So there are some reasons to think that ecosystems can be somewhat teleofunctional in nature in that they are capable of some degree of self-regulation.[187] In any event, if it terms out that ecosystems really are teleofunctional *and* have goals of their own then they too would at least have a characteristic that fulfills a sufficient condition for having morally considerable teleofunctional interests that would give them direct moral standing.

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186 For further discussions of the homeostatic functions of ecosystems and their self-maintaining processes see Przemysław Trojan's book *Ecosystem homeostasis* (1983) and Dyke and Weaver's 2013 article "The Emergence of Environmental Homeostasis in Complex Ecosystems."

187 The insight into ecosystem homeostasis should, however, be tempered with what other ecologists have said regarding ecosystem *instability*. Ecological scientists have noted that the romanticized view of ecosystems as paragons of stability is false. Although ecosystems have a certain degree of homeostatic control they are also subject to large, natural fluctuations and disturbances too. As Colleen Clements writes, "It is simply an ordinary feature of ecosystems that stasis is not indefinitely maintained and that, therefore, major and highly significant change occurs in biotic systems leading to both value and disvalue from a human point of view" (Clements, 1976, p. 137). For another take on the view that ecosystems are not stable see John Kricher's "The Balance of Nature: Ecology's Enduring Myth" (2009).

But why think that beings that have "intrinsic teleology" or have "goals of their own" have morally considerable interests? Consider the following example. Forrest, my dog, has certain goals of his own that if fulfilled are good for his self-maintenance. If he is thirsty he will seek out water. Obtaining water is a goal for him and achieving this goal is good for his continued health. But now let us suppose that someone were to put him on a lease so that his water bowl is just beyond his reach. Forrest would still "have the goal of his own" of drinking water and drinking water would still be good for his health. If someone prevents him from obtaining water, when there is no good reason to do so, then they are thwarting his goal, a goal that is good for him to achieve and that does not interfere with the goals of other beings.

What the biocentrist basically wants to do is claim that *all* living things have *goals* of their own and if so then all non-sentient, living things have goals of their own which in turn means that they have morally considerable interests that gives them some direct, minimal moral standing. In other words, it is a sufficient condition for those beings to have direct, minimal moral standing. All things considered, it is basically wrong to interfere with another being's goals especially if its pursuit of those goals does not interfere with the goals of other beings.

That kind of argument looks something like the following.

1) If some non-sentient, teleofunctional being *x*, has a goal of its own, then *x* has direct, minimal moral standing.
2) If some non-sentient, teleofunctional being *x* has direct, minimal moral standing then *x* has a morally considerable teleofunctional interest.
3) Thus, if some non-sentient, teleofunctional being *x*, has a goal of its own, then *x* has a morally considerable teleofunctional interest.

Some might want to claim that having a goal of one's own is also a *necessary* condition for a non-sentient being to have a morally considerable teleofunctional interest. For instance, if it is true that a tree has a morally considerable teleofunctional interest in its leaves enabling photosynthesis then that tree must have its own goal of enabling photosynthesis. Photosynthesis is, in some sense, what the tree "aims" or "tries" to do.

Likewise, if there should exist some non-sentient, teleofunctional being that does *not* have a goal of its own then it would not have morally considerable teleofunctional interests. For example, if a tree does not have its own goals then its own goals cannot be frustrated. After all, there are no aims or goals available to frustrate! Hence, a tree that does not have its own goal of obtaining sunlight (for example) cannot be morally violated if someone were to prevent its leaves from obtaining sunlight.

The argument for this proposition looks like the following:

1) If some non-sentient, teleofunctional being *x*, has a morally considerable teleofunctional interest, then *x* has direct, minimal moral standing.
2) If *x* has direct, minimal moral standing then *x* has a goal of its own.
3) Thus, if some non-sentient, teleofunctional being *x*, has a morally considerable teleofunctional interest, then *x* has a goal of its own.

At this point I want to further examine the question of what having a goal of one's own means. As mentioned previously, biocentrists such as Taylor and Attfield hold this position. I will also provisionally accept the conclusion of the above argument that *if* some non-sentient, teleofunctional being has a goal of its own[188] then it has a morally considerable teleofunctional interest in pursuing that goal, they have an interest that would give them direct, minimal moral standing.

If it is true that having a goal of one's own is both a necessary and sufficient condition for a non-sentient being to have morally considerable teleofunctional interests, then we will need to consider what necessary condition must be met in order for it to have a goal of its own. If it should turn out that non-sentient beings are incapable of meeting this necessary condition, then

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[188] In a later section of this chapter I challenge the view that *all* living organisms have goals of their own.

whatever else might be said in defense of their moral standing, they will not have a goal of their own. Hence, they will not have teleofunctional interests that give them direct, minimal moral standing.

With this concern in mind I want to focus on the question of what would be a *necessary condition* for non-sentient, teleofunctional beings to have a goal of their own.

III. A Necessary Condition for Having a Goal of One's Own

As I showed in chapter three, teleofunctional systems have numerous, interconnected parts that all contribute to their self-maintenance. What I want to show in this section is that if it really is true that some non-sentient, teleofunctional system has a goal of its own then its teleofunctional parts must *have* teleofunctions.

The basic structure of my argument is the following:

1) If a non-sentient, teleofunctional system, *x*, has a goal of its own, *y*, then *x* has the goal of *y*.
2) If a non-sentient, teleofunctional system, *x* has the goal of *y*, then *x* is capable of malfunctioning with respect to *y*.[189]
3) If *x* is capable of malfunctioning with respect to *y*, then *x* has the functional purpose of *y*.
4) If *x* has the functional purpose of *y* then x's teleofunctional structures are capable of malfunctioning with respect to contributing to *y*.
6) If x's teleofunctional structures are capable of malfunctioning with respect to contributing to *y*, then x's teleofunctional structures have the teleofunctional

[189] Note that this premise applies only to non-sentient beings. It does not apply to sentient beings or rational agents. There can exist instances of sentient or rational beings, such as human beings, that can "have a goal" but that are not therefore capable of *malfunctioning* with respect to that goal should they fail to reach that goal. For instance, if Timmy, a human being, *has the goal* of becoming an astronaut it wouldn't be proper to say that he is therefore *capable of malfunctioning* with respect to becoming an astronaut. If Timmy failed to become an astronaut it would not be because he *malfunctioned* with regard to becoming an astronaut but because he failed to perform a set of actions that if completed would have resulted in him becoming an astronaut. On the other hand, if a tree has the goal of obtaining sunlight then it is capable of *malfunctioning* with respect to obtaining sunlight in that it is capable of functioning improperly with regard to its ability to reach that goal.

purpose of contributing to *y*.

7) Thus, if a non-sentient, teleofunctional system, *x*, has a goal of its own, *y*, then x's teleofunctional structures have the teleofunctional purpose of contributing to *y*.

When we say that some object or structure "has a functional purpose" we normally mean that that object has a function. For instance, screwdrivers have the functional purpose of driving screws into wood. This is because driving screws into wood are what screwdrivers are *for*. That is their function. Likewise, computers have various functional purposes that we would also say are their functions. Many computers have the functional purpose of facilitating the typing and production of documents. That is one of their functions. That is one of the things that they are *for*. Likewise, if a teleofunctional structure, such as a cell membrane, *has the teleofunctional purpose* of selectively filtering matter, then that structure is *for* selectively filtering matter. Selectively filtering matter is the *function* of that teleofunctional structure.

However, beings that have goals of their own have *purposes* in a different sense than beings that do not have goals of their own do. For example, screwdrivers have the purpose of driving screws into wood. But it seems strange to think that they also "have the goal of their own" of driving screws into wood. Screwdrivers are not the kinds of things that have their own goals at all. Beings that have a goal of their own are capable of aiming, at various states of affairs. This sense of "having a purpose" belongs to beings that have their own goals. For example, should my dog, Forrest, form the desire to drink water then drinking water would be a goal of his very own. This would also mean that drinking water would be one of his own purposes. But my dog "has the purpose" of drinking water in a different sense that screwdrivers "have the purpose" of driving screws into wood.

The kinds of purposes that belong to objects such as screwdrivers and computers are what are known as *extrinsic* purposes. An extrinsic purpose is a purpose that is extrinsic to the thing that has it.[190] These are also what we could call functional purposes. The functional purpose of a screwdriver is extrinsic to the screwdriver because its purpose was assigned to it by a being *other than itself*. A screwdriver is for driving screws into wood because that is what its designer intended it to do.

Daniel Nicholson defines *extrinsic purposiveness* in the following way.

> "A machine is extrinsically purposive in the sense that it operates towards an end that is external to itself. Its *telos* is imposed from the outside and it is of use or value to an agent other than itself. A machine *does not serve its own interests* [my emphasis] but those of its maker or user." (Nicholson, 2013, p. 671).

The kinds of purposes that belong to beings that have a goal of their own are known as *intrinsic* purposes. Intrinsic purposes are those purposes that arise from the being that has those purposes. Intrinsic purposes exist when a being, x, brings about one state of affairs, y, in order to bring about some other state of affairs for its own good. Screwdrivers do not have intrinsic purposes because they are incapable of bringing about one state of affair *in order to* bring about some other state affairs *for themselves*. Screwdrivers do not perform various tasks *in order to* bring about their own ends. Conscious agents and other intentional beings, however, do perform various tasks in order to bring about their own ends.[191] For example, my dog has the intrinsic

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[190] Designed objects that only have extrinsic purposes, however, do not necessarily have to only bring about the interests of the designer or agent that brought it about. For example, a teleofunctional system can have the purpose of maintaining its own self-maintenance even if such self-maintenance doesn’t bring about or serve the utilitarian interests of its designer. A robotics engineer can design a robot with the capacity to regulate the charging and re-charging of its own power supply. This purpose, however, is *extrinsic* and so did not come *from* the robot (assuming that the robot did not have mental states or representations) but rather the robot's designer. Nonetheless, this extrinsic purpose serves the robot's own teleofunctional interests. Such an extrinsic purpose exists because an engineer had his or her own intrinsic purpose of designing a system with certain self-regulating capacities.

[191] A intrinsic purpose, however, can be aimed at serving the interests of beings other than the being that has the intrinsic purpose in question. For example, a mother might have the intrinsic purpose of aiming to feed her infant. But that intrinsic purpose of hers is not simply for her benefit because her aim is to feed the infant and being fed is in the infant's interests. So there is a

purpose of drinking water in order to quench his thirst which is pleasing to him. These kinds of purposes are imposed from within the thing that has those purposes and that bring about the ends of the thing that has them.

Nicholson defines *intrinsic purposiveness* this way. He writes,

> "...an organism is intrinsically purposive in the sense that it acts on its behalf, towards its own ends. Its telos is internal, arising from within..." (Nicholson, 2013, p. 671).

So to say that the author of this dissertation “has the purpose” of eating lunch at noon is entirely different from the claim that a screwdriver “has the purpose” of driving screws into wood. To say that the author of this dissertation “has the purpose” of eating lunch at noon is to say that the author is capable of bringing about one state of affairs (driving home) in order to bring about some other states of affairs for himself (eating lunch). According to Taylor non-sentient living things have purposes in this sense. But to say that a screwdriver “has the purpose” of driving screws into wood does not mean to say that it also aims at bringing about one state of affairs in order to bring about some other states of affairs for itself.

For the remainder of this dissertation, and for purposes of shorthand, I will refer to intrinsic purposes as *goals of one's own* while extrinsic purposes will be referred to as *functional purposes*. To say that I have the intrinsic purpose of driving home means to say that I *have the goal* of driving home in that it is a goal *of mine* to drive home. Likewise, to say that a heat-seeking missile "has the goal" of seeking out sources of heat means that it "has the extrinsic purpose" of seeking out sources of heat which in turn means that seeking out sources of heat is its *functional purpose*, but not a goal *of its own*.

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distinction between the *origin* of an intrinsic purpose and the *interests* that that purpose aims to bring about. Or, to put it another way, there is a distinction between that which is the *source* of the purpose and that which the purpose is *aimed at*.

Let us assume that a naturally-evolved, living tree has the goal of its own of growth in the way that Taylor argues and that it is directed toward its own ends.[192] Obviously if the tree has its own goal of growth, then certainly it *has the goal* of growth. For instance, let us say that it is a goal of my own to consume food. If this is true then it must also mean that I at least *have the goal* of consuming food. Similarly, a tree that has a goal of its own of growth also *has the goal* of growth.

If the tree has the goal of growth this would also mean that the tree is at least capable of failing to achieve that goal. But this in turn means that it is capable of failing to perform the functions that it needs to in order to fulfill that goal. For instance, if a tree has the goal of growth then it is capable of failing to reach that goal. And if it is capable of failing in that way then it is likewise capable of failing to fulfill those teleofunctional purposes that contribute to its growth. So, for instance, should its leaves malfunction in gathering sunlight then the tree could not obtain its goal of growth. A tree with malfunctioning leaves is a malfunctioning tree. It is a tree that has structures that are not fulfilling their functional purposes. So if the tree itself is capable of malfunctioning then surely its structures also *have functional purposes*. Those functional purposes are what its leaves, as teleofunctional structures, are supposed to do.

On the other hand, if something does not *have a functional purpose*, but only *performs* that function, it is not one that is capable of *malfunction* with regard to its function. For instance, let us suppose that on one unfortunate occasion my neighbor accidently backs his car into my home resulting in a large hole in my living room wall. This hole allows a considerable amount of sunlight into my living room. In fact, the hole in my living room wall causes the interior of my

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192 The target goal or aim of growth, however, need not be regarded as the *only* goal of a tree. On this assumption a tree could presumably have other goals such as reproduction, acquiring sunlight, absorbing water, fighting various diseases, etc.

living room to be exceedingly well lit. This hole *performs the function* of allowing in sunlight. But, of course, allowing in sunlight is not *the functional purpose of* the hole in my living room wall. The hole was not made with that function in mind even if it happens to allow in sunlight very well. So although this hole *performs the function* of allowing in sunlight, and even performs that function well, it does not *have the functional purpose* of allowing in sunlight.

Should my neighbor take it upon himself to patch up the hole in my living room wall then it would no longer function as a "sunlight allower". But his action would not result in the hole *malfunctioning* with respect to allowing in sunlight precisely because the hole itself never *had the functional purpose* of allowing in sunlight to begin with. So no matter how excellently the hole in my living room wall might *perform the function* of allowing in sunlight, it does not have that as its functional purpose. Hence, nothing that my neighbor could do to the hole could cause it to malfunction. His actions could, however, cause it to no longer *function as* a "sunlight allower".

Imagine that I were to dam up a naturally-formed creek that just so happened to supply water to a nearby wetland. Let us further imagine that the creek *performs the function* of supplying water to the wetland but it does not *have the functional purpose* of supplying water to the wetland. It was not made with that purpose in mind. My action of damming up the creek is one of causing it to *function differently* say, as a retention pond, but not one of causing it to malfunction. I did not cause the creek to "function improperly as a wetland water provider" or to “not function as it was supposed to”. In terms of whether my action of damming up the creek violates the creek's goal of providing water to the wetland it must at least be the case that the creek had the goal of providing water to the wetland. In other words in order to violate the creek's goal it must at least have a goal for me to violate. And so causing the creek to no longer function *as it was supposed to* is precisely what I did not do. This is because the creek never had the functional purpose of supplying water to the wetland. It is not *for* providing water to the wetland although it happens to perform that function quite well.

However, let us suppose that I dam up a ditch that was constructed by a farmer as his means of draining water away from his farmland. This constructed ditch clearly *has the functional purpose* of draining water away from the farmer's property. By damming it up I cause it to malfunction as a "farmland drainer". It no longer functions in the way that it was supposed to function.

Consider yet another example. Suppose that a small pile of boulders were to function as a dam in a city ditch. The boulders wound up in their location by the movements of water currents in the ditch. This pile of rocks function as a dam, but they do not have that as their function. Sally, a local child, loves to play in the deep water next to the dam. Billy, another neighborhood child, smashes this particular collection of rocks so that it no longer functions as a dam. Some might say that Billy's act of causing the pile of rocks to function differently was morally wrong because that action resulted in Sally no longer having a place to swim. But notice that Billy's act of smashing the pile of rocks was not an act of "causing it to no longer function as it should". We might say that Billy’s act of causing the pile of rocks to function differently was wrong (in that, for instance, it made Sally feel unhappy for no good reason) but it would not be because he caused that pile of rocks to *malfunction*.

Or suppose that a sophisticated, autonomous, non-sentient teleofunctional robot was designed by a team of research scientists. This robot was designed for being goal-directed toward its own long-term self-maintenance. This robot is capable of finding its own sources of energy and even of repairing itself. In light of the scientist's aim of generating a self-maintaining, teleofunctional robot they invented the robot's central processing unit *for* coordinating input data from various external sensors. The central processing unit and the external sensors have their respective functional purposes because the team of research scientists intended those structures to have those functions which in turn contribute to the overall goal of the robot's self-maintenance.

If the robot's central processing unit fails at making the right sort of causal contribution to the robots self-maintenance we would rightly say that this structure is *malfunctioning* and not that it simply "no longer performed the function" of coordinating input data. But in order for that claim to make sense its central processing unit must at least have had the functional purpose of coordinating input data.

Consider once again the case of Instant Arto, a non-sentient, instant cell. This cell has numerous, teleofunctional interests in all of its parts contributing to its self-maintenance. But due to its instantaneous, essentially random etiology this cell does not have any structures that have functional purposes. Its cell membrane, for example, *performs* the function of selectively filtering matter but it does not *have* that as its functional purpose. In fact none of its teleofunctional structures have functional purposes. It just happened to pop into existence by an act of sheer chance.

If someone were to puncture Instant Arto's membrane such an act could not be claimed to be one in which that person *caused* the cell's membrane to *malfunction* or to *function improperly* since the cell's membrane doesn't have a functional purpose.[193] By puncturing its membrane they may cause it to cease *functioning as* a highly-selective barrier or to *function*

[193] Some of us might not *like* for someone to puncture Instant Arto's membrane, but that is a different question from whether puncturing its cell membrane is an act of causing it to *malfunction*.

differently as a less-selective barrier. In turn the cell dies because the membrane can no longer selectively filter matter to the degree necessary for its homeostasis. If the cell *dies* it dies because its membrane functions differently not because it malfunctioned or no longer functioned *as it should*.

In order for someone to cause the cell's membrane to malfunction, and where causing it to malfunction is morally wrong (as biocentrists suggest), then it must be the case that the membrane *had a functional purpose*. But that is the very thing that Instant Arto's membrane does not have.

In his essay "Of Suicide" David Hume remarks that "It would be no crime in me to divert the *Nile* or *Danube* from its course, were I able to effect such purposes. Where then is the crime of turning a few ounces of blood from their natural channels!" (Hume, 1799, p.8). Here Hume suggests that in order for it to be morally wrong to divert "a few ounces of blood from their natural channels" there must something about that action that is morally evaluative. But since there is nothing evaluative about causing the Nile River to *flow differently* there is likewise nothing evaluative about causing a person's veins to *flow blood differently*. The Nile, he suggests, might *function as* a "transporter of water to the Mediterranean Sea" but there is nothing inherently wrong with causing it to *function differently* as a "transporter of water to the Gulf of Suez". Likewise, the flow of blood in a person's veins could be diverted from their "natural channels" so that they no longer *function as* an "oxygen suppliers to the brain" but instead *function differently* as "the blood's escape route from the body". In the case of the Nile River and in the case of venous blood flow, a person caused something to *function differently* than it did before. But they did not cause those structures to malfunction.

Many of us would probably favor the view that veins have the functional purpose of transporting blood, whereas the Nile River does not strike us as having the functional purpose of transporting water to the Mediterranean Sea. Nonetheless, if it were the case that both the Nile River and a person's veins had the functional purposes of transporting water to the Mediterranean Sea and supplying oxygenated blood to the brain respectively we might be in a position to call such acts of *changing their function* to something else to be acts of causing those structures *to malfunction*.

When someone causes a thing to malfunction that person causes it to no longer function as should or as it was supposed to. We can physically describe what happens when water is diverted from a naturally-formed channel and when blood is diverted from its proper course in someone’s veins. But this does not mean that such physical descriptions necessarily preclude a normative assessment of whether those structures have functional purposes and so are capable of malfunctioning.

In any event, what is needed for the normative assessment of malfunction is whether something has a functional purpose. In order for someone to make the evaluative claim about whether a person’s veins are malfunctioning or no longer functioning as they should they must at least be in a position to say that those veins had a functional purpose or were supposed to channel blood in a certain kind of way.

Let us assume, for the sake of argument, that a tree has leaves that do not have any functional purposes. So, for instance, its leaves do not have the functional purpose of gathering sunlight but rather simply *perform the function* of gathering sunlight. Let us further suppose that these leaves perform that function rather well and that such performances positively contribute to the tree’s ability to grow and maintain itself. Let us now suppose that an art student picks all of these leaves from the tree and uses them as ornaments in her art collage. Since these leaves do not have the functional purpose of gathering sunlight they are not now malfunctioning with respect to gathering sunlight. Rather they are merely functioning differently than they did before. As such her action of removing the tree's leaves is not one of causing those leaves to malfunction. But if the art student is not in a position to cause them to malfunction then surely her removal of those leaves cannot be claimed to be a morally impermissible violation of the trees interests. It is not a morally wrong act *against the tree's interests* to cause its leaves to function differently than they currently are functioning in the same way that it is not a morally wrong act against the Nile River's interest to cause it to function differently.

Both acts are not morally wrong acts against the tree's interests or against the river's interests.[194] And if it is not a morally wrong injunction against tree's interests to cause its leaves to function differently then surely the tree does not have a morally considerable interest in its leaves gathering sunlight, an interest that provides moral agents a reason to value the tree intrinsically and to treat it as an object of direct moral concern. There is no moral injunction against the proper versus improper treatment of its leaves.

Conversely, if we assume that a tree's leaves can be caused to malfunction then those leaves must have a functional purpose. Leaves that are malfunctioning are ones that are not performing their function tasks. Leaves of this sort are said to be defective, diseased, malformed, etc. A leaf that is performing its function of gathering sunlight is a properly functioning leaf. Leaves of this sort are said to be healthy, flourishing, etc.

A tree that has malfunctioning leaves is one that cannot achieve its goal of growth. It will in turn be a malfunctioning tree. In like manner, a car that has a malfunctioning engine is a

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194 Recall that in order for something to have an interest it must at least have a preference interest, a sentient interest or a teleofunctional interest.

malfunctioning car. This means that a tree's function can either be hindered or furthered by whether its teleofunctional structures are performing their functions. If a tree has leaves that are defective or malfunctioning, then the tree itself will not grow properly. It will malfunction. Conversely if a tree has leaves that are performing their functional jobs then it will grow properly, it will achieve its goal of growth (assuming, of course, that there are no *othe*r teleofunctional structures of it that are malfunctioning).

A naturally-evolved tree that is goal-oriented toward its own end of growth will also have the goal of gathering sunlight since gathering sunlight is part of its means toward growth. As such its leaves, as ineliminable structures of the teleofunctional system that is the tree, will not just merely perform the function of gathering sunlight. They will likewise *have the functional purpose* of gathering sunlight. They are *for* gathering sunlight because that functional task is itself one of the goals that the tree itself is aimed at in so far as sunlight is necessary for its growth. The tree itself is teleologically oriented towards its own well-being which also includes the goal of gathering sunlight. Leaves that do not perform their function do not make the right sort of causal contribution to the tree's goal of growth. Conversely, a properly functioning tree will have functioning leaves because of the connection that exists between a tree being healthy and its leaves being healthy. A healthy tree has healthy leaves.

Scott Simmons points out the kind of connection that exists between whether something has a functional purpose to whether it can be harmed. In short he argues that in order for a biological system to be counted as being harmed by some state of affairs that biological system must have structures that have functional purpose. He writes, "...it seems clear that, say, an organ that cannot be said to have anything wrong with it (i.e., be defective) cannot have been harmed." (Simmons, 2013, p. 255)

For instance, should it turn out that a tree's leaves that do not have the functional purpose of gathering sunlight then those leaves cannot be harmed or damaged by some state of affairs causing them to malfunction. Similarly, if a non-sentient, teleofunctional system, such as a tree, does not have the goal of growth then it cannot be harmed by any state of affairs that cause it to stop growing. It cannot be made to malfunction and so it cannot be harmed in that way.

A tree that has teleofunctional structures that do not have any functional purposes are not teleofunctional structures that can be harmed in the sense of being *caused to malfunction*. And an entire teleofunctional system that is comprised of structures that do not have functional purposes is one that likewise cannot be harmed in the same sense.

For the reasons given above I propose the following as a necessary condition for having a goal of one's own.[195]

> *Some non-sentient, teleofunctional system, x, has a goal of its own, only if x has structures that have teleofunctional purposes.*

IV. Can a Systems-based Account be used to Reliably Establish the Existence of Morally Considerable Teleofunctional Interests for Non-Sentient Beings?

As I illustrated in chapter three, the systems-based account allows someone to make sense of what is in an organism’s interests without requiring further knowledge of its causal history. According to this account a living thing has an interest in its structures performing their teleofunctions because of the actual internal, functional role that those structures play in the self-regulation of it. Etiological explanations for how some teleofunctional system acquired its structures are simply not needed to determine whether a living thing has a teleofunctional interest in its structures performing their teleofunctions. If we needed to identify the teleofunction of an

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[195] I have argued in the previous section that having a goal of one's own is also a *sufficient* condition for having morally considerable teleofunctional interests.

organism's structure and the corresponding interest hat the organism has in that structure performing it teleofunction, we would not need to wait for some etiological explanation of how that function arose. As Delancey writes,

> "If we were to discover a new kind of mammal, for example, we would not be stumped to understand it, waiting until the evolutionary biologists placed it in evolutionary history and then told us why this or that organ or behavior evolved. We could just watch it in its environment, and working with some basic naturalist presuppositions[196]…we could develop theories of what it was up to…Some common-sense understanding of organisms as complex systems with teleofunctions is the best explanation for our ability to recognize (at least some) instances of flourishing in other organisms…if we were ever to discover extraterrestrial life, with a completely different evolutionary history than we have derived for our own planet, we would not be flummoxed until we uncovered that planet's fossil record" (Delancey, 2004, p. 184).[197]

I also showed in chapter three that this account is able to resolve problematic cases of harmful, selected functions such as that of the oncogene. The reason why the oncogene is not in

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[196] A good question that could be asked is whether our own unspoken *etiological* presuppositions might be among the "basic naturalist presuppositions" that Delancey refers to. "What", it might be urged, "is a new kind of *mammal* if not what we have *already* come to recognize as animals with a particular kind of evolutionary history; one that resulted in their placement in the mammalian lineage?"

[197] Karen Neander (1991), however, takes the contrary position. She, like Varner, thinks that causal/historical explanations are a crucial aspect of understanding the functional purpose of an organism's structure. She writes,
"Suppose there are no lions. Then suppose that *half a dozen lions pop into existence* [sic], we know not how. Having stared at them in stupefied amazement for some time, we eventually begin to wonder about their wing-like protuberances on each flank. We ask ourselves whether these limbs have the proper function of flight…I contend that we could not reliably place them [the "wings"] until we knew or could infer the lions' history. And if we were to discover that the lions had no history, and were the result of an accidental and freak collision of atoms, they would definitely not belong in any of our familiar functional categories" (Neader, 1991, p. 179-180). Some might think that Neander's use of the word "lion" does not represent actual lions because "real" lions have a particular evolutionary history by natural selection that makes them lions. Thus, the "lions" that suddenly popped into existence are not really lions. In any event, if Delancey is correct then we would not need evolutionary, historical knowledge in order to determine what the wings of these "lions" are for. All we would need to do is simply observe these creatures in their environment in order to determine what, if any, teleofunctional role that their wings might play in their self-regulation.

an oncomouse's interests is because it is not a teleofunctional structure. It does not contribute to the self-regulation of the mouse but instead contributes to a degradation of the mouse's overall self-maintenance. It is not playing the right kind of endogenous causal role in the maintenance of the life of the mouse. Thus, the mouse has no teleofunctional interest in its oncogene producing cancerous tumors. The cancerous tumors that the oncogene facilitates disrupt and inhibit the otherwise, normal teleofunctional structures that exist in the mouse's organisational system.

Thus, while the oncogene of the mouse is not performing a teleofunction, (in Delancey's sense) the other integrated biological structures and systems of the mouse are. These are the teleofunctional structures that perform functions that the mouse has a teleofunctional interest in.[198] A harmful, naturally-selected function, such as violently fighting rivals, is likewise not in the teleofunctional interest of male elephant seals. Naturally-selected fighting behavior causes systemic harm to individual male elephant seals just as artificially-selected oncogenes cause systemic harm to them. Systemic harm is not good for mice or elephant seals. Thus, selected functions that bring about systemic harm are not in the interests of these organisms.

But there is a real problem for the systems-based view, if one wants to use it to establish the existence of *morally considerable* teleofunctional interests. The problem lies in the fact that while such an account is successful in identifying the existence of teleofunctional interests of non-sentient beings, it cannot rule out instances of teleofunctional organisms that do not *have teleofunctions*.[199] It allows for cases of non-sentient organisms that do not meet a necessary

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198 It is also true that oncogenic tumors cause pain in oncomice. So having an oncogene is also not in the mouse's sentient interests either. See Maurizio Salvi's "Transforming Animal Species: the Case of 'Oncomouse'" in *Science and Engineering Ethics* (2001).

199 In other words, a teleofunctional organism need not have structures that have teleofunctions. Instant Arto, for example is a teleofunctional organism, but it does not have structures that *have* teleofunctions.

condition for having a goal of one's own.

For instance, an instantly produced, non-sentient organism, such as Instant Arto, has structures that *perform* various teleofunctional tasks. But none of its structures actually *have* teleofunctional purposes. Instant Arto's structures cannot be caused to malfunction; they can only be caused to function *differently*. Likewise, Instant Arto itself cannot be caused to malfunction or to become defective. Since Instant Arto's cell membrane doesn't have the teleofunctional purpose of selectively filtering matter, it does not have the goal of selectively filtering matter. Hence, puncturing its cell membrane does not appear to be a moral violation of that goal. Hence, Instant Arto's teleofunctional interest in its membrane performing the function of selectively filtering matter is not a morally considerable teleofunctional interest. Its teleofunctional interest does not provide a reason to value it intrinsically.

Instead let us assume that there exists a tree which has leaves that do have teleofunctional purposes. Let us say that I prevent these leaves from performing the teleofunction of absorbing sunlight by blocking their access to sunlight. Should my action of causing the tree's leaves to malfunction disrupts the tree's goal of absorbing sunlight then that tree's teleofunctional interest in its leaves absorbing sunlight is a morally considerable teleofunctional interest. Notice that in order for my act to count as a moral transgression against its interest, it must at least mean that I caused the leaves of the tree to not function as they should, to function in a way contrary to the goal of the tree. If its leaves have the teleofunctional purpose of absorbing sunlight and the tree has the goal of absorbing sunlight, then blocking the tree’s leaves from absorbing sunlight is an act of causing those leaves to malfunction and of violating the plant's goal. In this case if we assume that the tree has the goal of absorbing sunlight then my act of blocking sunlight from its leaves is an act of causing those leaves to malfunction. This means that absorbing sunlight must be what the leaves are *for* not just what they *happen to do*.

If biocentrists want to make the case for the moral standing of *all* living things by recourse to their possession of interests, then they must argue that the teleofunctional interests of non-sentient beings are also morally considerable. But in order to do that their account of interests must also include a provision which requires that all non-sentient beings have structures that have teleofunctional purposes. Any biocentric account of interests that does not fulfill this necessary condition cannot succeed in establishing why all living things have morally considerable teleofunctional interests. It cannot succeed in establishing why all living things have inherent worth.[200]

Holm's organisational account, a type of systems-based account, implies that Instant Arto has the goal of selectively filtering matter even if its cell membrane does not have the teleofunctional purpose of selectively filtering matter. Its membrane does *not* have the teleofunctional purpose of selectively filtering matter because that structure was not *selected* to perform that function.

In fact, the teleofunctional structures of all instant organisms do not have teleofunctional purposes at all. Should Instant Arto's membrane get punctured by someone we would not be in a position to say that such an act *caused* that structure to malfunction or to function improperly. Its membrane never *had* a teleofunctional purpose to begin with because its etiology did not select its membrane to perform that teleofunctional job. The systems-based account then would allow instant, non-sentient organisms to count as having morally considerable teleofunctional interests when in fact they do not.

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[200] As a reminder, in chapter one I define inherent worth as, "The value that a thing has in virtue of, a) having interests and b) where such interests provide a reason why all moral agents ought to intrinsically value the thing that has such interests."

All that a systems-based account of teleofunctional interests can do is show that some system has teleofunctional interests. Unfortunately, the biocentrist devoted to showing that *all* living things, including non-sentient beings, have inherent worth will not get proper guidance from that account because it is not concerned with whether the structures of non-sentient beings have teleofunctional purposes.

In order to account for the existence of teleofunctional structures that do have teleofunctional purposes we must make some sort of appeal to an etiology one that *selects* those teleofunctional structures to *have* the teleofunctions that they perform.

For this reason I will set aside a systems-based account as being inadequate in accounting for morally considerable teleofunctional interests of non-sentient beings.

V. Can "Instant, Non-Sentient Beings" have Morally Considerable Teleofunctional Interests?

It is for this same basic reason that an "Instant organism" type of etiology is unable to provide an account of why instant organisms have teleofunctional interests that are morally considerable. An instant organism etiology would claim that any teleofunctional system that arose by an instantaneous, chance event would have teleofunctional interests that arose out of that etiology. But, that etiology cannot produce non-sentient, teleofunctional systems that have structures that have teleofunctional purposes. Instantly-produced, non-sentient teleofunctional interests could not have their interests violated by someone causing their teleofunctional structures to *malfunction*. Hence, this type of etiology cannot generate non-sentient beings that have morally considerable teleofunctional interests.

At this point I will set aside an "Instant organism" type etiology from the list of viable contenders for identifying morally considerable teleofunctional interests in that it does not meet a necessary condition for the existence of morally considerable teleofunctional interests, namely that those teleofunctional interests must belong to beings that possess structures that have teleofunctional purposes.

VI. Can Non-Sentient Beings produced by an Agent-Selection, Non-Design Etiology have Morally Considerable Teleofunctional Interests?

Let us now consider whether an agent-selection, non-design etiology can be successful in generating non-sentient beings that have morally considerable teleofunctional interests.

An agent-selection, non-design etiological account is not the same thing as a design account in that the former, but not the latter, does not involve genuine teleological planning or deliberate design on the part of an agent who directs various states of affairs to bring about a teleofunctional system. That is to say, just because an agent’s selective activity is causally responsible in some way or other for the existence of a teleofunctional system, it does not follow that such a system was *designed*.

Also, an agent-selection, non-design etiology can produce both teleofunctional and non-teleofunctional systems. An example of a non-teleofunctional system produced by this etiology is "Tom's rainwater collector" which was previously illustrated in chapter two.[201] Tom's rainwater collector has numerous structures that are integrated in various ways with each other but those structures are not integrated in such a way that the system itself acquires self-regulation. The system might regulate the flow of water perhaps but it does not have structures that all work together for it to regulate *itself*. The rainwater collector itself doesn’t have any internal, systemic regulatory processes at all. As such it is not a teleofunctional system and so it

[201] See Section IV, "A Survey of Etiological Accounts of Living Organisms", in chapter two.

cannot have teleofunctinal interests.

So let us assume for the sake of argument that this etiology actually produced a non-sentient, teleofunctional being rather than a non-teleofunctional one. Would that system have morally considerable teleofunctional interests?

Consider the following thought experiment as a case of an agent-selection, non-design etiology responsible for bringing about a teleofunctional, living cell.

> *Sara, a lab scientist randomly gathers pipettes each filled with a random assortment of nucleic acids, carbohydrates and proteins. She throws them all into a large bin. Their distribution within the bin is entirely random. Next, she blindly grabs a handful of pipettes from the bin and smashes them onto the lab counter spilling their contents. As it so happens the chemicals from the pipettes mix together in such a way that the nucleic acids within the mixture acquire the capacity to replicate themselves. Our lab scientist, upon noticing this fact, regards the replication of nucleic acids as something that she particularly likes. She decides to keep this particular collection. She grabs another random handful of pipettes from the bin and smashes them against the counter. As it so happens these chemicals fortuitously mix with the chemicals on the counter top that have nucleotides capable of self-replication in such a way that the mixture produces a living cell (let us call it "Nondesign Arto") capable of respiring on its own, feeding itself and replicating itself. The lab scientist determines that she likes the ability of this selected entity to do all of those things that Nondesign Arto has a teleofunctional interest in. It has an interest in its membrane continuing to perform the function*[202] *of selectively filtering matter. If the cell's membrane were to rupture the cell would die. To avoid the possibility of such damage the lab scientist scoops up Nondesign Arto and keeps it safe in her laboratory incubator where conditions for its continued reproduction and survival are optimal.*

In the case of Nondesign Arto[203] we have an organism that was brought about at one or more stages by an agent, Sara, but in such a way that those stages in its development were not directed by Sara to obtain that cell as a predetermined object. That is Nondesign Arto had a history in which some of its parts were *selected* by Sara but were not *designed* by Sara for any

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[202] As I will explain later, even though its membrane performs the function of selective filtering it does not have the function of selective filtering.

[203]This particular example is meant to apply to the emergence of teleofunctional systems, most notably living, teleofunctional systems.

function. Its cell membrane performs the teleofunction of selectively filtering matter but it does not have the teleofunction of selectively filtering matter. Sara had no intentions or plans to form any of the cell's teleofunctional structures in light of any functional job that she wanted them to perform.

This cell appears to have teleofunctional interests. It has numerous structures that are integrated and multi-functional. Its structures work together to bring about its self-maintenance and regulation. If this organism were to be placed in conditions that destabilized one of its teleofunctional structures, such as its cell membrane, its self-regulation would come to an end.

But are its teleofunctional interests morally considerable?

I will argue that they are not for the following reason.

Nondeseign Arto's cell membrane does not *have the teleofunction*[204] of selectively filtering matter even though that is what that structure is doing. For example, although we might say that the membrane itself contributes to regulating the cell's pH, which in turn helps regulate protein synthesis, which in turn help make more membrane proteins, it does not *have* the teleofunction of performing any of these contributory functional tasks. It was not *selected for* the function that it currently performs. That structure just accidently happened to be capable of performing those tasks.[205]

And since Nondesign Arto's membrane does not have the teleofunction of performing

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[204] To say that a structure, *S* "has the teleofunction" of performing function, *F*, I mean that that structure *has the teleofunctional purpose of* performing *F*, or that S is *for* performing the teleofunction *F* (non-psychologically).

[205] Additionally, Nondesign Arto does not have any structures with Millikanian, proper functions because it does not have any ancestors. In order for this cell to have a membrane with a proper function it must have some ancestor that possessed such a membrane as well. And since it does not have structures with proper functions then those structures do not have the functions (are not for the functions) that they currently perform.

these tasks, or of any task for that matter, it cannot *malfunction* if it ever were to cease performing those functions. If its membrane were damaged by someone in such a way that it no longer filtered matter we would not be in a position to say that its membrane is malfunctioning. Its membrane cannot malfunction or function improperly because its membrane has no function to begin with. If, on the other hand, we were to say that Nondesign Arto's membrane is "functioning differently" that would simply mean that its membrane is no longer performing a functional job that it once did. As such Nondesign Arto does not have a goal of its own. Hence, it cannot have a morally considerable teleofunctional interest.

But this need not mean that Nondesign Arto is without some other value. We might, for instance, value it for reasons other than its possession of teleofunctional interests. Perhaps it has a certain rare aesthetic quality about it, such as intricacy or coloring that makes it pleasing to the human eye. Those features might indeed give us some reason to treat it with some respect but not its teleofunctional interests per se.

But many biocentrists think that we should not value living things simply because they happen to appear beautiful to us. Instead we should value all forms of life regardless of whether they happen to be aesthetically pleasing. Some forms of life in fact aren't particularly beautiful. For instance, the blobfish, *Psychrolutes marcidus*, is actually quite ugly.[206] So if we go by aesthetic qualities such as beauty it would turn out that some forms of life would not be valuable.

In any event Nondesign Arto was selectively generated on the basis of its possession of structural features that just so happened to be pleasing to an agent. Nondesign Arto has a

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[206] The Discovery News website posts an interesting article on ugly animals and why they should be valued. See "Blobfish Wins Ugliest Animal Mascot Contest" at http://news.discovery.com/animals/endangered-species/ugly-animals-need-saving-130618.htm (Viegas, 2013)

teleofunctional interest in its membrane continuing to function as a selective barrier. But that function arose out of the arbitrary, utilitarian concerns of an agent with no real functional purposes in mind. So the reason why Nondesign Arto has a teleofunctional interest in its cell membrane continuing to act as a selective barrier is because Sara found that particular feature to be pleasing to her, not because it would be beneficial or good for the self-maintenance of the organism.

It is for this reason that all non-sentient, teleofunctional beings produced by an agent-selection non-teleological process will not have morally considerable teleofunctional interests. Sentient beings or conscious agents produced by this etiology do have morally considerable interests. But that does not mean that *all* teleofunctional beings produced by this same etiology have morally considerable interests. If non-sentient beings do not have morally considerable teleofunctional interests then it is also not the case that all living things have inherent worth.

VII. Naturally Selected, Proper Functions and Goals of One's Own`

At this point the only etiological options available for producing non-sentient, teleofunctional beings that could have teleofunctional structures with teleofunctional purposes are a natural selection etiology and a design etiology.

The suggestion made by many biocentrists is that the existence of *proper functions* are what can ground the existence of inherent goals and hence morally considerable teleofunctional interests for non-sentient, teleofunctional beings. They want to show that all living organisms with a natural selection etiology have their own goals because they have structures with *teleofunctional purposes*. The goal-oriented behaviors and functions of living things, they claim, are “original” to them in large part because they have structures with teleofunctional purposes assigned to them by natural selection, purposes which are not given to them from something outside of themselves such as a designing agent.

It has been argued that natural selection is capable of selecting structures to have functions understood as functional purposes. Specifically it has been argued that naturally selected *proper functions* count as functional purposes.[207] Ruth Millikan has claimed that proper functions are those functions that it would make sense for us to claim are the functional "purposes" of a structure. Structures with proper functions have, according to Millikan, functional "purposes". She writes, "...the things that have "proper functions" do seem to coincide with things (omitting God) that have, in ordinary parlance, "purposes." (Millikan, 1984, p. 18). So on this view if the roots of a tree have the *proper function* of absorbing water they have the *functional purpose* of absorbing water.[208]

Millikan's account of the normativity of naturally-selected functions is part of a larger philosophical project of arriving at norms of performance from nonnormative, natural properties. As Millikan writes in her paper "Speaking up for Darwin" she writes,

> "Meaning and truth cannot be naturalized without a theory that naturalizes norms generally. Sellars followed Wittgenstein, grounding his theory of norms in community. An alternative, some of us have argued, is to *ground the needed norms in evolutionary biology* [my emphasis] - to let Darwinian natural purposes set the standards against which failures, untruths, incorrectness, etc. are measured." (Millikan, 1991, p. 151)

> She has also written that,

> "The definition of "proper function" is intended as a theoretical definition of function or purpose. It is an attempt to describe a unitary phenomenon that lies behind all the various sorts of cases in which we ascribe purposes or functions to things...My claim is that actual body organs and systems, actual actions and

207 As I argued previously in order for a non-sentient teleofunctional being to have a goal of its own it must have structures that have teleofunctional purposes.

208 In a later section I challenge the claim that naturally selected proper functions count as functional *purposes*.

> purposive behaviors, artifacts, words and grammatical forms, and many customs, etc., all have proper functions, *and that these proper functions correspond to their functions or purposes* [my emphasis]. (Millikan, 1989, p. 293).

So Millikan's definition of proper functions is meant to be an account of functional *norms* of performance, or as we might also call them, functional *purposes*. Although she uses the words "supposed to" and "purpose" in quotation marks her notion of proper functions is one of functional normativity. A cell membrane that has the Millikinian proper function of selectively filtering matter is, presumably, *for* selectively filtering matter. Selectively filtering matter is its functional purpose. That is what it is "supposed to" (normatively) do.

Naturalistically-minded biocentrists then pick up on this normativity of function to imply that all naturally-selected living things have their own goals. In particular, complex, naturally-selected, teleofunctional living things have structures that have teleofunctional purposes because their structures have Millikanian proper functions. The general line of thinking goes that since naturally selected structures have teleofunctional purposes then the whole organism itself will have a goal of its own, a goal oriented towards its own well-being.[209] And since all naturally selected, living things are goal-oriented toward their own well-being, they all seem to have goals of their own. Hence, all naturally selected living things have morally considerable teleofunctional interests. Hence, they all have inherent worth.

This argument might look something like the following.

1) All NSNSLTs[210] have teleofunctional structures with naturally selected proper functions.
2) If an NSNSLT has teleofunctional structures with naturally selected proper

[209] This is presumably because the fulfillment of the functional purposes of the teleofunctional structures of living things also results in the fulfillment of the self-maintenance of the organism itself. Because of the causal connections that exist between all of the teleofunctional structures of the organism the self-maintenance of the organism is the sum total of the fulfillment of all teleofunctional purposes of all of the individual structures of that organism.

[210] From here on I will use the abbreviation NSNSLT to stand for "naturally-selected, non-sentient living thing".

functions then it has structures with functional purposes.
3) If something has structures with functional purposes then that thing has a goal of its own.[211]
4) Thus, all NSNSLTs have goals of their own.
5) If all NSNSLTs have goal of their own then all NSNSLTs have morally considerable teleofunctional interests.
6) Thus, all NSNSLTs have morally considerable teleofunctional interests.

Ruth Millikan stresses the importance of how being "selected for" is important for a thing to have a proper function, which for Millikan is a functional purpose. She writes,

> "To have a proper function an item must also come from a lineage that has survived due to a correlation between traits that distinguish it and the effects that are "functions" of these traits, keeping in mind that a correlation is defined by contrasting positive with negative instances. Intuitively, these traits have been *selected for* [my emphasis] reproduction over actual competitors. Because the correlation must be a result of a causal effect of the trait, the trait will not merely have been "selected" but will have been "selected for" (Sober 1984). Thus a thing's proper functions are akin, intuitively, to what it does by design, or on purpose, rather than accidentally." (Millikan, 2002, p. 8).

Likewise, Millikan draws the connection between a structure being "selected for" and it having a purpose when she writes,

> "In sum, if we look at the whole human person in the light of our history of evolution by natural selection,…it appears that all levels of purpose have their origin in *adaptation by some form of selection* [my emphasis]. In this sense, all purposes are ‘‘natural purposes.’’ Even though there are, of course, many important differences among these kinds of purposes, there is a univocal sense of ‘purpose’ in which they are all exactly the same." (Millikan, 2004, p. 13)

In other words, in order for a structure to have a functional purpose it is necessary that it be *selected for* performing a certain functional task.

Jay Rosenberg has also made the following comments regarding Millikan's connection between functional purpose and being selected for. He writes,

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[211] Some might disagree with this proposition and regard the possession of functional purposes for teleofunctional structures to not be a sufficient condition for the organism bearing those structures to have a goal of its own. For the purposes of this dissertation I, however, will not challenge this premise.

> "The likenesses to which Millikan wants to direct our attention, in other words, come into view only from a narrow, limited, and specialized theoretical perspective, the perspective of biological functionalism. From this perspective, what counts is the availability of a certain pattern of explanation. Something has a *purpose* [my emphasis] just in case the best explanation why it exists or obtains appeals at some point to ‘‘adaptation by some form of selection.’’[212] Its purpose *is* [his emphasis] ‘‘in one way or another, whatever it has been selected for doing’’ [Millikan, 2004, p. 13] or, more precisely, (Rosenberg, 2007, p. 693).
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>> 'the functions of things are effects that these things have, namely, effects that they have been *selected for* [my emphasis] causing, or that their producers have been selected for producing things that will cause, and so forth. [Millikan, 2004, p. 67]'"[213]

But why, exactly, should being "selected for" be necessary for a thing to have a functional purpose?

I provide the following reason.

We must be clear about what it means for a thing to have a functional purpose. If some object, *x*, has a functional purpose, p, then x is *for* p. For instance, if we say that the functional purpose of a screwdriver is driving screws into wood, then it means that the screwdriver is *for* driving screws into wood.

But how can any object, including screwdrivers, come to be *for* anything? How can an object come to possess a functional purpose? The screwdriver did not accidentally get the functional purpose of driving screws into wood. It was brought about in such a way so that the screwdriver might fulfil the task of driving screws in wood. So in order for the screwdriver to be *for* driving screws into wood it had to have had an etiology that fashioned it with that functional purpose in mind. Over the causal history of the screwdriver it was selected *for* driving screws

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[212] For reference see the above quote from Millikan on this page.

[213] Rosenberg inserts a footnote here. He writes, "As far as I can tell, Millikan uses ‘purpose’ and ‘function’ pretty much interchangeably, as I have just done, although she plainly favors the former..." (Rosenberg, 2007, p. 693)

into wood.[214] In this case the screwdriver was selected by the engineer for the functional purpose of driving screws into wood. In this way the screwdriver was "selected for" driving screws into wood.

All other things that we normally think have functional purposes must have been selected for their functional tasks too. The heart, presumably, has the functional purpose of pumping blood because it was selected for pumping blood. The butterfly's wing is for flight, has the functional purpose of flight, because it was selected for flight. And the disc brake is for stopping vehicles because it was selected to stop vehicles.

This way of thinking about functional purposes and being selected for has, of course, spilled over into the domain of biological structures. Natural selection, it is claimed by Millikan, selects all manner biological structures for functional purposes. For instance, natural selection selected the heart for pumping blood and that is why it has the functional purpose of pumping blood. Likewise, natural selection selected the cell membranes of single-celled organisms for selectively filtering matter. These naturally selected cell membranes have the functional purpose of selectively filtering matter.

However, the view that natural selection can select structures *for* functional tasks is untenable. One might grant, for purposes of expediency, that the biological structures of naturally-selected living things have Millikinian proper functions. But they were not actually *selected for* any functional purposes. A naturally-selected heart, for example, might be said to have the Millikanian proper function of pumping blood because past performances of pumping blood were adaptive for ancestral heart-bearers. But that does not mean that the heart has the

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[214] The "selected for" here is referring to the screwdriver being *designed*. It was *designed for* driving screws into wood.

functional purpose of pumping blood. A naturally-selected heart does not *have the functional purpose* of pumping blood because pumping blood is not what that heart was selected *for*.

The reason why we should say that the heart was not selected for pumping blood is because the naturally-selected heart was not selected *in order to* pump blood. For a structure to have a functional purpose it must at least have been brought about in such a way that is was selected for some functional task or selected *in order to* or *so that* that task would be brought about. For example, screwdrivers were brought about *in order to* drive screws into wood. They were *selected for* driving screws into wood. But it is not true that the roots of naturally-selected trees were *selected for* absorbing water or brought about *in order to* absorb water. For a structure to have a functional purpose means for it to be brought about by a process in which there was some selection for it.

But this is just what natural selection cannot do. A structure could only have a Millikanian proper function but it could not have a functional purpose understood as a functional task that it was *selected for*. This means that if we are going to talk about structures that have naturally-selected, proper functions we must work with the understanding that those structures *were not selected for* a functional task and that *functional purposes* belonging to structures that *were selected for* a functional task.

My argument against the existence of structures that have naturally-selected functional purposes is the following:

1) If the naturally-selected heart has the functional purpose of pumping blood, then it was selected for pumping blood.
2) But, the naturally-selected heart was not selected for pumping blood.
3) Thus, the naturally-selected heart does not have the functional purpose of pumping blood.

Jerry Fodor has commented on the basic nature of this problem as well. The problem, in essence, is that natural selection cannot truly select any trait or structure *for* some functional end.

He writes,

> "Here's the problem: you can read adaptationism as saying that environments select creatures for their fitness; or you can read it as saying that environments select traits for their fitness. It looks like the theory must be read both ways if it's to do the work that it's intended to: on the one hand, forces of selection must act on individual creatures since it is individual creatures that live, struggle, reproduce and die. On the other hand, forces of selection must act on traits since it is phenotypes - bundles of heritable traits - whose evolution selection theory purports to explain. It isn't obvious, however, that the theory of selection can sustain both readings at once. Perhaps the consensus view among Darwinists is that phenotypes evolve because fit individuals are selected for the traits that make them fit. This way of putting it avoids the ambiguity, but whether it's viable depends on whether adaptationism is able to provide the required notion of *'selected for'* [my emphasis]; and it seems, on reflection, that maybe it can't. Hence the current perplexity...The present worry is that the explication of natural selection by appeal to selective breeding is seriously misleading, and that it thoroughly misled Darwin. Because breeders have minds, there's a fact of the matter about what traits they breed for; if you want to know just ask them. Natural selection, by contrast, is mindless; it acts without malice aforethought. That strains the analogy between natural selection and selective breeding, perhaps to the breaking point. What, then, is the intended interpretation when one speaks of natural selection? The question is wide open as of this writing." (Fodor, 2007, p. 19-20).

Although the question of what the intended interpretation of "selected for" should be when one speaks of natural selection is open for Fodor, it is not open when the intended interpretation of "selected for" should be when one speaks of intentional selection or conscious design. Perhaps this is the only way that being "selected for" can be faithfully interpreted.[215]

Paul Davies thinks that even the term "proper function", construed as a *normative* function, should be done away with because naturally selected proper functions are not truly normative. He thinks that naturally selected structures simply do not, properly speaking, have *proper,* as opposed to improper, functions. As Davies writes, "…our understanding of *functions* [my emphasis] must be reformed to better fit a progressive orientation toward inquiry, and that

[215] In the next chapter, I provide a defense for this interpretation of what being "selected for" means.

requires giving up our traditionally normative understanding of functions" (Davies, 2009, p. 55). The "normative understanding" that Davies is referring to here is the Millikanian view that naturally-selected structures have functional purposes. He thinks that we should cease referring to the functions of naturally-selected structures as *proper* functions where proper functions denote functional purposes.

Davies argues that proper functions, insofar as they are claimed to represent organismic or structural *purposes* in biology, cannot survive the insights that Darwin has provided us. He thinks that virtually all attempts to ground functional norms, understood as what structures are 'supposed' to do, or 'meant' to do, on the basis of past reproductive success via natural selection, are bound to fail. In particular, he argues that mere past reproductive success tells us nothing about the current functional utility that a structure has in an individual organism. And so it cannot give us an account of what that structure *should* be doing at the present. For Davies, evolutionary adaptations (which are defined in causal, historical terms) do not entail functional normativity, in the sense of functional *purposes*, at all. In addressing the connection between proper functions and normativity he writes,

> "The naturalistic credentials of the theory of proper functions are fraudulent; it takes only a bit of historical insight to reveal the deceit…This is clear in detail and in general, in light of what we already know about our history and constitution...In evolutionary theory, "adaptation" is defined in purely historical terms. Present-day tokens of a trait qualify as adaptations for some effect if and only if they descend from a lineage of ancestral tokens that *were selectively successful* [my emphasis] by virtue of producing that very effect. And that means that, by definition, having the property "being an adaptation" tells us nothing about the other properties of present-day tokens. Or, more modestly, the most it tells us is that similarly structured organisms in similar ecologies will likely evolve in ways that converge on a similar functional property....Knowing that present-day tokens are adaptations in light of their history tells us nothing about, say, their present utility; *they may be adaptations in light of their history but maladaptive in light of their present situation* [my emphasis]. Similarly, being an adaptation tells us nothing about the normative properties of present-day tokens, since "being descended from selectively successful ancestors" *is distinct from* [my

> emphasis] "being supposed to produce such and such an effect". Success in the past is not equivalent to possessing a standard of self-evaluation today. What one's ancestors did in the past tells us nothing about what one is supposed to do now or in the future." (Davies, 2009, p. 82-83)

According to Davies, advocates of proper functions[216] work on the assumption that there exist ‘norms of performance’ even though such an assumption is not in keeping with the "naturalistic orientation of inquiry" that is required by natural selection and by modern science in general. He writes,

> “The assumption is that some effects of some natural objects are genuinely functional – in the sense that such functions entail norms of performance intrinsic to the relevant traits that underwrite the possibility of malfunctions – while other effects are not genuinely functional, but at best merely useful. I reject this assumption because I reject the claim that some natural objects possess intrinsic norms of performance. To accept the postulation of such norms is, I argue, contrary to a naturalistic orientation in inquiry and certainly contrary to the methods and postulations of the theory of evolution by natural selection” (Davies, 2000, p. 103-104).

Both Elliot Sober and Jay Odenbaugh have recognized the overall difficulty of arriving at functional norms or proper functions by way of a naturalistic evolutionary story. For Sober references to past fitness are not enough to secure current functional norms. He writes,

> “What we should conclude is that these functional notions of normality are not to be characterized in terms of a historical notion of fitness. Perhaps they can be understood in some other way; that remains to be seen” (Sober, 1980, p. 378).

For Odenbaugh the move from a naturalistic ontology to a normative function for naturally-selected structures appears rather daunting. He writes, “…the difficulty is making sense of normativity in a wholly natural world” (Odenbaugh, 2015, p. 2).[217]

Natural selection etiological accounts of functions are unable to give a truly *teleological*

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216 What Davies also calls “selected functions”.

217 I am not here arguing that normativity itself is impossible under an assumption of naturalism, only that normativity is, as Odenbaugh argues, is a "difficulty" on a naturalist assumption.

explanation of function, an explanation of what some structure was selected *for* (in other words its functional *purpose*) in the context of why it was brought about for that purpose. According to Cummins and Davies, natural selection etiological functional explanations cannot tell us why some structure *has the functional purpose* that it does. This problem can be put in the following way. "If we are to construe proper functions as descriptions of what various structures "should" do, or as Millikan says what they are "supposed to" do, how are we to understand what it is that they "should" do in light of the fact that they weren't even selected *for* bringing about the very functional end that they presumably did bring about?"

So if the biocentrist wants to make the argument that naturally-selected, non-sentient beings have goals of their own, then they will be not able to justify that view on the claim that they have structures with functional purposes. And if the implications of the Darwinian view of life are really correct then the environmentalist's project of showing that naturally-selected, proper functions denote functional *purposes* is a non-starter.

VIII. Natural Selection and Aristotelianism

The notion of having a goal of one's own is closely tied to the concept of interests defined as "a good of one's own". The connection between them can be illustrated in the following way. Those things that have goals of their own have them because they embark on activities "aimed at" their own self-preservation, sustenance, etc. and that goal belongs to the organism itself. Self-regulatory activities are good for the thing that pursues them and these activities do not exist for some other extrinsic purpose. Biocentrists think that interference with these kinds of goals is *prima facie* wrong.

For many biocentrists, the claim that all *naturally-selected* living things have their own goals is based on the view that the process of natural selection can generate structures that have functional purposes. It is then claimed that since proper functions denote functional purposes then it also generates organisms that have goals of their own.[218] But as I have previously argued, natural selection cannot generate structures that have teleofunctional purposes. Hence, the claim they have teleofunctional purposes cannot serve as an antecedent condition for naturally-selected living things to have their own goals.

Still, others insist that naturally selected living organisms do have goals of their own.

Daniel Nicholson, for example, argues that living organisms are intrinsically purposive while artificially selected machines are only extrinsically purposive. He contrasts living organisms with machines by arguing that the parts or structures of naturally-selected beings exercise functional *purposes* for the good of the whole organism and that exist *only* for its good. Artifactual machines, on the other hand, have parts or structures that do *not* exist *only* for its good. Their structures exist also for the goals or purposes of the designer of the machine. As he writes,

> "...the parts of both machines and organisms have functions, given that in each case the immediate beneficiary of their operation is the whole system to which they belong, be it a machine or an organism. The key difference here is that in the case of the machine, the function of the whole is in turn good for an external agent, namely the maker or user of the machine. In contrast, in the case of the organism, the concatenation of functional beneficiaries is avoided because the system is intrinsically purposive and consequently does not serve the interests of

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[218] Gary Varner, for example, argues that an organism "A has an interest in X if an only if...X would fulfill some biological function of some organ or subsystem of A, where X is a biological function of S in A if and only if
(a) X is a consequence of A's having S and
(b) A has S because achieving X was adaptive for A's ancestors." (Varner, 1998, p. 68)
For further discussion of Varner see sections II and III of chapter two. For Varner, a biological function is basically a Millikanian proper function and an interest is, by definition, morally considerable. Also an interest, for Varner, represents having a goal or aim that can be identified without reference to something outside of the thing that has that interest. That is things that have interests have their own goals.

an external agent." (Nicholson, 2013, p. 671)

Basically Nicholson is arguing that living organisms have their own purposes because their structures and parts are for their self-maintenance and preservation. Naturally selected, non-sentient beings have structures that are *for* their preservation and self-maintenance because their structures have organismic preservation and self-maintenance as their functional purpose.

But what could motivate the view that non-sentient, naturally-selected beings are intrinsically purposive or have goals of their own?

An answer to that question lies in an Aristotelian conception of natural selection and of non-sentient, living things and their processes. Many biocentrists arguing for the existence of the inherent worth of all living things work on the assumption that living things, including all non-sentient, living things, have their own Aristotelian "telos" or purposiveness. These biocentrists, according to Hans-Jürgen Link,

> “rel[y] on the observation that living beings appear to aspire to an inherent end; after all, even biologists seem to give a functional description of life. Plants, for example, grow, seek nutrition and reproduce. In an Aristotelian diction, organisms give the impression of being directed towards a telos…Even if less complex life forms do not have experiences, it is argued, to compromise a living organism is contrary to its ‘interests’ and therefore morally wrong since it is not appropriate to its natural telos” (Link, 2013, p. 439).

A basic, biocentric argument for the existence of the inherent worth of naturally-selected, non-sentient beings by recourse to Aristotelian purposes might look something like the following.

1) All NSNSLTs have intrinsic, Aristotelian purposes.
2) If all NSNSLTs have intrinsic, Aristotelian purposes, then all NSNSLTs have goals of their own.
3) Thus, all NSNSLTs have goals of their own.
4) If all NSNSLTs have goals of their own, then all NSNSLTs have morally considerable teleofunctional interests.
4) Thus, all NSNSLTs have morally considerable teleofunctional interests.
5) If all NSNSLTs have morally considerable teleofunctional interests, then all NSNSLTs have inherent worth.

6) Thus all NSNSLTs have inherent worth.

In order for the conclusion of the argument to be established by the premises given it must be the case that premise one is true.

What I want to consider at this point are the arguments in support of premise one, the claim that all naturally selected, non-sentient living things have intrinsic, Aristotelian purposes.

There appear to exist two separate arguments for this claim.

One argument relies on the premise that natural selection is itself some kind of purposive or directed process that can generate the intrinsic, Aristotelian purposes of all living things. Natural selection is in some way guided by some kind of overarching directionality or teleology[219] in which various forms of living things are in some sense "aimed at" by the process of natural selection itself.

An argument in support of premise one that employs such a premise is the following. I call this argument the "Aristotelian Natural Selection Argument".

1) If natural selection is a purposive, directed process, then all NSNSLTs have intrinsic, Aristotelian purposes.
2) Natural selection is a purposive, directed process.
3) Thus, all NSNSLTs have intrinsic, Aristotelian purposes.

The view that the evolution of life is directed in some way stems from the basic Aristotelian view that there is a "top-down" structure to reality including the existence and form of all living things. As Mariusz Tabaczek writes,

> "While the predecessors of his philosophical reflection on nature found it necessary to specify the most basic and enduring entities, and define the principles of the compositional explanation of everything else, Aristotle opted for a “top-down” approach in life-sciences. As the first anti-reductionist, he argued that natural objects owe their characteristic modes of being and acting to their formal natures. Aristotle’s way of doing biology reflected the basic principles of

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[219] Henri Bergson is an example of a philosophers that embraces a form of evolutionary change for the existence of living things that is guided or directed. See his book *Creative Evolution*.

> his substance metaphysics founded on the concepts of hylomorphism (material and formal composition of entities), teleology, essence, chance and necessity, and thus remained in opposition to materialistic and reductionist explanations found among Pre-Socratics." (Tabaczek, 2014, p.57)

Some biocentrists might want to argue that the evolutionary process of natural selection is goal-directed and purposive, a process capable of directing itself in certain ways so that the things produced by it are in some sense "meant" to occur. The changes that take place in nature, according to this view, are ultimately not undirected or blind.

Aristotle himself espoused support for the view that there was some kind of teleology in nature and that living things and their structures were constructed in such a way that they would fulfill some functional ends.

As Fran O'Rourke writes,

> "Teleology is equally obvious for Aristotle both within the internal behavior and the outward activity of the living organism: here too there is manifest order. From his observations of animals, Aristotle concluded that the structure of the body is so *constructed by nature as best to fulfill a definite function* [my emphasis]; so too, more minutely, are its parts. The bird's wings are shaped so that it can fly; the fins of the fish are so designed since its nature is to swim in water. 'Nature,' Aristotle declares, 'makes nothing without a purpose but always with a view to the best possible for each individual, preserving the particular substance and essence of each'.[220] (O'Rourke, 2004, p. 19)

On this view nature constructs living things in order to "fulfill a definite function."

But, natural selection, properly understood, is an undirected, purposeless process. It does not "aim" for anything. So the claim that all naturally selected living things get their intrinsic, Aristotelian purposes *because* they were naturally-selected is a non-starter. This, of course, does not show that Aristotelianism is false only that natural selection as a process is itself non-Aristotelian.

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[220] Here O'Rourke footnotes Aristotle's *On the Progression of Animals* 8.708a9-12.

According to John Dewey, the Aristotelian way of thinking about purposes must ultimately be done away with if we are to maintain a basic Darwinian perspective on the development of life. He addresses the consequences of the Darwinian picture of the world as it relates to the question of purpose and the moral concerns of human beings. Purposefulness had previously provided an explanation for why things had some moral value. But this is no longer the case. He writes,

> "Purposefulness accounted for the intelligibility of nature and the possibility of science, while the absolute or cosmic character of this purposefulness gave sanction and worth to the moral and religious endeavors of man....The Darwinian principle of natural selection cut straight under this philosophy. If all organic adaptations are due simply to constant variation and the elimination of those variations which are harmful in the struggle for existence that is brought about by excessive reproduction, there is no call for a prior intelligent causal force to plan and preordain them." (Dewey, 2009, pp. 58-59)

Although Aristotelian forms are not themselves *intelligent* causal forces they are instances of preordination. If Dewey is right it looks like the advocate of an Aristotelian conception of living things cannot appeal to a specifically Darwinian, natural selection process as a means of explaining the existence of the functional purposes or inherent goals of all living things.

In any event, if it is true that natural selection is an undirected, rather than a directed, process, then premise two of the "Aristotelian Natural Selection Argument" is false. This in turn means that the argument is unsound. The fact that natural selection is an undirected process does not *prove* that naturally selected, non-sentient organisms do *not* have intrinsic, Aristotelian purposes. Nonetheless, it does show that *if* naturally selected, non-sentient living things do turn out to have intrinsic, Aristotelian purposes it would not be *because* those living things were naturally selected.

This leaves a second argument that a biocentrist might use for the claim that all naturally selected, non-sentient living things have intrinsic, Aristotelian purposes.

This argument begins with the premise that all naturally-selected, non-sentient living things, are members of a species. In turn, all naturally-selected, non-sentient living things have structures that have functional purposes as defined by the norm of the species. Living organisms themselves have their own Aristotelian purposes because their structures have inherent functional purposes that "aim at" fulfilling their proper functional role as dictated by the species or kind to which the organism belongs.

This argument, which I call the "Aristotelian Natural Goodness Argument" might look like the following:

1) All NSNSLTs are members of a species.
2) If all NSNSLTs are members of species then all NSNSLTs have structures that have Aristotelian functional purposes.
3) If all NSNSLTs have structures that have Aristotelian functional purposes, then all NSNSLTs have goals of their own.
4) If all NSNSLTs have goals of their own, then all NSNSLTs have morally considerable interests.
5) Thus, all NSNSLTs have morally considerable interests.

What I want to examine here is an argument for premise two that comes by way of Philippa Foot and her account of functional purpose via Aristotelian categoricals.

Philippa Foot and Rosalind Hursthouse argue that different species have characteristic "natural goods" or inherent purposes that are appropriate for their kinds[221]. According to Foot all species have their own particular way of life or life cycle that includes such things as their species' development, reproduction, self-sustenance, feeding, etc.

Teleological statements, statements about what the functional goal of an organism's

[221] Foot's and Hursthouse's views on natural goodness are very similar. I will, thus, focus mainly on Foot's discussion of natural goodness of living organisms. For more info on Hursthouse's view see her 1999 book *On Virtue Ethics*.

structure is, are statements about those structures, traits or processes that exist the context of the organism's species. An example of this way of thinking about the purposes of a living thing's structures is described by Foot in the following way. She writes, "There is an Aristotelian categorical about the species *peacock* to the effect that the male peacock displays its brilliant tail *in order to* [her emphasis] attract a female during the mating season" (Foot, 2001, p.31).

One initial objection to Foot's notion of Aristotelian categoricals comes from the recognition that species themselves don't seem to represent precise, ordering *categories* in nature at all. The species that exist in nature are remarkably diverse and have gone through all sorts of gradual changes over time. Many species share much in the way of genetic and morphological overlap.

Natural selection, and the findings from modern evolutionary biology, tell us that individual organisms don't appear to trace their historical development according to some preexisting, Aristotelian forms but are *genetically malleable* in innumerable ways and subject to all manner of further random genetic changes. These biological findings suggest that the "categories" are of life are artificial constructs. Although this does not definitively *prove* that Aristotelian forms do not exist it nonetheless suggests that there are no formal ordering characteristics as targets that define what functional purposes are appropriate for an organism. In fact the myriad possibilities for genetic mutations in living organisms is one of the things that actually *makes* gradual evolutionary change by natural selection possible. This means that species are not stable, prototypical units that have natural purposes as defined by their species or type. Rather species are dynamic, fluid entities. As Elliot Sober writes,

> "The fact that species evolve gradually entails that the boundaries of species are vague. The essentialist holds that there are characteristics which all and only the members of species possess. But this is no longer a tenable view; it is just as implausible as demanding that there should be a precise number of dollars which

marks the boundary between rich and poor" (Sober, 1980, p. 356).

Likewise, Sober thinks that the tenuous existence of various biological forms in nature refutes the Aristotelian claim to a formal telos or purpose regarding individuals of biological species. He writes,

> "…evolutionary theory makes it more plausible to view species as spatio-temporally extended individuals than as natural kinds. A genuine natural kind like gold may "go extinct" and then reappear; it is quite possible for there to be gold things at one time, for there to be no gold at some later time, and then, finally, for gold to exist at some still later time. But the conception of species given by evolutionary theory does not allow this sort of flip-flopping in and out of existence: once a biological taxon goes extinct, it must remain so" (Sober, 1980, p. 359).[222]

For Sober, biological species do not represent natural kinds because biological species, unlike natural kinds, are not stable but are subject to far too many chance, environmental, genetic and historical forces that constantly change. On the other hand, gold, a chemical element that is produced by repeatable, stable and known natural forces, does represent a natural kind. David Hull, like Sober, emphasizes the view of biological nonessentialism this way:

> "…if all gold atoms were to cease existing, the class of gold atoms would temporarily have no members. Later when atoms arose with the appropriate atomic number, gold would come into existence again. However, once a species becomes extinct, it cannot rise again. If a species of flying reptile were to evolve which was identical in every respect to a species of extinct pterodactyl save origin, it would have to be classed as a new species" (Hull, 1976, p. 184).

John Nolt argues that we should abandon the Aristotelian orientation of thinking about the evolutionary development of living organisms as teleologically striving to reach some ideal

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222 Like Sober, Stephen J. Gould believes that living organisms will not reemerge once lost to extinction. The natural selection processes that brings about living organisms and the circumstances that govern their emergence are so contingent and unrepeatable that it is not reasonable to think that there is some inherent tendency in nature to produce one species or another. The haphazard forces and contingencies of natural history would almost never produce the same type of organism twice. They would, however, produce gold more than once.

state. He writes,

> “From Plato onward, much of the Western tradition held that for each biological species there was a single immutable form that defined the ideal of perfection for its members. But that notion has two fatal flaws: (1) it is incompatible with Darwinian biology, and (2) even if it were not, it is no longer clear why perfection in that sense should be good at all…Plato and Aristotle explained the goodness of perfection by positing a natural tendency of things to strive for, imitate, or approximate their ideal forms. Perfection was good for an organism, then, because to realize its ideal form was its natural end, its telos. In medieval theology, standards of perfection were regarded as divinely ordained. Since Darwin, however, there has been no reason to believe in ideals that function either as goals toward which organisms naturally strive or as standards set for them by divine decree. This is not to say that organisms lack purpose, but only that they lack the specific purpose of realizing ideals. In what sense, then, could realization of an ideal (even supposing such things existed) be good for them – or, indeed, good at all?” (Nolt, 2009, p. 139-140).

Foot, however, has a ready answer to these kinds of objections. Her view of functional purpose is not really an *etiological* explanation of functional purpose but rather an *Aristotelian categorical* one. An Aristotelian categorical explanation of functional purpose does not make reference to the historical, causal forces that brought about living things. Rather it makes reference to the species or kind that the organism belongs to at a given point in time. Foot explains how individual living organisms and their structures can come to possess functional purposes by recourse to their membership within a species even if species are not themselves fixed. The normative evaluation of living things and their structures is made independently of the species etiology. She writes,

> "It will no doubt be objected here that reproduction is in fact not fixed, since species themselves are *subject to change* [my emphasis]. This is of course important, and it means that Aristotelian categoricals must take account of sub-species adapted to local conditions. The history of a species is *not, however, the subject with which Aristotelian categoricals deal* [my emphasis]. Their truth is truth about a species at a given historical time, and it is only the relative stability of at least the most general features of the different species of living things that makes these propositions possible at all. They tell how a kind of plant or animal, considered at a particular time and in its natural habitat, develops, sustains itself, defends itself, and reproduces." (Foot, 2001, p. 29).

Aristotelians also refer to the functional purposes or goals of living things in light of what it is that they *need* as dictated by their species. Micah Lott describes Foot's notion of needs as connected with the Aristotelian categorical features of a species in the following way:

> "Because "the tiger has four legs" is a true Aristotelian categorical, we can also say that tigers "need" four legs. In this way, Aristotelian categoricals correspond to what Foot, following Elizabeth Anscombe, refers to as "Aristotelian necessities." Here, what is "needed" or "necessary" is that on which good hangs. In this sense an oak tree "needs" deep roots – to be a good, excellent oak tree, a particular oak tree must have deep roots, and this is so because deep roots play an important part in the life of "the oak." What counts as "necessary" in the case of living things is determined by the life form. Thus, earthworms do not "need" four legs as tigers do – and "earthworms have four legs" is not a true Aristotelian categorical – because having legs is not part of how the earthworm achieves the ends that define its life cycle." (Lott, 2012, p. 357)

On the Aristotelian categorical view, "butterflies have a proboscis" is a true Aristotelian categorical and since having a proboscis is important in the life of butterflies, individual butterflies *need* a proboscis.[223] But this doesn't mean that butterflies need *any sort* of proboscis. They need a proboscis that performs its function *well* or as it is supposed to in keeping with the part that it plays in the life of "the butterfly" just as deep roots play an in important part in the life of "the oak".

This implies that the structures of all naturally-selected living things have functional purposes, functional jobs that those structures are "supposed to" perform as dictated by the species. An excellent proboscis is one that fulfills its functional purpose in the life of individual butterflies in the natural kind "butterfly". Sipping nectar is the purpose of the proboscis and so an excellent proboscis is one that is adept at sipping nectar. However, as I pointed out earlier, the

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[223] Notice how this differs from a typical categorical statement. The statement "Dogs have four legs" does not entail the categorical proposition that "*All* dogs have four legs." The former statement is an Aristotelian categorical statement while the second is a categorical statement simpliciter.

structures of naturally-selected living things, on an Aristotelian categorical view, will have functional purposes *regardless* of whether those organisms were naturally selected or not.

A malformed proboscis does not follow the norm *as specified by the type*, not as specified by the causal process that brought about the butterfly. A butterfly with a malformed proboscis cannot fulfill its purpose as specified by the norm of the type "butterfly". A functioning proboscis, on the other hand, is one that fits the norm of the type "butterfly" and so does fulfill its functional purpose as specified by the norm of the type "butterfly".

Foot warns her readers that the term “function” can be interpreted in either an evolutionary/historical sense or in a sense of what is 'good' for the organism that bears a structure with that function. She stresses the use of the term function in the *latter* sense as occupying a special place in the actual lives of living things. Those functions that an individual living thing’s structures have are those functional purposes that are conducive to its self-maintenance, nourishment and reproduction as appropriate to its species. In a footnote to chapter two of her book “Natural Goodness” she writes,

> “It is imperative that the word ‘function’ as used here is not confused with its use in evolutionary biology, where, as Simon Blackburn has put it in the Oxford Dictionary of Philosophy, ‘the function of a feature of an organism is frequently defined as that role it plays which has been responsible for its genetic success and evolution’(149-50). Features that are functional in this sense are what Dawkins, for instance, calls ‘adaptations’, when he defines an adaptation both historically and as ‘approximately an attribute of an organism that is “good for something”’ (*The Extended Phenotype*, 290). In such contexts it is supposed to make sense to speak of the good of a species, as if a species were itself a gradually developing, one-off organism, whose life might stretch for millions of years. Perhaps the extinction of a species is imagined as a kind of death, and therefore as if it were an evil with that which makes for its continuance thought of as ‘for its good’! It is easy to confuse these technical uses of words such as ‘function’ and ‘good’ with their everyday uses, but the meanings are distinct. To say that some feature of a living thing is an adaptation is to place it in the history of a species. *To say that it has a function is to say that it has a certain place in the life of the individuals that belong to that species at a certain time.*” (my emphasis, Foot, 2001, p. 32).

Foot is using the term ‘function’ not to refer to some evolutionary adaptation, what Ruth

Millikan might call a "proper function" or what Gary Varner would call a "biological function", but, as she puts it, to “a certain place in the life of the individuals that belong to that species at a certain time”[224]. These functions, accordingly are functional purposes *not because those functions arose out of a process of the natural selection of previously adapted ancestors* but because they are the natural functional features of the organism’s *species*.

Foot then extends the notion of purposiveness beyond just the *structures* of all living things to include individual living things *themselves*. Individual organisms have their own goals or purposes, things that they in some sense "intend" to do, or are "supposed" to do, as specified by their species or type.

But Foot warns her readers that the existence of these kinds of purposes does not always mean that all living things *have* those purposes *in an intentional or psychological sense*. Instead all living things have purposes of their own in a derivative sense in that they acquired their purposes through their membership within a species. She writes,

> "There is an Aristotelian categorical about the species *peacock* to the effect that the male peacock displays its brilliant tail *in order to* [her emphasis] attract a female during the mating season. The display serves this purpose. Let us call such language, purposive language. But be careful here! Where something that S's do is, in this sense, purposive we should beware of slipping over into saying of an individual S that it *has* [her emphasis] this purpose when it does this thing. Plants grow upwards in order to get to the light, *but it is fanciful to say that that is what my honeysuckle is trying to do or that that is 'its end'* [my emphasis]". (Foot, 2001, p. 31)

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224 Foot writes that the question of functional normativity is not a mere question that can be answered by an evolutionary account such as Millikan’s. She writes, “We are not interpreting it [the question of functional normativity] as a historical question, as ‘proper function’ is interpreted, for instance, by Ruth Millikan in *Language, Thought, and Other Biological Categories*, chapter 1, and as ‘function’ would generally be interpreted in evolutionary biology. As Wiggins says in Postscript 4 in *Needs, Values, Truth*, 353, ‘we really need to describe what morality has become [his emphasis], a question on which evolutionary theory casts no particular light’” (Foot, 2001, p.40)

Foot then makes a distinction between plants and animals in that although plants engage in certain activities that they are supposed to perform as specified by their type, other living things such as some animals *do* seem to have their own intentional purposes in the sense that they actually intend to engage in various self-maintaining activities. She writes,

> “If we ask either with regard to a plant or to an animal why it does a certain thing or has a certain characteristic, we are satisfied with an answer that places this operation *in the life of that species* [my emphasis]. Moreover, if we consider the concepts involved we should be surprised to be told that there is no common meaning or shared logical structure between evaluations of botanical and zoological subjects. The common structure of evaluation seems unaffected by the radical difference between the two. Animals operate very differently from plants, because perception plays a large part in the way that they gain nourishment, defend themselves, and reproduce. Yet there is no reason offhand to suppose that the word 'function' has a different meaning in a sentence about the function of the spreading of a peacock's tail and in one that speaks of the opening of a flower in sunlight. There seems to be identity in the general structure of such explanations throughout the sub-rational world, in spite of the differences appearing in a range of subsidiary concepts. It is true, for example, that an answer to a ‘Why?’ question about an animal may be in terms of appetite and therefore not just about what it needs but also about what it wants: even about what it 'tries to do'. Since plants do not have desires or appetites, no feature or operation in a plant can be explained by what it wants, and although we sometimes say that a plant is 'trying to get to the light', this must be recognized as a fanciful use of words. Yet we find, as already suggested, the same structural terminology as of goodness or defect relating to parts, characteristics, and operations, and also terms such as 'function' and 'purpose' and expressions such as 'in order to' or 'in order that' in things as different from each other as plants and animals.” (Foot, 2001, p. 40-41).

While it is true that a peacock can intentionally extend its tail feathers 'in order to' attract a mate it is not true that a honeysuckle plant can likewise *intentionally* extend its leaves 'in order to' acquire sunlight. The phrase 'in order to' can be interpreted in two different senses. In one sense the phrase 'in order to' can refer to intentionally guided behaviors and actions. The male peacock probably has enough intentional states to actually desire to, want to or intend to extend its tail feathers. Likewise, my dog is capable of intending to drink water in order to quench his thirst. On this sense of 'in order to' animals can have goals or purposes *of their own* in that their intentional states, preferences, desires, etc. are in some sense *original* to them.

But plants, on Foot's view, also seem to have purposes that are original to them as well, purposes *of their own*. So how are we to interpret what a plant does when Foot says that it extends its leaves 'in order to' acquire sunlight? Foot's answer is that the 'in order to' in this different, second sense is one of the Aristotelian categoricals about what plants do. The honeysuckle plant extends its leaves in order to get sunlight, not because it is capable of desiring to gather sunlight, but because that is what individual honeysuckle *plants* are supposed to do *as defined by their group or species*. Likewise the male peacock *has its own purpose* of displaying its tail during mating season, not simply because it actually intends to display its tail feathers during mating season, but because tail display itself is a functional purpose of the peacock's tail as defined by its species.

The proponent of Aristotelian natural goodness argues that membership within a *species*, not its natural selection etiology, is all that is needed for an individual living thing within that group to have functional purposes and goals of its own. The defender of Aristotelian natural goodness could say, "Foot is right to say that individual honeysuckle plants extend their leaves *in order to* acquire sunlight in virtue of their being members of the species 'honeysuckle'. In fact, *all* living things, sentient and non-sentient alike, have purposes of their own where such purposes are defined by their membership within a species."

But then we can inquire as whether it is true that non-sentient living things can indeed have purposes of their own in virtue of being a member of a species. We can inquire into whether premise two of the "Aristotelian Natural Goodness Argument" is correct.

Consider the following thought experiment. Imagine that a million Instant Artos all suddenly popping into existence at the same time and in the same habitat due to a single lightning bolt striking a shallow pond. All of these individual cells have the exact same biological constitution, have the same basic way of life and engage freely in reproduction with one another.

If we consider this group of organisms to be a "species", in the sense that they are all similar in the above ways, then according to the proponent of Aristotelian natural goodness we would have to say that the individual cells within the group conform to a true Aristotelian categorical statement about the species 'Instant Arto'. One such statement is "All Instant Artos are selective matter filterers". In turn this would mean that each individual Instant Arto would have a *purpose of its own* of selectively filtering matter simply by the fact that the individual belongs to a group or species. Given that *that* is a true Aristotelian categorical statement about the species 'Instant Arto' then each individual Instant Arto in the entire group would have a *purpose of its own* of selectively filtering matter.

But does *that* seem correct?

These single-celled organisms would be regarded as having purposes of their own *even if* their teleofunctional structures were not *selected for* any teleofunctional purposes. This claim is at odds with the view that in order for an object or structure to have a functional purpose it must have been produced by a causal history that "selected it for" a functional purpose. The Aristotelian categorical position would claim that there is no need for references to what some structure was "selected for". A structure's being "selected for" a functional purpose is not needed for that thing to have a functional purpose.

So, is being a member of a group *enough* to make it the case that a living thing has structures that are for any functional purposes? This seems a rather odd position to hold.

The structures of Instant Arto were not selected for any teleofunctional purposes yet on an Aristotelian categorical view it would turn out that its structures have teleofunctional purposes anyway just by recourse to membership of the organism within a species. As I have previously argued, having structures that were selected for teleofunctional purposes is a *necessary condition* for a non-sentient living thing to have a purpose of its own. But the defender of Aristotelian categoricals would deny this. They would argue that the structures of instant, non-sentient organisms have teleofunctional purposes. Their cell membranes not only *perform* the teleofunction of selectively filtering matter, but they *have the teleofunction* of selectively filtering matter even if their membranes were not "selected for" selectively filtering matter.

At this point the defender of Aristotelian natural goodness could respond by saying, "Yes Instant Arto is a genuine species. Even though it *seems* like they do not have structures with teleofunctional purposes they really *do* simply because of their membership within the species 'Instant Arto'". Should the defender of Aristotelian natural goodness go in for this view then it wouldn't matter at all what a species etiology is for it to have structures with functional purposes.

The defender of Aristotalian natural goodness, however, could go the other way and respond by simply denying that Instant Arto is a true species. They might not like the implication that an instantly-produced group of organisms could really have structures that have functional purposes. As such they might try to find some way of denying that a group of instant organisms could count as a species. They might respond by saying "Instant Arto is *not* really *species*. Even if a million instant organisms were all brought about by the same causal process and were all the same biologically, that does not qualify them to be members of a species because in order for a group of organisms to belong to a species it must be a group that was brought about in the right sort of way, a causal process that *adapted it to*[225] the conditions of its environment. In order for a group of organisms to belong to a species that group must itself have been adapted to its

[225] Being "adapted to" here should be interpreted in non-psychological, non-intentionalist terms.

environment. 'Instant Arto' was not brought about by a process that adapted it to its environment. Hence, it is not adapted to its environment. Hence, it is not a true *species*."

Notice that this kind of response *does* make reference to the *etiology* of a group of organisms as being a necessary requirement for that group to be counted as a species and thus for the individuals in that group to have structures with teleofunctional purpose and thus have purposes of their own. In particular a species is one that was brought about by an etiology that adapted it to its environment.

However, Foot claims that *how* a species came about is *irrelevant* to whether the organisms within it conform to an Aristotelian categorical. To quote from Foot again,

> "The history of a species is *not* [my emphasis], however, the subject with which Aristotelian categoricals deal. Their truth is truth about a species at a given historical time, and it is only the relative stability of a least the most general features of the different species of living things that makes these propositions possible at all." (Foot, 2001, p. 29).

The defender of Aristotelian natural goodness might say in response, "Foot is simply wrong to suggest that the truth of Aristotelian categoricals does not depend in any way on the etiology of the group. The truth of Aristotelian categoricals *does* depend on the etiology of the group under consideration. The truth of a group's Aristotelian categoricals *depends on* whether that group was *adapted to* its environment. Only things that are adapted to their environment get to count as a species and get to count as having Aristotelian categoricals."

But there is a problem for this move.

If the defender of Aristotelian categoricals makes this argument and they claim that natural selection itself is the *only* etiology responsible for adapting a species to its environment, then it also looks like an instant organism type etiology can likewise *adapt* a group of organisms *to* its environment. The instant organisms referred to in the above thought experiment were all adapted to their environment in the sense that they were able to survive and thrive perfectly well under the conditions in which they were found. Likewise, a naturally-selected group of single-celled organisms can be regarded as adapted to their environment for the same reason. If it turns out that they are capable of surviving and thriving in their habitat, then they are adapted to that habitat. Claims about what adapts an organism to its environment are in this way susceptible to being mere "post-hoc" claims.

In a footnote to his paper "Against Darwinism" Jerry Fodor argues that the claim that natural selection *adapts organisms to* their environment is "post-hoc". He writes,

> "As usual, *not attending to the intensionality of one's explanatory constructs eventuates in all sorts of silliness* [my emphasis]. Thus Jarrel Diamond (in his Introduction to Ernst Mayr's *What Evolution Is* Basic Books, 2001) wonders (rhetorically) 'How can one explain the remarkable adaptation of every species to its chosen niche?' (p. x). Likewise Sober (1993) p.186: "The exquisite fit of organisms to their environments is one of the central phenomena that the theory of evolution by natural selection attempts to explain." (See also passages from Dobzhansky quoted on p 49 of Sterelny and Griffiths.)[226] But, so long as `degree of fitness' and `the organism's environment' are specified post-hoc, there's nothing here to wonder at except a *tautology*. If a certain creature fails to occupy a certain niche exactly, then it just follows that that isn't exactly the niche that the creature occupies. Imagine a research program directed to explaining why each creature fits so precisely into the corresponding hole in space. Would the NSF be well-advised to fund it? "Or imagine Scrooge before his tragic capitulation: `The chap who is living in the gutter on scraps from the tables of the rich has *nothing to complain* of, for he is *perfectly adapted* to living in exactly the way that he does; viz in the gutter on scraps from the tables of the rich.' This would be a joke if it were funny." (Fodor, 2008b, p. 21)

In other words, it makes just as much sense to claim that a group of instant organisms is "adapted to" its environment, should it turn out to survive and thrive in its environment, as it is to say that a naturally selected group of organisms is "adapted to" its environment, should it happen

[226] Fodor does not provide a complete references for Sober's quote nor from his mention of Sterelney and Griffiths in the references cited section of his paper. The quote from Sober can be found on page 172 of Sober's book *The Nature of Selection: Evolutionary Theory in Philosophical Focus* (Sober, 1984). The reference to Dobzhansky by Sterelny and Griffiths is found in the book *Sex and Death: An Introduction Philosophy of Biology* (Sterelny and Griffiths, 1999).

to survive in its environment. In this way the 'adaptation' or being 'adapted to' is, as Fodor suggests, "post-hoc". Both an instant organism etiology and a natural selection are capable of producing organisms that are adapted to their environment.

So clearly having an etiology that results in a group of organisms being "adapted to" their environment is not enough for that group of organisms to be counted as a *species.* Instant organisms are adapted to their environment even though the defender of Aristotelian natural goodness would claim they are not a species.

It might also be urged that the claim that natural selection really *adapts* a group of organism to their environment is not true. It might be reasonable to think that natural selection does not really *adapt* organisms *to* their environment. In order for a causal process to adapt something to some environment there must be some kind of intentionality or directionality to that process so that the thing being adapted *to* the environment is guided in some way. But natural selection is an undirected, unguided process. As such, it cannot, properly speaking, *adapt* a group of organisms *to* an environment.

So the defender of Aristotelian natural goodness is still left with the question, "Just exactly what is needed for a group of organisms to be counted as a *species*?" Well, one place to start is by looking at what most biologists think a species is. According to Peter Bowler, modern biology, as informed by Darwinian evolutionary theory, regards species as "a breeding population" (Bowler, 2003, p. 5).

But this definition of a species will not help the defender of Aristotelian natural goodness who wants to deny that a group of instantly-produced organisms could be a species. The problem is that while naturally-selected organisms can result in a breeding population, a million instantly-produced organisms can also result in a breeding population. If natural selection itself is claimed to be *the* etiology responsible for generating a species, then it looks as if *that* claim is false. An instant organism type etiology is logically consistent with it being able to generate a species.[227]

The defender of Aristotelian natural goodness cannot on the one hand claim that membership within a species is what defines the inherent purposes of organisms and on the other hand claim that a group of instantly-produced organisms cannot be a species. In order to do that they must make some kind of appeal to the group's *etiology*. But, Aristotelian natural goodness is an etiology *independent* notion. Whatever gets counted as a species has organisms within it that have structures with functional purposes as defined by their species. If a group of instant organisms counts as a species, and under an Aristotelian natural goodness perspective there is no reason to think that they would not, then instantly-produced organisms have structures with functional purposes too.

But the problem is that instantly-produced organisms do *not* have structures that were *selected for* any teleofunctional purposes. Aristotelian natural goodness would claim that these organisms get to have functional purposes even if by all appearances they do *not*.

Apart from these difficulties in spelling out just what should be regarded as a species and why an instant organism type etiology should *not* be regarded as species-producing, I would like to move to a discussion of a more *substantial* problem for the Aristotelian natural goodness argument.

For the purposes of the remainder of this section I will assume that Aristotelian categoricals can result in organisms that have structures with Aristotelian functional purposes. What I want to argue against is the claim that naturally-selected Aristotelian functional purposes represent the *interests* of individual organisms. The Aristotelian Natural Goodness argument

[227] A breeding population of organisms can also be brought about by a design etiology as well.

claims that there is a rather straightforward relationship between Aristotelian categoricals and organismic flourishing. Specifically premise four of that argument claims that "If all NSNSLTs have goals of their own, then all NSNSLTs have morally considerable interests." I want to argue that this premise of Aristotelian Natural Goodness argument is false.

Morally considerable interests are interests *of individual organisms* were the fulfillment of those interests is good for the well-being of the individual organism in question. But there appear to be cases of "Aristotelian categoricals" that do *not* represent what is good for the well-being of individual organisms of a species.

It has been claimed by Foot that living things engage in behaviors that are naturally good for them. They engage in behaviors that promote their own self-maintenance, reproduction, etc. These behaviors, behaviors that promote their own good, are specified by the true Aristotelian categoricals of the species to which the organism belongs. Foot wants to naturalize the normativity of teleological statements such as "the honeysuckle plant extends its leaves *in order to* acquire sunlight" by pointing to some "natural facts" that express what is naturally good for individual organisms of the species. For her, some of these natural facts, facts concerning what members of a species or type do, exhibit “patterns of natural normativity” (Foot, 2001, p. 38). So these natural facts are taken in turn to be teleological facts about the functional purposes of a living thing's structures that are good for the individual organism itself.

Foot writes,

> “…’natural’ goodness, as I define it, which is attributable only to living things themselves and to their parts, characteristics, and operations, is intrinsic or ‘autonomous’ goodness in that it depends directly on the relation of an individual to the ‘life form’ of its species.” (Foot, 2001, pp. 26-27).

So, for example, it could be argued that nectar is important for the life of all butterflies. Butterflies need nectar because it is good for them. The characteristic way that butterflies go about getting nectar is by using the proboscis. That structure aids in the sipping of nectar which then fulfills the Aristotelian categorical statement that “Butterflies are nectar sippers.” And since butterflies are nectar sippers the purpose of its proboscis is to aid in the sipping of nectar. A butterfly must have a functioning proboscis if it is to be successful at sipping nectar. A butterfly then *need*s a functioning proboscis because it needs nectar and it needs nectar because nectar is a characteristic good for all butterflies.

These characteristic “goods” exists for all forms of life.

There are characteristic goods for bacteria, fungi, plants, birds and human beings along with every other form of life that specifies what the purposes of their structures are. Bacteria, for instance, have certain purposes that belong specifically to them and not to some other group of organisms. They have interests in their structures fulfilling their purposes. Fungi, on the other hand, have a very different way of life and hence have their own purposes.

However, the findings of evolutionary biology suggest that many individual organisms belong to species that engage in apparently *harmful* and destructive behaviors, behaviors that do not seem to be good for or benefit the individual organisms of the species at all. A biocentric individualist devoted to an Aristotelian categorical view would have to say that these destructive behaviors represent "natural goodness" too and must also be for the good of the individual organism just as much as helpful behaviors are naturally good. There is nothing within Aristotelian natural goodness that can separate harmful and destructive functions from functions that promote the good of the organism. All that Aristotelian categoricals can give us are statements about what members of a species do, not whether those features of the species are actually *good for* the individual members of that species.

For example, a biocentric individualist devoted to an Aristotelian categorical view of living organisms would have to say that the violent fighting behavior of individual male elephant seals is good for their well-being and is a purpose *of their own* even though it doesn't really look like such behavior is actually good for their well-being at all. Take the following as presented by Micah Lott:

> “A related example involves the dominance hierarchies among male elephant seals. These seals fight one another to gain exclusive control of the harem, sometimes to the point of significant injury, and the females of the species typically refuse to mate with any other than the dominant male. Such behavior, Fitzpatrick says, makes “perfectly good evolutionary sense,” because the genes tending to produce such behavior would have out-replicated their rival alleles in the gene pool. But once again there is no plausible benefit realized by such behavior: “Can we really suppose that animals fighting desperately with their peers simply in order to out-reproduce them are thereby acting ‘for their good’, or for any organism’s good for that matter, making themselves or others better off? On the contrary, it seems elephants seals could at least in principle get on just as well without these traits – perhaps even better, expending less energy fighting, avoiding the inevitable injuries, and so on”” (Lott, 2012, p. 364)

The statement "Male elephant seals are violent fighters." is a true Aristotelian categorical about the species 'elephant seals'. The violent fighting behavior of male elephant seals is a “natural fact” about all males of that species just as much as it is a “natural fact” that organisms of that species need and consume food. Hence, engaging in fighting behavior is also one of their goals.

The problem is that it does not appear as if it is, or would be, one of their *interests*. It is one of the things that male elephant seals *do* and it is expressed in the form of an Aristotelian categorical, but it does not contribute to well-being of the individual male elephant seal.

Hence, there is no reason to think that *this* goal represents an interest let alone *a morally considerable interest*. Having this goal does not provide a reason to value the individual male elephant in and of itself. There might be *other* reasons to value the male elephant seal in and of itself, but not because it has the goal or purpose of engaging in *this* kind of violent behavior.

If anything the violent fighting behavior of male elephant seals makes these animals *extrinsically valuable* for genetic reproduction. But it does not provide a reason to value these living things in and of themselves.

As William FitzPatrick writes, “These traits are needed if they [male elephant seals] are to function fully as the sorts of gene replicating systems they are, but they don’t improve the lives of elephant seals or contribute to their flourishing” (FitzPatrick, 2000, p. 117).[228] Thus Aristotelian categoricals are not able to identify and separate harmful activities from activities that are unharmful or beneficial. If there turns out to be some form of violent behavior in the animal world that appears contrary to a flourishing kind of individual life, then the defendant of an Aristotelian categorical view of living organisms needs to provide some way of dealing with these problems.

I call this problem the "problem of harmful Aristotelian categoricals".

In fact, disconcerting natural facts are not uncommon in the natural world at all. For example, some female warblers kill off the young offspring of rival females in their vicinity. Presumably this gives females that engage in such behavior a reproductive advantage.[229] On this view we would have to say that female great reed warblers commit infanticide *in order to* spread their genes because that is just what female great reed warblers do and this is beneficial to the *species*. This is a natural fact about them. But many of us would find it difficult to further

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228 Another example is found in the lifestyle of a microsporidian parasite called *Nosema*. *Nosema* infects larvae of the flour beetle and by its own genetic endowments secretes a chemical analogue to the larvae’s own juvenile hormone. *Nosema* produces so much of this hormone that it effectively causes the larvae to grow larger than normal. This in turn provides are larger shelter for the *Nosema* parasite to live in. This facilitates *Nosema*’s reproduction. Natural selection in this case has produced one organism, *Nosema*, with a lifestyle utterly detrimental to another species, the flour beetle. But natural selection cares neither for the *Nosema* nor the flour beetle. Also, see p. 87-88 in FitzPatrick, 2000 or Fisher and Sanborn’s paper “Production of Insect Juvenile Hormone by the Microsporidian Parasite *Nosema*. (Fisher and Sanborn, 1962).

229 See the article by Hansson et al. “Infanticide in Great Reed Warblers: Secondary Females Destroy Eggs of Primary Females.” (Hansson et al., 1997).

claim that such an activity is a kind of “natural goodness” directed at fulfilling organismic well-being.[230]

This problem can also be illustrated in the opposite way. Some Aristotelian categoricals would regard some *helpful* behaviors as being *defects* of the organism engaging in them. Consider the following from Timothy J. Clewell's Master's Thesis "The Promise and Limits of Natural Normativity in a Neo-Aristotelian Virtue Ethics". He writes,

> "To give an example, tree squirrels live a predominately solitary life, they breed about twice a year and the female looks after the young. According to Foot, in order for a tree squirrel to be described as *flourishing* [my emphasis] it must be living a life where these characteristics are realized. This is not simply a claim about what is required for tree squirrel flourishing, it is also a claim about what we even mean when we say something is a tree squirrel. For this reason, if a male squirrel stayed with the female squirrel and they raised the young in tandem, we can make sense of saying the male squirrel is in some way defective and not flourishing *qua* tree squirrel (even if the male’s behavior promotes the survival of the baby squirrels). We can do so by referring to the characteristics that play a role in the fulfillment of the teleology of members of the tree squirrel species. But the only way that such evaluations work is if there is some concept, external to all particular instantiations (of tree squirrels) by which the particulars are to be judged. A male tree squirrel, behaving in a way that it actually promotes the well-being of its offspring, would seem (at least on an account that takes into consideration its own particular goal) to be flourishing. If one wants to say otherwise, the criteria by which one judges flourishing must be *external to the apparent goal of the particular life* [my emphasis] about which a judgment is being made." (Clewell, 2011, p. 11-12)

The problem of Aristotelian categoricals could also apply to a group of organisms that was deliberately designed in the lab primarily for extrinsic ends that have nothing to do with individual organismic flourishing. A maliciously-designed group of organisms would have true Aristotelian categoricals about their functional purposes just as much as a naturally-selected

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230 Insights such as these led Alfred North Tennyson to depict nature as being “red, in tooth and claw”. This famous phrase is from Cantro LVI of Tennyson’s poem “In Memoriam A.H.H.”. A line in the previous cantro (Cantro LV) of that same poem expresses a similar sentiment. Nature is wasteful, without foresight and “So careless of the single life”. (Tennyson, 1900).

group of organisms would have true Aristotelian categoricals about them. A maliciously-designed group of organisms could have purposes according to their Aristotelian categoricals that do not promote the well-being the individuals of the groups. William Fitzpatrick discusses this kind of possibility for those who, like Foot, advocate a conceptual connection between organismic well-being and what functions that an organism has as ascribed by Aristotelian categoricals. He writes,

> "Perhaps many will still insist - as I believe Foot would - that it is just intuitively obvious that biological teleology must be understood ultimately in terms of welfare promotion, claiming that there is simply a conceptual connection between function in biology and the promotion of welfare of the satisfaction of welfare-based needs...I'd like to consider a thought experiment that may help to remove the temptation to suppose that welfare promotion must come into the functional teleology of living things, weakening the opponent's confidence in such a conceptual connection...suppose there is an extremely clever inventor who has discovered in the laboratory how to design and create organic machines that look and act much like natural organisms, maintaining and reproducing themselves through very similar methods, including many of the same bio-chemical reactions and so on. Let us imagine that the similarity is close enough that these machines are conceded to be alive, and to be such that we can genuinely speak of their welfare (unlike any machines that have actually been created so far). This inventor, however, is rather perverse: He is single-mindedly obsessed with the propagation of the replicating molecules in these machines which correspond to genes in natural organisms - call them "shmenes" - and cannot be persuaded by his more conscientious colleagues to place first priority on their welfare as he designs them. Instead he simply designs his machines simply to work ultimately toward the most efficient replication of their shmenes, however this affects their welfare...Now it seems clear to me that what he has created are primarily and ultimately shmene replicating machines. The functions pertaining to these things are generally and ultimately related to the end of shmene replication, not to the promotion of the machines' welfare. The fact that they have welfare at all is incidental....But now if this is right, then clearly there can be living things whose functionality does not have generally or ultimately to do with the promotion of their welfare, but has to do with (in this case) shmene replication. There is not, therefore, any conceptual connection between function in living things and welfare promotion. (Fitzpatrick, 2000, p. 189-190)

If we conceive of this group of artificially-produced living machines (let us call them "Arto Machines") a *species*, and there's no reason to suppose that are not, then they too must have true Aristotelian categoricals about them based on their membership within the group "Arto Machines". One of those categoricals might be, "Arto Machines sacrifice their own well-being for the replication of 'shmenes'". But there is no reason to think that their sacrificial behavior represents an interest *of theirs*. In fact such behavior is not really in *their* interest at all. If anything the replication of shmenes is *in the interest of the designer* of Arto Machines. To be more precise, the *teleofunctional purposes* of an Arto Machine's structures enable it to maintain itself but only *so that* such self-maintaining capacities enhances its ability to replicate shmenes.

It might be objected by Foot, and other defendants of the "natural goodness" view, that although these instances of violent animal behavior and "shmene replication" might *appear* to be destructive or harmful *to us* they are actually *good for* the individual organisms of these species to engage in. It might be claimed that the violent fighting behavior of rival elephant seals, harsh though it appears to us, is actually very successful in adapting them to the conditions in which they are found and in which competition for mates is very high.

Likewise, they might also say that instances of male tree squirrels that help rear their young are actually instances of *defective* tree squirrels. Although instances of such behavior might *appear* to be beneficial to us, they are actually behaviors that are defective and thus bad for the organisms of the species. "These kinds of objections to natural goodness" they might say, "are simply an artifact of our tendency to *project* onto nature our own feelings and expectations about what is good or bad for living things. We should not anthropomorphize the natural world and view its normativity through the lens of our own prejudice. Instead we should rely on the Aristotelian categoricals to speak for themselves and make those judgements for us."

But this objection will not work. The point of the objection to Aristotelian categoricals is not that we have somehow *projected* our own prejudices onto nature. Rather the objection is that some Aristotelian categoricals do not always express what is truly good for the life of *the individual organism of the species*. In other words, not everything that is an Aristotelian categorical represents an activity that is truly *in the interest* of the individual organism of the species. Individual male elephant seals might desire to engage in violent fighting behavior and this behavior might be a "natural fact" about them, but this behavior is objectively not good *for the life of the individual male elephant seals* of the species regardless of whether we might think that such behavior is bad or not. Such behavior might be good for the species' own integrity but it does not actually benefit *the individuals* of that species. Males of the Autumn Spider, *Metellina segmentata*, will fight each other to the death for the advantage to reproduce with a female. As Prenter et al. write, "In male-male fights for 'ownership' of the web in the genus *Metellina*, the larger males have an advantage (Hack et al. 1997; Bridge et al. 2000), smaller males are occasionally injured or killed (personal observation)." (Prenter et al., 2003, p. 1054). This fighting behavior is a "natural fact" about them as a species. But it is not good for the life of the individual males.

Still the defender of an Aristotelian categorical view might respond by claiming that while these behaviors are not necessarily good for the health of individual organisms of a species they are still good for those organisms because these behaviors are what allow the individual organism to *reproduce* which is good *for the organism*.

But even a cursory examination of *this* notion reveals that reproduction itself has nothing to do with what is good for the individual organism. Reproduction is the passing along of one's own genetic material to subsequent generations. It does not, however, bring about what is good for the life of the individual organism itself. Reproduction itself does not further the good *of the* *individual organism*.[231] If anything we might be able to say that it is good *for the genes* of the organism in that they are what enjoy some form of continued survival through the act of reproduction by the individual organism.[232]

Aristotelian categoricals don't always coincide with individual organismic flourishing. Those that attempt to wed natural selection with an Aristotelian categorical view will inevitably end up cashing out "natural goodness" not in terms of *individual* flourishing, but rather in terms of what is *good for the species*, or what is good *for the genetic survival* of the species, or even what is *in the interests of the species*. Evolutionary biology suggests that much of what takes place in natural selection is not aimed at bringing about the good of individual living beings and their self-maintenance. Rather organismic flourishing takes a back seat to the genetic reproduction of the species.

With this in mind I want to return to the "Aristotelian Natural Goodness" argument.

1) All NSNSLTs[233] are members of a species.
2) If all NSNSLTs are members of species then all NSNSLTs have structures that have Aristotelian functional purposes.
3) If all NSNSLTs have structures that have Aristotelian functional purposes, then all NSNSLTs have goals of their own.
4) If all NSNSLTs have goals of their own, then all NSNSLTs have morally considerable interests.
5) Thus, all NSNSLTs have morally considerable interests.

Given the information presented earlier regarding harmful behaviors that are Aristotelian categoricals and helpful behaviors that are not Aristotelian categoricals I want to argue that

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231 It might, however, be claimed that reproduction can be "good for" individual organisms in the sense that those organisms have *preferences or desires* to reproduce. In this way it can be "good for" a mother to have a baby if that is what the mother desires. But, non-sentient being do not have such desires and so reproduction cannot be "good for" them in that way.

232 In the next section I examine the question of whether genes have their own purposes.

233 As a reminder, the NSNSLT is an abbreviation for "naturally-selected, non-sentient living things".

premise four of the "Aristotelian Natural Goodness" argument is false. If a male elephant seal engages in the "goal of its own" of violent fighting behavior as a means of spreading his own genes, that might be a form of Aristotelian "natural goodness", but it would not be an *interest of* the male elephant seal. Having that kind of goal is not for its good and so engaging in that kind of destructive behavior cannot be a *morally considerable* interest. Such behavior does not provide a reason to care about the individual male elephant seal non-instrumentally. It does not give it inherent worth.

At this point it might be suggested that naturally selected, non-sentient beings can still have goals of their own because a certain *part* of them has a goal of *its* own. It might be argued that while entire living organisms themselves are not the loci of inherent, Aristotelian purpose or goals of their own that a part of them is the loci of such intrinsic purposes or goals of their own. Hence, naturally selected living things can in some sense have a goal of their own because they have a part that has a goal of its own. That part or portion of living things that some have suggested might have a goal of its own are *genes*.

IX. Can Genes have Goals of Their Own?

Richard Dawkins, a prominent figure in evolutionary biology, holds the view that living organisms are gene “survival machines” that ultimately exist "for"[234] the benefit of genetic reproduction.

As Dawkins writes,

“Four thousand million years on, what was to be the fate of the ancient replicators

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[234] I put the word "for" in quotes here to point out that natural selection itself does not do anything *for* something else because it has no foresight.

> [genes]? They did not die out[235], for they are past masters of the survival arts. But do not look for them floating loose in the sea; they gave up that cavalier freedom long ago. Now they swarm in huge colonies, safe inside gigantic lumbering robots,[236] sealed off from the outside world, communicating with it by tortuous indirect routes, manipulating it by remote control. They are in you and in me; they created us, body and mind; and their preservation is the ultimate rationale for our existence. They have come a long way, those replicators. Now they go by the name of genes, and we are their survival machines." (Dawkins, 1999, pp. 19-20).

Or, consider these comments from Lawrence Rifkin's article "Is the Meaning of Your Life to Make Babies?" in a *Scientific American* blog post.

> "Genetic evolution is the meaning of biologic life, in that it is the why and how of it, as well as the stock of future biological existence. The genes that survive -- and in turn the organisms they make -- are the winners in the existence game. Can we just dismiss this when considering the meaning of our own individual human lives? Sure, evolution itself does not have a specific direction or teleology, and genes themselves are not conscious, so there is not meaning in that sense. But evolution cannot just be shrugged off as something apart from us, take it or leave it. It is the biological explanation of who we are, how we got here, and the diversity of life. Over billions of years, life left the oceans, stretched limbs to cover the earth, raised wings to fly. Underlying it all are the replicating molecules that continue to copy themselves even now." (Rifkin, 2013).

So, on this view all living things are gene "survival machines" with the extrinsic purpose of replicating their genes. In his book *The Selfish Gene* Dawkins claims that genes are really the final unit of selection, not organisms themselves. That is to say genes are the things that get selected and passed on to the next generation by natural selection, not individual organisms. Organisms and their structures were not brought about *in order to* serve the organism's own

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[235] This reference to "dying" is of course metaphorical. Ancient replicating genes are not alive in and of themselves. So to speak of them "dying" doesn't mean to speak of them as no longer being alive. Rather it is to speak of them as no longer existing.

[236] The asterisk here was given by Dawkins to indicate his own endnote which contains the following commentary on his use of the term "robots" to describe living things: "If, like most of the critics of my 'lumbering robot' passage, you are not religious, then face up to the following question. What on earth do you think you are, if not a robot, albeit a very complicated one? I have discussed all this in *The Extended Phenotype*, pp. 15-17." (Dawkins, 1999, pp. 270-271).

good. Instead they were brought about in order to help make more DNA.[237]

This is what I call the “genetic selectionist” view. Nature "selects" *genes* not individual living things. On a genetic selectionist view whatever is “good for” the survival and selection of genes is whether those genes are carried by organisms that are adept at reproducing themselves. Paul Sheldon Davies explains the genetic selectionist view this way:

> “We could, for example, postulate a drive or, if not a drive, an inherent tendency within genes to manifest and perpetuate the species form. Something like this appears to be the view of Richard Dawkins’s 1976 gene-centered theory, according to which individual organisms are properly conceptualized as nothing more than the genes’ (or the genotypes’) way of making more copies of themselves. Genes serve as the *theoretical center of command and control* [my emphasis] by orchestrating the development of the organism’s body and behavioral repertoire in order to help ensure its own perpetuation. Individual organisms come and go much like the seasons, but genes, thanks to the relatively reliable copying processes through which they replicate, enjoy a relative form of immortality” (Davies, 2009, p. 97)

The genetic selectionist might try to argue that even if all naturally-selected, individual living things are not the direct bearers of goals of their own but rather are purposeful pawns in the reproduction of genes, that their *genes* still have their own goals. Perhaps genes exist “in order to” perform some inherent life function or have some essential “natural tendencies” about them to perform some function or bring about biological goals. These would be purposes or goals that are intrinsic to the genes. And if the genes have intrinsic purposes then the organisms bearing those genes have their own intrinsic purposes.

The argument for the claim that naturally-selected, non-sentient beings have their own purposes based on their possession of genes, what I call the "Genetic Purposes Argument", might look like the following:

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[237] In *The Selfish Gene* Dawkins also writes, “A monkey is a machine that preserves genes up trees, a fish is a machine that preserves genes in the water; there is even a small worm that preserves genes in German beer mats.” (Dawkins, 1999, p. 21).

1) If the genes of all NSNSLTs have their own inherent purposes, then all NSNSLTs have their own inherent purposes.
2) The genes of all NSNSLTs have their own inherent purposes.
3) Therefore, all NSNSLTs have their own inherent purposes.

But, according to Paul Sheldon Davies, the claim that genes have their own goals as the 'command and control' center of species propagation and development is quite contested, and for some biologists, highly suspect and controversial. Davies argues that genes really do not have their own goals or inherent tendencies. This is so for two reasons.

First, genes are not the only causal factor dictating organismal development and form. If they were then perhaps we could say that genes have their own natural ends or purposes in bringing about certain biological forms or species. But, modern science has uncovered other causal factors besides genes that can significantly influence organismal developmental patterns. Davies writes,

> "The crucial general claim is that there appears to be no non-question-begging grounds for conceptualizing genes as centers of command and control. Genes are of undoubted importance in ontogenesis[238] – they provide information causally necessary for organismic development – but the same is true of causal factors in [the] other three resources. Development requires a host of epigenetic interactions [1], behaviors [2], and culturally transmitted symbols [3]" (Davies, 2009, p. 97).[239]

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[238] This is the developmental patterning and unfolding that takes place in an individual organism from its earliest stage (i.e., the fertilized egg) all the way up to the full-grown adult form.

[239] For a further explanation of other factors besides genes that are responsible for organismic development and form see Jablonka and Lamb, 2005. They write,

> "The idea that DNA alone is responsible for all the hereditary differences between individuals is now so firmly fixed in people's minds that it is difficult to get rid of it…The genetic [DNA] system is the basis of all biological organization, including the organization of the supragenetic heredity systems we are going to consider, but these additional systems allow variations in a different type of information to be transmitted. The variations occur at *higher levels of organization* [my emphasis] – at the cell [epigenetic], organism [behaviors], or group level [culturally transmitted symbols]. They may be quite independent of variations at the genetic level, in just the same way that variations in recorded performances may be independent of variations in the score" (Jablonka and Lamb, 2005, p. 109-110).

Second, genes do not seem to have their own internal drives or goods that they are *striving* to obtain. Genes merely dictate differences between species as they dictate organismal form, but they have no inherent, natural tendencies within them to realize any particular, biological development or form. As Davies observes,

> "…there is no sense in which genes contain an internal drive that is genuinely intrinsic to its operations. The behavior of genes, as is well-known, is affected by an array of extrinsic factors – cellular, organismic, and environmental. We can change developmental outcomes by manipulating mechanisms internal to the gene, without doubt, but we can also alter development by manipulating mechanisms in the cell, elsewhere in the organisms, even in the environment…genes would never exhibit anything we might reasonably describe as a natural *striving toward* [my emphasis] self-perpetuation" (Davies, 2009, p. 98).

Davies goes one step further to claim that this Darwinian understanding of biological functioning is simply not consistent with the claim that non-sentient beings have their own intrinsic purposes. He writes,

> "If contemporary theories of development are on track, then the forms of life that gardeners and breeders cultivate are not at all as Kant and his contemporaries thought of them. The coherence, stability, and persistence of living forms are, for Kant, an expression of something *intrinsic* [my emphasis] to the individual organism. For us, by contrast, no one and no thing ensures the coherence or stability of living forms. No one is in charge; nothing comprises a center of command; no sentry protects against change or destruction. To the contrary, the human form and all the other forms we encounter are fleeting effects of recurring ensembles of scattered causal factors, and only the most obstinate failure of historical imagination could make us think otherwise…a radical implication of evolutionary theory is that the perpetuation of living forms is not under the control of a command center *of any sort* [my emphasis]. Not even a metaphorical one" (Davies, 2009, p. 99-101).[240]

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[240] In reference to Kant see section 65 of his book *Critique of Judgment* where he writes, "An organi[s]ed being is then not a mere machine, for that has merely *moving* power, but it possesses in itself *formative* power of a self-propagating kind which it communicates to its materials though they have it not of themselves; it organi[s]es them, in fact, and this cannot be explained by the mere mechanical faculty of motion…*internal natural perfection*, as it belongs to those things which are only possible as *natural purposes*, and are therefore called

In other words naturally-selected, non-sentient living things do not really have intrinsic purposes or goals of their own because they have no inherent tendencies to *direct themselves* towards their functions and processes.

In any event even if it did turn out that genes had their own intrinsic purposes the living organisms that contain those genes do not directly have goals of their own. And if naturally selected living organisms are not the direct bearers of goals of their own, but rather their genes, then we would have to say that it is the genes of living things that have morally considerable interests not the individual organisms to which they belong.

The counter-argument to the "Genetic Purposes Argument" looks like the following:

1) If all NSNSLTs have their own inherent purposes, then the genes of all NSNSLTs have their own inherent purposes.
2) But, the genes of all NSNSLTs do not have their own inherent purposes.
3) Therefore, all NSNSLTs do not have their own inherent purposes.

So if this argument is correct it looks like there is little to recommend for the view that naturally selected, non-sentient beings have intrinsic purposes or goods of their own.

X. Is This the End for a Biocentrism Based on Natural Selection?

The process of natural selection has been argued to be capable of bringing about non-sentient, teleofunctional beings that have a good of their own. Yet this same view of life has actually made it untenable to think that non-sentient, teleofunctional beings and their structures, really have teleofunctional *purposes* or that their teleofunctional structures exist *for the purpose* of their self-maintenance and good. As such naturally-selected non-sentient living things do not

organised beings, is not analogous to any physical, *i.e.* natural, faculty known to us…" (Kant, 1790, sec. 65).
This 'formative power' for Kant represents some kind of direction or "aim" (non-psychological) to life and biological forms. These "aims" are what Davies denies exists.

have goals of their own that could confer upon them direct moral standing.

If we examine what happens to a naturally-selected single cell after its cell membrane is punctured we will find no instances of sentient harm done to it. It feels no pain and makes no plans to escape it. It also has no desires so it cannot be harmed by having any preference interests violated. It can, however, be systemically harmed by having its teleofunctional interests violated.

But why, it may be asked, should *that* kind of harm matter from a moral point of view especially given that its teleofunctional structures do not have purposes, specifically functional purposes for its own good? The naturally-selected, single cell *has an interest* in its membrane continuing to perform the teleofunction of selectively filtering matter[241]. But if we puncture its membrane all that happens to it is a cessation of its self-regulatory abilities. It ceases its biochemical processes because it can no longer maintain its internal homeostasis. But no *goals* as such have been thwarted. So on the face of it, it doesn't look like any *moral* wrong has been done directly to these beings.

But the biocentrist wants to maintain that a moral wrong *had* been done.

The biocentrist faces a problem in trying to identify just what could be morally salient about the teleofunctional interests of all naturally-selected, non-sentient beings that give them direct moral standing. As I have argued above it cannot be because naturally-selected, non-sentieint living things have goals or have structures that exist for their self-maintenance. Hence, it cannot be because these beings have a good of their own.

XI. Why All Non-sentient Living Things Do Not Have a Good of Their Own

[241] The same would be true of an instantly-produced cell, a designed cell or any cell that is appropriately teleofunctional. Its etiology is irrelevant to what its teleofunctional interests are.

But what if it should turn out that all non-sentient teleofunctional beings *regardless of their etiology* simply do *not* have a good of their own anyway?

There are actually a few good reasons to think that all non-sentient teleofunctional beings do not have goods of their own because they do not have *goals* of their own.

First, these beings do not have mental states capable of holding some goal as a future target. They do not *aim* for some future state of affairs at all. These beings are capable of responding to changes in their environment in various ways, but that does not mean that they have their own intrinsic purposiveness or goals. Furthermore, the problem with using teleological language to describe the teleofunctional life processes of *non-sentient* beings is that these beings themselves do not *strive* or *aim* to do anything insofar as being capable of *making plans* and endeavoring to bring about some future state of affairs for themselves. Our claim that these beings have their own goals might be less about the fact that they actually have their own goals and more about our own propensity to project intrinsic purposiveness onto these beings in much the same way that we are prone the anthropomorphize the undirected process of natural selection (Fodor, 2007).

A second argument for why all non-sentient beings do not have goals of their own comes from comparing some designed, non-sentient beings with other non-sentient living things. For example, designed objects, such as heat-seeking missiles, can rightly be said to *have the goal* of seeking out sources of heat, but they do not have *their own goal* of seeking out sources of heat. One reason why we might think that non-sentient beings do not have their own goals is because they are incapable of assigning goals to themselves in such a way that they are able to dictate their own behavior. Intentional beings, as opposed to non-sentient beings, do have this ability. Lilian O'Brien has some similar thoughts on this matter. She writes,

> "Even if we grant that the heat-seeking missile has such states [that]...are sufficient for mentality, I don't think that it's the kind of agent that can perform an intentional action...although the missile behaviour is goal-oriented, it does not itself assign a goal or goals to its behaviour..." (O'Brien, 2015, p. 137)

Oftentimes, we use certain metaphorical language to talk about the teleofunctional processes of non-sentient beings. Sometimes we say that a tree, or some other plant, "aims" to grow toward sunlight or that it "struggles" to find a source of water. Individual cells, it is sometimes claimed, “try” to regulate their own internal pH levels. But these terms are misleading. Trees, bacteria and other non-sentient forms of life do not themselves "aim" or "try" to do anything in the sense of having intentional states or purposive behaviors directed toward some future goal.

It makes some sense for us to think that conscious agents, beings that have preference interests, have their own goals. These are beings that can make plans and form intentions to embark on various activities that they themselves aim at. It also makes some sense to think that sentient beings, beings that are capable of feeling pain and responding to it, have their own goals too because they embark on purposive behaviors in response to external stimuli.

Most, if not all, sentient beings if physically harmed will experience a phenomenal state of pain and will engage in some sort of purposive behavior, although not necessarily conscious, to avoid it or get away from it. These beings at least seem to have *intentions* in avoiding pain as evidenced by their reactions to pain. For instance, many sentient beings can sense and escape sources of pain that are external to them. Invertebrates, many of which are sentient beings, but not conscious agents, can exhibit behavioral responses to pain. As Dr. Jane Smith writes,

> "Most, if not all, invertebrates have the capacity to detect and respond to noxious or aversive stimuli. That is, like vertebrates, they are capable of ‘nociception.’ Examples of aversive stimuli include changes in temperature beyond the animal's normal range, contact with noxious chemicals, mechanical interference, or electric shock. Under certain conditions, all of these might be expected to cause pain in humans. In general, invertebrates, like vertebrates, respond to such stimuli by

> withdrawing or escaping so as to reduce the likelihood that they will be damaged by the noxious conditions." (Smith, 1991, p. 26)

So it seems reasonable to think that both conscious agents and sentient beings have their own goals and can embark on purposive behaviors.[242] And so it is reasonable to think that they have interests that are morally considerable.

Some, however, might regard the phenomenon of heliotropism[243] in plants to be a purposive behavior, a goal of their own. It might be argued that plants move their leaves *in order to* get sunlight. On this view plants seem to have the goal of their own of acquiring sunlight. Lowell Nissen, however, disagrees with the view that plants have goals. He thinks that in order for something to have a goal it must be able to have mental representations of that goal. He writes,

> ...since our language admits such sentences as "Hannibal's goal was to conquer Rome," or even, elliptically, "Hannibal's goal was Rome," it is easy to slip into the incorrect view that a goal is identical to a state of affairs or an event such as conquering Rome, or even a physical entity, such as Rome. Nagel does this when he talks about plants being goal-directed systems. A goal-directed system must be a system whose behavior is directed to a goal, and that requires a goal. Since he is operating under the nonmentalistic assumption, he must mean by "goal" something not mind-dependent that is an objective state of affairs, a certain arrangement of the nonmental world, such as photosynthesis actually occurring, roots actually reaching moisture, or leaves actually facing the sun. This makes it necessary to refer the mind-dependent interpretation as an "end in view" or "deliberate goal." Nonetheless...an objective state of affairs in the world is not a goal. The mere fact that plants regularly extend roots to moisture does not make their behavior goal-directed any more than the fact that rocks regularly roll downhill makes their behavior goal-directed." (Nissen, 1997, pp. 196-197).

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242 Also Tyler Burge has commented on the existence of apparently goal-directed behavior of spiders in the genus *Portia*. These spiders have the ability to make plans and change routes when tracking down prey. Regarding these spiders Burge writes, "There is substantial evidence that Portia can set and hold in memory a detailed route [to capturing prey]. Following the route often involves extensive detour behavior. Portia commonly forages in a jungle tangle of branches and vines. In such an environment, detours are often necessary." (Burge, 2010, p. 515)

243 Heliotropism is the ability of plants to turn their leaves toward and track sources of light.

On Nissen's view plants do not have the goal of moving their leaves toward sunlight because the state of affairs "leaves actually reaching the sun" is not, properly speaking, a goal *for it*. He thinks that in order for something to have a goal it must be able to hold that goal in representation as some future target. Beings that have mental states as representations of some future target are able to hold goals as future targets. But non-sentient beings, mindless beings, are not capable of having mental states as representations of some future target.

Nonetheless, the behaviors of non-sentient living beings are conducive to their own self-maintenance. These beings are able to control their own physiological processes in such a way that their own biological integrity is maintained. In fact all living things have an amazing ability to regulate their own internal processes in response to varying and harmful external conditions by the employment of their teleofunctional structures. But having this ability should not be confused with having *goals* of their own.

XII. Some Clarification on Morally Considerable Interests and Moral Standing

Given that it seems quite difficult to make the case that non-sentient, teleofunctional beings have *their own goals*, it looks like the biocentrist project of showing that all living things have inherent worth might be in danger.

The problem for the biocentrist is not in establishing that non-sentient living beings have teleofunctional *interests*. The problem is that their teleofunctional interests do not denote teleofunctional interests that are morally considerable to the extent that such interests give them direct moral standing.

Should a biocentrist accept the view that all non-sentient living things do not have goals or goods of their own she has a decision to make.

First, she could choose to take up the view that while conscious agents and sentient living beings have interests that provide them direct moral standing (because they have their own goals) non-sentient beings do not have interests that provide them direct moral standing because they do not have goals of their own.

Or she might choose to hold the view that all non-sentient living beings do not have *interests* because they do not have a good of their own. Hence, they cannot have inherent worth. If she chooses this option she might argue the following:

1) If something has interests that give it direct moral standing then it has a goal of its own.
2) But all NSLTs[244] do not have goals of their own.
3) Thus, all NSLTs do not have interests that give them direct moral standing.
4) If all NSLTs do not have interests that give them direct moral standing, then they do not have inherent worth.
5) Thus, all NSLTs do not have inherent worth.

If an environmentalist were to accept *this* line of reasoning then it looks like she really would have to give up on the biocentrist project of showing that *all* living things have inherent worth.

But she could reject the claim that they have inherent worth by a *different* route. She could simply deny that non-sentient living things have interests and that since they do not have interests they cannot have inherent worth. She then might instead try to show that all living things are still morally considerable even if they do not have interests.

Lars Samuelson points out this kind of move in the following passage. He writes,

> "Many non-sentientist environmental ethicists think that there are *reasons* to care for things that do not have interests, and towards which we cannot have such duties. These non-sentientists hold that we can have moral reasons that are not connected to duties *towards* someone. It is not an argument against such views to simply state that we cannot have such reasons. Dale Jamieson (1998: 47) applies a similar question-begging line of reasoning when he simply postulates that '[n]on-

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244 Here NSLT stands for "non-sentient, living things".

> sentient entities are not of primary value because they do not have a perspective from which their lives go better or worse. Ultimately the value of nonsentient entities rests on how they fit into the lives of sentient beings'. The claim of non-sentientist environmental ethicists is precisely that non-sentient entities can have a value independently of how they fit into the lives of sentient beings (cf. Crisp's response to Jamieson (Crisp, 1998: 477))" (Samuelson, 2010, p. 529)

Here we have the prospect of a biocentrist arguing that there could still be *reasons* to think that non-sentient beings have moral standing even if they should turn out not to have interests and thus not to have inherent worth.

What I want to argue here is that the biocentrist considering *this* option should not allow *sentientism* to dictate the terms of what *having an interest* means. I have argued in the previous chapter that non-sentient beings *can* have interests even if they do not "have a perspective from which their lives go better or worse". It is perfectly reasonable to talk about what is, or would be, *in a living thing's interests* even if that thing has no conscious awareness of its own interests, has no concept of what is 'better' or 'worse' for it or can have no experiences of pleasure or pain.

Even if it is true that there is some *other* way of arguing that we have a reason to care for non-sentient beings *besides the fact* that they have interests, it would be a misstep to simply capitulate to a sentientist criterion of interest possession if in fact non-sentient beings really *do* have interests.

The main question that we should ask at this point is not whether non-sentient living beings have teleofunctional interests (they do) or whether they have a goals of their own (they do not) but whether they have teleofunctional interests that provide a reason to care about them non-instrumentally.

It is quite reasonable to think that beings that have goals of their own, such as rational agents and sentient beings, are entitled to some *direct* moral standing. These beings have interests that make them *directly* morally considerable. But how can someone have a *direct* moral obligation to non-sentient, teleofunctional beings especially given that those being do not have goals of their own?

It does not appear as if they can.

A being that has direct moral standing is a being that other moral agents have obligations directly *to*. For example, human beings have *direct* moral standing because we have certain moral obligations *to* them not to harm or kill them.[245] Likewise, we have direct moral obligations to other sentient beings not to cause them to feel unnecessary pain. So conscious agents and sentient beings have direct moral standing. And furthermore they have this standing because they have goals of their own regardless of their etiology.

But we should *not* conclude from this that non-sentient living things cannot have teleofunctional interests that also provide a reason to care about them non-instrumentally. Their teleofunctional interests could still be morally considerable in an *indirect way* even if those interests do not confer direct moral standing to them.

The biocentrist willing to accept the conclusion that all non-sentient living things do not have goals of their own might instead try to find some way of showing that their interests are *still* morally considerable even if they do not confer direct moral standing to their bearers.

First it is possible for there to exist some things that we do not have *direct* moral obligations to, but rather *indirect* moral obligations to. These things can have moral standing in an indirect sort of way. They can have *indirect moral standing*.

For the purposes of this dissertation I will define indirect moral standing in the following

[245] We could also say that we have direct moral obligations to human being *because* they have direct moral standing. I do not here wish to defend the claim that having direct moral standing is a necessary and sufficient conditions for us to have obligations to them only that such a view could be argued for.

way.

X has indirect moral standing if and only if there is a reason not to harm X that is not based on any intrinsic properties of X.

For example, I own a car that has the purpose of providing me with transportation. One of its intrinsic properties is that it "has an engine". But this intrinsic property provides no reason not to harm it. But the car could have an extrinsic property such as "loved by David" of "is David's only form of transportation". These extrinsic properties do provide a reason not to harm it. Thus the car has indirect moral standing by recourse to these extrinsic properties. I have a fairly strong preference interest in having my car kept in working order. Should someone steal my car's alternator they would not be violating the car's *interests*. After all my car is something that has no interests at all because it is neither sentient nor teleofunctional. On this point moral agents do not have direct obligations *to the car* not to remove its alternator. However, the car's indirect moral standing means that there is a reason not to harm it. This does not mean that it would always be wrong to harm my car. It only means that there exists a reason not to harm it.

It is not the case that my car has *no* moral standing whatsoever. My car acquires a degree of *indirect* moral standing through my preference interests in it. To be sure, my car doesn't have interests. But *that* shouldn't mean that there cannot be a reason not to harm it that is not based on any of its intrinsic properties. Other moral agents have a direct obligation *to me* to treat my car with respect even if they do not have a direct obligation *to the car* to treat it with respect. My car has this indirect moral standing because I, as a being with goals of my own, have a preference interest in it being treated with care by others. My car has indirect moral standing because there is a reason not to harm it but that reason does not rely on any intrinsic properties of it. My car has indirect moral standing because there is a reason not to harm it based on my preference interest in it which is not an intrinsic property of the car.

Non-sentient living things can have teleofunctional interests that can be indirectly morally considerable. This is possible if their teleofunctional interests are the subject of a rational agent's preference interests.[246] They would have indirect moral standing because there exists a reason not to harm them that is not based on any of their intrinsic properties.

My car does not have *interests*[247], but the oak tree that grows in my front lawn does. The oak tree in my front lawn has the extrinsic purpose of providing shade to my house during hot summer months. But that is not the only extrinsic purpose that it has. It also is beautiful and adds some value to my property so it is extrinsically purposeful in those ways as well. These extrinsic purposes are among the reasons why it should not be harmed by others. Damage to that tree's teleofunctional structures would constitute a violation of its interests. But since there is a reason not to violate its interests that is not based on any of its intrinsic properties, then the tree has indirect moral standing.

With these considerations in mind I would like to add the following as a sufficient condition for a non-sentient living being to have teleofunctional interests that give it indirect moral standing.

If some rational agent has a non-trivial,[248] *preference interest in the*

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[246] There also might be *other* ways that non-sentient living things could get indirect moral standing.

[247] This is because my car is not a complex, teleofunctional being. It has no long-term self-maintaining capacities. As I mentioned in chapter 3 beings that are not complex or have teleofunctional complexity (such as fires) do not have interests.

[248] I include the word "non-trivial" here to exclude cases of what we might call "weak" preference interests, preference interests that are not strong enough to provide much, if any, reason to not harm the thing that one has the weak preference interest in. For instance, someone might have a very weak or *trivial* preference interest in their car bumper not being very, slightly scratched yet also not think that any moral wrong would have been committed if someone should very slightly scratch their bumper. This kind of trivial preference interest might be claimed by

teleofunctional interests of a non-sentient being x, then x has teleofunctional interests that give it indirect moral standing.

My oak tree has teleofunctional interests that give it indirect moral standing because I have a non-trivial preference interest in it. But the tree's teleofunctional interests in and of themselves do not provide a reason for why it should not be harmed.[249] Nonetheless, the tree's teleofunctional interests *indirectly* provide it with some moral standing.

The preference, sentient and teleofunctional interests of conscious agents and sentient beings provide them with direct moral standing because these interests belong to beings that have goals of their own. For instance, my preference interests in a tree's teleofunctional interests are directly morally considerable because those interests are among *my* intrinsic purposes. Hence, I have *direct moral standing* while the tree has *indirect moral standing* in relation to my preference interests in it. The teleofunctional interests of non-sentient beings, however, do not provide them direct moral standing. This is because these beings do not have goals *of their own*.

The specific problem for the biocentrist hoping to argue for the claim that all living things have inherent worth is that it needs to be shown that the teleofunctional interests of all non-sentient living things *provide a reason* for why all valuers should value or care about them *in and of themselves*, not specifically whether they have a good of their own or whether their

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some to provide *some* reason not to scratch the car's bumper (since the person *preferred* that it not be slightly scratched), but it might also be argued that such a trivial preference interest actually does *not* provide a reason not to scratch the bumper at all (since the person also did not regard that preference interest as being one that it would be wrong for others to violate). It might be argued that such a trivial preference does not really provide a reason not to very slightly scratch the car bumper because it would never be morally wrong to violate that particular preference interest. On the other hand, *non-trivial* preference interests are ones in which it would be *prima facie* morally wrong to violate. Whereas *prima facie* it is not wrong to violate a trivial preference interest.

[249] Here I am assuming that the tree that I am talking about is a naturally-selected tree. But it could just as well be an instantly-produced tree or a tree produced by some designer. The etiology of the tree would not matter to whether the tree *could* have indirect moral standing.

interests are directly morally considerable. Recall that in chapter one I defined morally considerable interests as *interests that provide a reason for why all valuers should care about the possessor of those interests in and of itself*.[250]

The biocentrist who believes that all living things have inherent worth, as defined in this dissertation, thinks that all living thing have interests that are *morally considerable* and that we should value all living things in and of themselves because of the interests that they have. The fact that we should value them in such a way has implications for how we end up *treating* them.

As Lars Samuelson writes,

> "...*reasons* are what EE should primarily be concerned with...EE is first and foremost a practical discipline. It is largely motivated by the insight that *action* is urgent if we want to reverse the current, alarming situation of the natural world. The point of establishing that nature has intrinsic value is that such values would lay claims on us – that they would supply us with reasons for action with respect to their bearers. If it were not for this connection to reasons, environmental ethicists and environmentalists would not have taken interest in the intrinsic value of nature in the first place. It is the practical questions about what we have reason to do that motivate the further questions that we may want to ask about value and moral standing. If these latter notions were not closely connected to reasons, they would simply not be interesting from an ethical point of view. What good would the value of nature be if it did not lay claim on us?" (Samuelsson, 2010, p. 530).[251]

Thus, the biocentrist who does *not* want to give up on the project of showing that all living things have inherent worth needs to show that all non-sentient beings can still have

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[250] For a discussion of the definition of morally considerable interests see section VIII of chapter one.

[251] Samuelsson should not be read as endorsing biocentric individualism here. Rather he is emphasizing the need to appeal to the existence of *reasons* for taking up a nature-preserving attitude. His use of the term "nature" does not refer precisely to individual living organisms but rather to "non-human, non-sentient natural entities". He writes,
"...the notion of intrinsic value has occupied a prominent position within the field [of EE], and one of its most frequently debated questions has been that of whether some non-human, non-sentient natural entities have intrinsic value. (From now on I will simply write ‘nature’ to refer to any such natural entity that one may think has intrinsic value.)" (Samuelsson, 2010, p. 518)

interests that provide a *reason* for valuers to care about them in and of themselves.

However, for the purposes of this dissertation I want to focus on the question of whether non-sentient living things can be guaranteed to have *indirect moral standing*. The question of whether the teleofunctional interests of non-sentient living things provide reasons for why they should be *cared about or valued non-instrumentally*, unfortunately is not a question that space here permits.

The question of whether there exists reasons for why a non-sentient living thing should not be harmed that are not based on any of its intrinsic properties is a separate question from whether there exists reasons for why a non-sentient living thing should be cared about non-instrumentally. For example, if I take a preference interest in a plant growing in my backyard then there would exist a reason not to harm it that is not based on any intrinsic properties of the plant. But the fact that I happen to have a preference interest in the plant does not necessarily mean that there is a reason *for others* to care about it non-instrumentally. Those other valuer have a reason not to harm it, but they might not necessarily have a reason to *care about* it per se.

At this stage it is important for the biocentrist to point to reasons for how the teleofunctional interests of non-sentient living things could give them indirect moral standing. Since all non-sentient living things do not have interests that provide them direct moral standing, the biocentrist should still inquire into whether the teleofunctional interests of *naturally-selected*, non-sentient living things could *guarantee* that those beings have indirect moral standing.

XIII. Can All Naturally-Selected Non-Sentient Living Things be guaranteed to Have Indirect Moral Standing?

At this point we should inquire as to whether the teleofunctional interests of all naturally-selected non-sentient beings gives them indirect moral standing.

Natural selection is incapable of selecting a teleofunctional structure *for* a functional task. Hence, naturally selected, non-sentient beings do not have teleofunctional purposes. Hence, they do not have goals. Since I have shown that naturally selected, non-sentient beings do not have goals, a biocentrist could still argue that natural selection is capable of generating teleofunctional interests that give their bearer's indirect moral standing.

For instance, consider the following world in which there exists only naturally-selected forms of life including some rational, moral agents. Billy, a five-year-old in that world, uproots a mulberry bush in his grandmother's back yard. Upon uprooting the plant Billy causes it to sustain fatal, systemic harm. The plant dies. The plant itself, however, is not the subject of direct moral standing. It sustains no sentient or psychological harm and has no goals of its own. Billy's grandmother happens to witness the plant's uprooting. Observing this event causes her to experience sadness and anger. She particularly liked the plant because of its beautiful leaves. She projected an extrinsic purpose onto the plant, that purpose being the purpose of appearing beautiful to her and her guests. Billy's grandmother thus experiences some psychological harm because this particular plant was one that she took a preference interest in. Billy's grandmother had an interest in maintaining the plant's teleofunctional interests. Billy, by violating the plant's teleofunctional interests, directly violated his grandmother's preference interests in the plant. Billy's act of uprooting the plant is thus wrong because his violation of the plant's teleofunctional interests resulted in the violation of another person's preference interests.

So what should we say about the moral standing of the plant? In this case it seems reasonable to think that the plant has indirect moral standing. The plant has teleofunctional interests. But those interests considered in isolation do not make the plant itself morally considerable or worthy of some respect in its own right. Rather its teleofunctional interests are the subject of another person's fairly strong, preference interests. It thus has an extrinsic purpose related to its teleofunctional interests. If this particular plant could not regulate itself because of some damage done to one of its teleofunctional structures it would not be as beautiful or as useful to Billy’s grandmother.

The plant, in this case, has indirect moral standing which means there exists a reason for why Billy, and other agents, should not harm it, a reason that is not based on any intrinsic properties of the plant. It has an extrinsic purpose associated with some agent, Billy’s grandmother, who has her own intrinsic purposes.

But would naturally-selected non-sentient teleofunctional beings be *guaranteed* to have such indirect moral standing?

Let us imagine a world without any creator in which there only existed naturally selected, non-sentient, teleofunctional beings. Should we think that the teleofunctional interests of *all* of these non-sentient beings are morally considerable? Would their teleofunctional interests represent some kind of moral value in that world?

I do not think so. The naturally-selected, teleofunctional interests of non-sentient beings in this world do not have moral value in themselves. These non-sentient beings do not themselves have goals, either intrinsic or extrinsic. These non-sentient beings engage in the processes of replicating their DNA, reproducing themselves, converting ADP into ATP, harnessing sunlight, making carbohydrates, and competing in the Darwinian “struggle for existence” etc. But these biological processes are completely amoral.

So in this type of world the naturally-selected, non-sentient living things in it cannot be guaranteed to have indirect moral standing.

But let us imagine a slightly differently world, one in which there exists many naturally-selected, non-sentient living things and just one rational agent, Ken.

Ken himself does not have a preference interest in any of the teleofunctional interests in the non-sentient beings that he encounters in that world. One day he uproots a small tree. Since Ken has no preference interests in the plants and there are no *other* rational beings around that could take an interest in the tree's teleofunctional interests, then there is not reason for why the tree should not be harmed. As such the tree's teleofunctional interests do not give it indirect moral standing.

Should Ken cause systemic harm to the non-sentient beings in this kind of world such an act does not appear to be morally wrong. Even Harley Cahan acknowledges that this kind of evaluation might be reasonable. He writes. "Should we find moral significance in an organism's goals? Perhaps not. We may coherently admit that plants have goals[252], yet deny that we have duties to them." (Cahen, 1988, p. 208).

Naturally selected plants have teleofunctional interests in replicating their DNA, converting ADP into ATP and in harnessing sunlight to make sugar. But those teleofunctional interests are not purposeful in themselves and do not themselves provide a reason for why any moral agent should value them in and of themselves. Thus, a natural selection etiology cannot *guarantee* that all living things produced by that etiology will have indirect moral standing.

Still it could be argued that even if all naturally selected living things do not have goals of their own there is a *high probability* that they would all acquire extrinsic purposefulness by being *appreciated* or valued by human beings. It might be argued that human beings routinely

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[252] Here Cahen is writing about the "goals" of a tree's "growth, survival and reproduction". Although, as I have argued previously naturally selected trees do not have goals. Unlike Cahen, I do not believe that we can "coherently admit that plants have goals."

project purposefulness onto the non-sentient beings produced by natural selection and so human beings routinely have preference interests in all naturally-selected, non-sentient living things. In other words it might be claimed that we, as observers of the natural world, always “see” purposefulness, goal-directedness and value in the world and that such human sentiments always makes it the case that the non-sentient living things that exist will acquire indirect moral standing from our dispositions to appreciate their teleofunctional activities. Since the teleofunctional interests of all non-sentient living things are valued by our fellow human beings, then there is a reason not to harm them that is not based on any of their intrinsic properties.

Note that this claim is consistent with human beings projecting purposefulness onto all non-sentient living things *without regard for their etiology*. In other words, humans could project purposefulness onto an instantly-produced tree just as much as they could project purposefulness onto a naturally-selected tree.

In any event even if human beings were to acquire some basic, natural affinity for projecting value onto non-sentient beings that is a far cry from the claim that we *would* value the teleofunctional interests of *all* naturally selected, non-sentient beings.

In fact there are some reasons to think that humans would not find purposes or care about all non-sentient living things. There are a great many non-sentient forms of life that *Homo sapiens* simply *hasn't even encountered yet* much less *valued*. There are still numerous, *unnamed species* of plants on the planet that are yet to be discovered by us.[253] For example, ten to twenty

[253] On a related note, Robert May and Ray Beverton have commented on biologist's efforts to discover and describe new species. Biologists have routinely opted for discovering and describing larger, more prominent forms of life than smaller, more obscure forms. Bigger things just seem to be more important to us than smaller or microscopic things. They write,
"As one moves down the size-spectrum of organisms, from the romantic large mammals and birds, through nondescript small arthropods [sic], on down to protozoan, bacterial and viral species, not only does concern for diversity and conservation fall away, but it even changes sign.

percent of known species of flowering plant are "missing" (Joppa et al., 2011a; Joppa, et al., 2011b).

Still the biocentrist could make a slightly different argument. They might say, "All that biocentrism needs is a case where one rational agent *cares about* the teleofunctional interests of all living beings in order for them to all have indirect moral standing. As long as one person has a preference interest in the teleofunctional interests of all non-sentient teleofunctional beings, then all valuers should care about those beings. And *I* care about the interests of all living things. So all living things have indirect moral standing." I will call this argument the "biocentric preferred interests" argument.

This argument might look like the following:

1) For all x, if x is a NSNSLT, then if the teleofunctional interests of all x are the subject of at least one human being's preference interest, then all x have indirect moral standing.
2) The teleofunctional interests of all x are the subject of at least one human being's preference interests.
3) Thus, all x have indirect moral standing.

It might, at first glance, appear that the "biocentric preferred interests" argument could make the biocentrist happy. All that is needed is for *one* human being to care about, or have a preference interest in, the teleofunctional interests of all non-sentient living beings.

There are, however, some problems for the "biocentric preferred interests" argument.

First, when the biocentrist says that she "cares about all living things" she means that she cares about the whole *collection* of living things, not all *individual* organisms. For example, a concert pianist can declare love to her adoring audience by saying "I love you all." This does not mean that she loves *each individual person* there. What she means is that she loves the group or

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In the Smithsonian Institution in Washington, a touching label attached to Martha, the last passenger pigeon, laments her death in 1914, but no-one mourned the passing of the last smallpox virus." (May and Beverton, 1990, p. 301).

the audience itself. The claim that a human being can care about all individual non-sentient living things is false. Human beings are simply not capable of taking up that kind of attitude toward all individual non-sentient living things.

It seems a bit unrealistic to expect that human beings actually would find some value or have some extrinsic purpose for the teleofunctional interests of *all* non-sentient living things. What goes on inside of a lone plant in a remote area of the world is actually of very little interest to most if not all human beings. As Holmes Rolston comments, "I too claim that no species among the five or ten million on Earth is worthless; each has a good of its kind; each is a good kind. But it is going to be quite a stretch to show that each and every one of them is *some good to us*." (my emphasis, Rolston, 2009, p. 101).

This is what I call the "the limited capacity of human caring" problem.

Second, many biocentrists think that all living things should not be harmed regardless of what *our*[254] preference interests turn out to be towards them. They believe that not only is it the case that *prima facie* all living things should not be harmed, but that the justification for why they should not be harmed shouldn't be based on the preferences of human beings at all. In other words, these biocentrists might agree that even if some person has a preference interest in all individual non-sentient teleofunctional beings (a doubtful proposition for human beings) that that would provide *some* reason for why those beings should not be harmed. But they would caution that such a reason is not *necessary* to guarantee the moral standing of all living things. Biocentrists think that all living things have value independently of their effects on human beings.

For instance, Holmes Rolston holds the view that living organisms have value

[254] By "our" I mean human beings.

independently of whether human beings subjectively confer value onto them. He writes,

> "The bee's defending its own life for what it is in itself is just as much fact of the matter as is its using its stinger or making honey to do so...these are observations of value in nature [my emphasis] with just as much certainty as they are biological facts. We are misled to think that all the value of the tree, instrumental or intrinsic, must be subjectively conferred, like the greenness, a secondary quality, or even a tertiary one. A simpler, less anthropically based, more biocentric theory holds that some values, instrumental and intrinsic, are objectively there, discovered not generated by the valuer." (Rolston, 2003, p. 146).[255]

Biocentrists such as Rolston would probably say, "*Prima facie*, all living things should not be harmed *even if no one else cares* about any of them at all. We have a *prima facie* duty not to harm all living things despite whether any being takes up a preference interest in them or not. Our *prima facie* duties to not harm living things shouldn't be dependent in that way on the evaluative attitudes of others."

Consequently, biocentrists would say that if the antecedent condition of premise one of the "biocentric preferred interests" argument does not hold all living things still shouldn't be harmed anyway. Reliance on such a premise, they think, undermines the overall biocentrist project of showing that all living things have value independently of whether any valuers happen to value them.

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[255] On a related matter, Paul Taylor claims that since human beings' moral intuitions about what has value and what does not are *socially conditioned and subjective*, that such intuitions cannot be reliable in getting at an objective environmental ethic. He writes,
"Our moral intuitions regarding how the living things of the natural world should be treated are psychologically dependent on certain basic attitudes toward nature that we were imbued with in childhood. What attitudes were given to us early in life reflect the particular outlook on animals and plants accepted by our social group....Since our intuitive judgments in matters of ethics are this way strongly affected by our early moral conditioning and since different societies will imbue children with different attitudes and feelings about the treatment of animals and plants, we cannot use either our own or anyone else's moral intuitions as grounds for accepting or rejecting a theory of environmental ethics...We must strive for objectivity, and this requires a certain detachment from our immediate intuitions in the area so that we consider without prejudice the merits of the case for a life-centered ethic." (Taylor, 1986, p. 23-24).

This is what I call the "independence from human valuers" problem.

Thus, in a world in which natural selection is the sole cause for the existence of all non-sentient living things it is not true that all of those beings are guaranteed to have indirect moral standing.

But non-sentient beings produced by the other etiologies considered thus far will also not be guaranteed to have indirect moral standing either. These considerations would no doubt also apply to non-sentient living things produced by the other etiologies we have considered thus far. Some of these beings might be extrinsically valued by other rational agents while others might not. There is no guarantee that they would *all* be extrinsically valued or appreciated by other rational agents.

The biocentrist concerned about these problems might then wish for an alternative to the "biocentric preferred interests" argument, one that steers clear of these complications.

But can this wish really be fulfilled?

As I have argued in this chapter, there is very little to recommend for the view that non-sentient teleofunctional beings have *direct* moral standing, a moral standing that exists independently of all valuers whatsoever. The only remaining option for non-sentient beings to acquire moral standing is if they acquire indirect moral standing. But as I have argued here the biocentrist's hope of guaranteeing indirect moral standing for all naturally-selected, non-sentient living things independently of the valuing attitudes human valuers cannot hope to succeed.

XIV. Conclusion

In this chapter I have attempted to demonstrate that a systems-based approach is not successful in showing how the teleofunctional interests of non-sentient beings could make them have direct moral standing or have a goal of their own. I have also argued that all of the etiological options considered in this chapter are unsuccessful in showing how the teleofunctional interests of all non-sentient living beings could make it the case that they have a good or a goal of their own. Neither the systems-based approach, nor the etiological approaches considered thus far appear to be very good candidates for showing that non-sentient living things can have such goals.

Biocentrists argue that *all* living things have interests that are *morally considerable*, interests that provide a reason for why the possessors of those interests should be valued in and of themselves. But if the biocentrist wants to argue that all living things have interests that give them *direct* moral standing, then as I have argued here, there seems to be little to recommend *that* view. If, on the other, hand morally considerable interests could include teleofunctional interests that give their possessors indirect moral standing, then all non-sentient living beings could have *that* kind of moral standing. That is if the biocentrist insists that interests that provide direct moral standing are the *only* kinds of interests that can provide moral standing, then non-sentient living beings *cannot* have moral standing. If, on the other hand, she is willing to countenance the view that interests that provide direct moral standing are *not* the only kinds of interests that can provide moral standing, then non-sentient teleofunctional beings could get indirect moral standing.

Daniel Dennett has described Darwinism as a "universal acid" which "eats through just about every traditional concept" (Dennett, 1995, p.63), including prescriptive norms in ethics. This acid, unfortunately, has now attacked the biocentrist project of showing that all living things have inherent worth. Darwin's theory has indeed reduced (and some may claim rightly) the status of human beings as the proverbial “pinnacle of creation”. Humans are now merely one among many species that inhabit the planet Earth.[256] Unfortunately, it has also made the biocentrist's project of showing that all living things have inherent worth more, rather than less, difficult. Naturally selected, non-sentient living things have no goals of their own. And if they happen to acquire some indirect moral standing it will depend entirely on other valuers contingently finding some value in them. Given the tenuous nature of those values perhaps the biocentrist should look elsewhere.

One problem that does need to be addressed, but that is beyond the scope of this dissertation, is whether teleofunctional interests that give non-sentient living things indirect moral standing should be regarded as interests that give them *inherent worth*. The problem is roughly this: If teleofunctional interests are the *only* kinds of interests that non-sentient teleofunctional beings can have, and those interests can only give those beings indirect moral standing and not moral standing in their own right, then it looks like non-sentient living beings cannot, properly speaking, have *inherent* worth. Non-sentient teleofunctional beings are not *inherently* worthy of moral standing *in their own right* because their teleofunctional interests do not represent a "good of their own". Non-sentient living things can only be worthy of moral standing by recourse to reasons for why they should not be harmed that is not based on any of their intrinsic properties. In this way non-sentient teleofunctional beings, it might by urged, cannot have worth that is *inherent* or *intrinsic* to them. If *this* understanding of inherent worth is what the biocentrist is hoping for, then as I have argued here, that project cannot succeed. If so

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[256] This is the claim that human beings are not inherently superior to other species but is instead a late-forming twig on the evolutionary “tree of life”. As Christopher Uhl writes, "In truth, we are not superior, nor inferior, to the rest of the family of life. The process of evolution has produced Earth's *tree of life*. This tree has myriad branches, each its own evolutionary line. The buds along each of these branches are species. Our species, *Homo sapiens*, represents on bud on one branch - no better, no worse than the millions of other buds strung along the tree's other branches." (Uhl, 2013, p. 79).

then such a biocentrist might be urged to give up on the claim that *all* living things have specifically *inherent* worth. It might be recommended that non-sentient teleofunctional beings could have some *other* kind of worth, just not *inherent* worth.

If, on the other hand, the biocentrist is willing to allow that non-sentient living things can have inherent worth because they possess, or can possess, interests that provide a reason not to harm them, then she will not have to give up on the claim that *all* living things have inherent worth.

Because of this difficulty I will then set aside the discussion of whether non-sentient living things can have *inherent* worth and instead focus on the question of whether non-sentient living things can have indirect moral standing.

The only other etiological possibility that we have not considered is a design etiology.

As I mentioned in chapter three, the systems-based account of interests suggests that there could exist artificial forms of life that would have interests. This approach leaves open the prospect that intelligently-designed teleofunctional systems, whether living or non-living, can be candidates for interest possession. Mossio et al. recognize this possibility when they write, “we leave open the possibility that, at least in principle, functional attributions may concern ‘non-living’ systems. In practice, however, all known cases of closed and differentiated self-maintaining systems are living systems” (Mossio et al., 2009, p. 828). If so then the environmentalist that accepts this aspect of the systems-based account cannot exclude items with a design etiology from having teleofunctional interests.

In the next chapter I will argue that if the teleofunctional interests of non-sentient living beings were brought about by a designer then those beings would be guaranteed to have indirect moral standing. All persons in that world would have a reason not to harm those beings independently of whether any of those persons happens to take up a preference interest in them.

CHAPTER FIVE
A Design Etiology and Indirect Morally Considerable, Teleofunctional Interests

In the preceding chapters I have attempted to demonstrate that there is a significant difference between having teleofunctional interests and having morally considerable teleofunctional interests. Morally considerable teleofunctional interests are ones that provide a reason to care about the possessor of those interests in and of itself or non-instrumentally.

I have also attempted to show that a non-etiological, systems-based approach is not capable of identifying teleofunctional interests that could make non-sentient beings have *direct* moral standing. This approach is very adept at identifying the presence of teleofunctional interests by recourse to whether a system has a teleofunctional type of organization. Should there exist some organism that contains a variety of structures and substructures that all work in conjunction with one another to contribute to its self-maintenance, then the future well-being of that thing would depend on the continued successful operation of its constituent, teleofunctional parts. That organism, as a teleofunctional system, would have teleofunctional interests in its parts continuing to perform the functions that they do.

But as I mentioned in the previous chapter, the teleofunctional structures of instant organisms do not have functions. Instant Arto's membrane, for example, does not have the function of filtering matter. And so no one can cause its membrane to malfunction. Its membrane is not for filtering matter.

Instant organisms are a problem for a non-etiological, systems-based views of interests because those accounts don't make any kind of moral distinction between the interests of "instant organisms" and other organisms produced in a different way.

Even though Instant Arto has a teleofunctional interest in its membrane filtering matter, should its membrane cease to function as a selective barrier (due to, for example, it being punctured by someone) we would be unable to say that that structure malfunctions or functions improperly as a result of its being punctured. Since Instant Arto's membrane does not have filtering matter as a function it also cannot malfunction or *improperly* filter matter. In this case Instant Arto has a teleofunctional interest in its membrane functioning as a selective barrier. But there is nothing about that interest that would warrant the conclusion that is should be valued in and of itself.

In fact, as I have argued, there is no good reason to think that non-sentient living things can have a good of their own even though they can have interests.

This leaves indirect moral standing[257] as the only available kind of moral standing that non-sentient living things can have.

We might admire the precision and efficiency with which Instant Arto's teleofunctional structures perform their functions and so it could have interests that give it indirect moral standing on that basis. We could also value it as a subject of future biomedical research or we might value it for some of its aesthetic properties (perhaps its membrane structure is particularly, intricate or beautiful).

But it would make very little sense for the biocentrist to claim that their teleofunctional interests would be universally preferred such that all teleofunctional, non-sentient beings would have indirect moral standing.

In the first section will explain what a design etiology is and I provide a definition of what the term "design" means.

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[257] In section XII of chapter four I defined indirect moral standing in the following way: *X* has indirect moral standing if and only if there is a reason not to harm X that is not based on any intrinsic properties of *X*.

In the second section I will raise the possibility that a design etiology could guarantee that non-sentient living things produced by it would have indirect moral standing. In it I make the argument that if all non-sentient living thing were designed then they would have indirect moral standing because they were brought about by an intrinsically good activity, creativity. Since creativity is an intrinsically good activity then there would be a reason why non-sentient living things that were brought about by that good activity should not harmed.

In the third section I provide a second argument for why designed, non-sentient living things have indirect moral standing. Here I will argue that designed, non-sentient living things are guaranteed to have indirect moral standing because they have teleofunctional structures that have teleofunctional purposes. The existence of these functional purposes guarantees that designed, non-sentient living things have indirect moral standing because these purposes were intended by a designer.

In the fourth section I introduce a "theistic design etiology" as possible way in which all non-sentient living things could have been brought about. This etiology, as the name implies, is one in which God brought about all non-sentient living things.

In the fifth section I provide some justification for the project of arguing that God's existence and action in the world does provide reasons not to harm the non-sentient living things that he designed. Various environmentalists have argued that some religious beliefs have been antithetical to an environmental ethic. They have made arguments which suggest that theism in environmental ethics is something that should either be avoided or is simply not relevant to environmental ethics.

In the sixth section I embark on a discussion of what it would take for a designer to design the non-sentient living things that exist in the actual world. Here I argue that such a designer would have to able to generate genetic information in order to bring about those beings. I also argue that given the highly complex nature of those living things and the amount of biological information that they contain that their designer would have, relative to beings like us, great creativity. Here I will attempt to show that such a designer would have, relative to beings like us, a level creativity that far exceeds our own. To us such creativity would be rather astonishing.

In the seventh section I will address the question of whether it would be proper to claim that natural selection is creative or has great creativity. Here I argue that since natural selection is a blind and without intention it cannot, properly speaking, be regarded as creative. It might *create* living things, but it cannot be *creative* nor exercise *creativity*. Rational agents, on the other hand, can exercise creativity.

In section eight I argue that if the theistic design etiology were true then the non-sentient living things that were brought about by that etiology would be guaranteed to have indirect moral standing for still further reasons. Here I argue that if all non-sentient living things were designed by God for the purpose of inspiring beings like us with a sense of awe and wonder then those non-sentient living things would have indirect moral standing of our obligation to be *thankful to God* for designing such beings. Having the obligation to be thankful to God provides a reason why we should not harm the non-sentient living things that were designed by God. Non-designed non-sentient living things, on the other hand, are not ones that we have an obligation to be thankful to God, or any other being, for bringing about.

In section nine I argue that if the theistic design etiology were true then the non-sentient living things that were brought about by that etiology are guaranteed to have indirect moral standing for still even further reasons, reasons not available for why a non-designed, non-sentient living being should not be harmed. I argue that if the theistic design etiology were true, then there would be an entire collection of preference interests that would provide a reason for the non-sentient living things produced by that etiology should not be harmed. This collection of preference interests is what I call a "project". Projects involve numerous preference interests and desires. Non-sentient living things that are not designed are not a designer's project and so a designer's preference interests cannot be among the reasons available for why non-designed non-sentient living things should not be harmed. Non-designed, non-sentient living things cannot acquire indirect moral standing for these reasons.

In the tenth, and final, section I provide a recap of this chapter and conclude with some final remarks about how a design etiological view of the teleofunctional interests of all living things is the best route that a biocentrist can take in support of their arguments for the claim that all living things have moral standing.

I. What Does it Mean to Have a Design Etiology?

At this point the biocentrist might simply accept the verdict that all non-sentient teleofunctional beings cannot by guaranteed to have indirect moral standing and try to find some other way of arguing on behalf of their protection.

There is, however, one remaining etiological option for how non-sentient living things could have come about. That etiological option is a design etiology.

But what does the term "design" mean?

Whenever I use the term ‘design’ I will *not* use it in the same way that some evolutionary biologists do when they refer to the process of natural selection as being one of ‘design’.

Scientists often use the term ‘design’ when talking about how the process of natural selection can 'design' living organisms and their structures. Natural selection, they claim, ‘designs’ living things. For instance, anthropologist Edward Hagen describes the process of natural selection as of ‘designing’ the human immune and sensory systems. He writes,

> "Natural selection *designed* [my emphasis] the immune system to detect and eliminate foreign proteins, but, in operation, the immune system must learn to detect and eliminate measles and strep. Similarly, natural selection designed our sensory systems to identify carbohydrate sources using reliable cues like color and taste, but these systems, in operation, must learn to identify particular carbohydrate sources, like apples and oranges." (Hagen, 2005, pp. 160-161)

Francisco Ayala, another evolutionary biologist, claims that natural selection can produce ‘design but without a designer’ (Ayala, 2007) while Daniel Dennett, in speaking about Charles Darwin’s own understanding of ‘design’, writes,

> “Hume’s Cleanthes...lumps the adapted marvels of the living world with the regularities of the heavens – it’s *all* like a wonderful clockwork to him. But Darwin suggests a division: Give me Order, he says and time, and I will give you Design. Let me start with regularity – the mere purposeless, mindless, pointless regularity of physics – and I will show you a process that eventually will yield products that exhibit not just regularity but purposive design.” (Dennett, 1995, p. 65).

On my use of the term ‘design’, however, there is no actual ‘design’ unless there is an actual designer or conscious agent that had some purposeful intention to bring about some object or state of affairs. For this reason I will treat the term ‘design’ to be equivalent to ‘design by an agent’.[258] If this is so then anything that is designed is one that is designed by an agent.

The following, then, is a necessary and sufficient condition for a thing to be designed.

X is designed if and only if x is designed by an agent.

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[258] I will use the term ‘design’ to refer to 'design by an agent' all the while recognizing that this is not the only sense in which that term has been used by others, particularly by evolutionary biologists. Although, as Plantinga argues in *Warrant and Proper Function*, these evolutionary biologists, if they are *naturalists*, should *abandon* the very idea of proper function or functional purpose. For a naturalist to adopt the intentionalist stance is to embrace an illusion that "...as Freud and Marx tell us, has its uses; but helping to achieve straightforward understanding is not among them" (Plantinga, 1993, p. 214)

According to my use of the term 'design' natural selection cannot ‘design’ anything because it is not an agent. It, unlike agents, cannot make conscious plans or intend for anything to come about. It does not involve the conscious planning of a mind. Should a non-sentient, teleofunctional being be produced by natural selection then that being would not be a designed being. Natural selection, like all blind, unguided processes has no mind and makes no purposeful plans to produce anything.

In his critique of Philip Kitcher’s attempt to “unify” the concepts of *purposeless* 'design' with *purposeful* design, Paul Davies amply describes this point in the following way. He writes,

> “Kitcher asserts that ‘one of Darwin’s important discoveries is that we can think of design without a designer’ (1993, 380). But this is ambiguous. It may assert merely that (a) Darwin showed us how to explain the apparent marks of design without postulating a designer. Alternatively, it may assert that (b) Darwin showed us that there really is design in the natural world despite the absence of a designer. Now I take it that (a) is true. But as we have seen, the truth of (a) cannot support Kitcher’s proposed unification, since the concept ‘design’ applies to the production of artifacts while the quite different concept ‘bears-apparent-marks-of-design’ applies to the evolution via selection of natural objects. I also take it that (b) is false. For no one, not even Darwin, can show that there is design in the absence of a designer, since no one can refute the rather plausible conceptual claim that design requires a designer...it is just not true that Darwin thought there could be design with no designers. On the contrary. Darwin’s view is that we can explain away that apparent marks of design without appeal to a designer. And to explain away the appearance of design without appeal to a designer is not to show that we can think of design without a designer; it is rather to show that we ought to cease thinking of the natural world as designed.” (Davies, 2001, p. 59).

Since natural selection is a mindless process it cannot *literally* be true that it intentionally selects structures *for* functional purposes. The use of such metaphorical language on our part might be instrumental in some way but it does not describe what is actually going on with natural selection. As Jerry Fodor writes,

> "It couldn't, for example, be *literally true* [my emphasis] that the traits selected for are the ones Mother Nature has in mind when she does the selecting; nor can it be literally true that they are the traits one's selfish genes have in mind when they undertake to reproduce themselves. There is, after all, no Mother Nature, and genes don't have, or lack, personality defects. Metaphors are fine things; science

probably couldn't be done without them. But they are supposed to be the sort of things that can, in a pinch, be cashed. Lacking a serious and literal construal of 'selection for', adaptationism founders on the methodological truism" (Fodor, 2007, p. 20).[259]

A doorknob is *for*, has the purpose of, opening and closing doors because that is what it was brought about *in order to* do. A watch, likewise, is for, has the purpose of, telling time. But the functions of naturally-selected structures are not like that because natural selection cannot select any structure *in order to* fulfill some functional goal. Designers, on the other hand, routinely select the structures of artifacts in order to fulfill some functional goal.

A teleological explanation, a *design* explanation, is an explanation of functional purpose that explains what the function of some structure is by recourse to what it was “selected to” do or what it was "designed to" do.

At this point I would like to provide some further explication of what being "designed" means. In order for something to be designed it must have been designed by an agent who employed her creativity in bringing it about. If something is designed, then it is something that a designer herself brought into existence by employing her creativity. Let's consider the proposal as a definition of what being designed means.

X is designed if and only if some agent, y, employed her creativity to bring about x.

But this definition has some difficulties.

Being the product of someone's creativity is not enough to show that that thing was *designed by* that agent. For example, suppose that some agent uses her creativity to design a fireworks show which unintentionally results in a patch of woods catching on fire. In this case

[259] Fodor has also made similar remarks in his paper "Against Darwinism", *Mind & Language*, 2008. (Fodor, 2008a).

the designer did not design *the patch of woods catching on fire* because it was not her intention for the patch of woods to catch fire when she designed the fireworks show. The patch of woods catching on fire, however, was *the product of* her creativity. She designed the fireworks show, but she did not design the patch of woods catching on fire.

So how might the definition of design be improved to take this kind of problematic example into account?

To that end I propose the following revised version of what it means for some object to be designed.

> *X is designed if and only if some agent, y, employed her creativity to intentionally bring about x.*

On this definition a painting would qualify as a "designed" object if that painter used her creativity to bring it about and that designer used her creativity *to intentionally bring it about*. The designer of the fireworks show designed *the fireworks show*. But she did not design *the patch of woods catching on fire* because she did not employ her creativity to intentionally bring *it* about.

But what exactly is creativity?

I will use the term “creativity” as it is defined by the Merriam-Webster Dictionary. It defines creativity as “the ability to make new things or think of new ideas”. So when an agent is creative, or engages in creativity, that agent uses her ability to bring about some new idea or concept. Arthur Cropley also emphasizes the newness, or what we might also call *novelty*, associated with creativity in the following way. He writes.

> “Almost 50 years ago, Morgan (1953) reviewed a large number of definitions of creativity and showed that the single common element was novelty. Cognitive definitions of creativity usually follow this tradition and emphasize production of *novelty as the crucial aspect* [my emphasis]...Novelty can be produced in the form of mere self-expression (daubing paint on paper, writing text in any way that pleases the writer, or picking out notes at random on the piano) or of simple

> production of variability (doing things differently from the usual regardless of accuracy, meaning, sense, significance, or interestingness)." (Cropley, 1999, p. 253).

It should be recognized that the novelty that is of concern here is the novelty of an *idea*. For example, a random bolt of lightning might be regarded as *novel* in that it might be an unexpected or surprising thing, but it is not a novel *idea* or an innovative concept. So the novelty that I am speaking about here is a novelty of an idea or concept.

A novel idea, however, might be "new" in two different senses. For instance, if an individual comes up with an idea for an invention *that already happens to exist* (even though this individual does not *know* that such an invention already exists), that person would have come up with a novel idea. The activity of coming up with that new idea would be an instance of creativity. But this new idea would be "new to her". It would not, however, be "new to the world".

But even if an idea is not "new to the world" that should not entail that the person's activity in coming up with the idea is not creative. An historical incident in which two separate people had independently come up with the same idea was the invention of calculus by both Newton and Leibniz. Although both of their ideas were not, in a strict sense, "new to the world" (because the other had already invented it) it would be false to say that neither of them had been *creative* in coming up with the idea of calculus. In other words an idea need not be "new to the world" in order for it to be an instance of a person's creativity.

Should some agent produce an idea that is both "new to the agent" and "new to the world" that too would be an instance of that agent's creativity. For simplicity's sake I will a confine illustrative cases of a person's creativity to cases in which that agent's idea is both "new to the agent" and "new to the world".

There can be instances in which a team of designers can work collaboratively to bring about an designed thing. For example, automobiles are designed by a team of designers collaboratively working together. One engineer designs the steering wheel of the automobile while another designs its drivetrain. If there should exist an automobile that was designed by a *team* of designers, then that would mean that that team designed it. The team, then, would be *the agent* that designed the automobile.[260]

There can also be instances where one or more *features* of an object were designed by separate designers but in which other features of that object were not designed by them either individually or as a group collaboratively. For example, one of the features of a television set is that its screen melts at 1400˚C. This is a feature of the television set. But it was not designed by any of the designers of the television. Also, a collection of toys under a Christmas tree might each be designed by different designers yet the feature of the collection itself appearing underneath the tree was not brought about by any of the individual designers of the toys. In this case one of the toys was made by one designer while some other toy was made by yet another designer. But the *collection* of toys itself was not collaboratively made by them.

The above considerations suggest that a person can design a *feature* of an object without having to design *all of the features* of that object, that a person can design a feature of an object, but not in collaboration with other designers of other features of that same object or that a single designer could design all of the features of an object without any causal input from other agents.

To take into account the fact that *features* of an objects can be designed we can stipulate that some *features* of an object are designed if they are ones that some agent employed her creativity to intentionally bring about. With this in mind I propose the following definition of what it means for a *feature* of some object to be designed.

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[260] Of course, not all teams are agents.

Feature, f, of object, o, is a designed feature of o if and only if some agent, y, employed her creativity to intentionally bring about f in o.

We can of course imagine some cases in which a teleofunctional object was brought about by an agent[261] that designed all of its teleofunctional features that are essential to its self-maintenance. For example, a tree is a teleofunctional object. In order for it to be teleofunctional it must maintain its own biological integrity. And in order for it to do that it must have teleofunctional features that are *essential* to its self-maintenance. These features are what I call "essential teleofunctional features". An essential teleofunctional feature is a feature that a teleofunctional object has that if absent would result in the cessation of that system's self-maintenance.[262] A tree, is a teleofunctional object and so has certain essential teleofunctional features. One of those essential teleofunctional features is its possession of phloem, a transporter of sugars. Without this essential teleofunctional feature the tree would cease to maintain itself. It would die. So we could imagine a case were a designer brought about this teleofunctional object

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261 An "agent" can be either a *single* rational agent or a *team* of agents.

262 There can also exist *non-essential teleofunctional features* that fulfill *non-essential teleofunctional roles*. These features, while not essential to a teleofunctional object's self-maintenance, can nonetheless be *conducive to it*. For example, having a left hand is a non-essential teleofunctional feature that my body has. I can continue to live and maintain my own biological integrity without having a left hand. Nonetheless, having a left hand is conducive to my self-maintenance. I can use it to feed myself, to grasp a glass of water or to fight off a predator. These states of affairs are conducive to my self-maintenance in that they make some sort of contribution (however slight) to my long-term biological integrity. Having a left hand fulfills those non-essential teleofunctional roles. But having a left hand is not *necessary* to my self-maintenance. Having a left hand is not essential to my self-maintenance. And so having that property fulfills some non-essential teleofunctional role. I can live without having a left hand. Having a heart, on the other hand, is an essential teleofunctional feature because having a heart fulfills an essential teleofunctional role within my body. If I did not have a heart my blood would no longer pump blood which would result in oxygen not being delivered throughout my body which would result in the cessation of my self-maintenance. I could, however, have a replacement heart or an artificial heart. And if I had one of those features they would fulfill the same essential teleofunctional role as my having of a heart presently does.

and all of its essential teleofunctional features, which would include its phloem.

There can, however, exist some cases in which *all* of the teleofunctional features of a non-sentient being were brought about by a designer even if some other agent was also partially, causally responsible for bringing it about.

Consider the following case.

> *Nancy intends to bring about an adapted, self-regulating cell. She consults the owner's manual of a new invention, The Adapted Cell Machine. This machine can produce any kind of appropriately adapted cell if an operator tell the machine what environment that she wants the cell is to exist in. Nancy enters in the appropriate environmental data into the machine so that it produces a cell that can exist in the forest soils of the Amazonian rainforest. The machine spits out a teleofunctional cell capable of regulating itself in those environmental conditions.*

Here we have a case where an agent, Nancy, brought about a teleofunctional living being that was adapted to its environment.

But Nancy did not *design* any of the teleofunctional features of this cell. We might say that Nancy was *in part* responsible for bringing about the cell and that the inventor of the machine was also in part responsible for bringing it about. But Nancy did not use her creativity to intentionally bring about any of the teleofunctional features of it. Rather she used a machine that was designed by some other agent for the purpose of generating teleofunctional cells.

The designer of the machine, however, can be said to be the designer of some of the teleofunctional features of the cell. Let us suppose that the designer of the machine programmed it to produce a particular kind of teleofunctional structure in response to a particular request by some other agent. The designer of the machine would have intentionally brought that teleofunctional structure about by employing his creativity. That teleofunctional feature would have been designed by the designer of the machine.[263]

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[263] An analogous case of design involving a machine that produces an object that has a feature

But let us imagine another case where Nancy does not enter the environmental data into the machine to produce the cell but rather *programs* the machine to produce the cell by providing it with explicit, procedural instructions for how it is to make it.[264] If her programming of the machine specified *numerous procedural operations* aimed at producing a specific kind of functional organism that she had in mind then this looks more like a case of actual design by Nancy. Nancy would be the designer for some of the teleofunctional features of the cell produced by the machine in that her *programming* of the machine required instructional input on her part to direct the system to produce an intended output. Such a case would be more analogous to a computer programmer entering instructional information into a computer so that it would engage in a particular computational process that would generate a specific kind of output.

Taking the above considerations in mind I propose the following definition of what a designed teleofunctional feature is.

> *Teleofunctional feature, f, of a teleofunctional object, o, is a designed teleofunctional feature of o if and only if some agent, y, employed her creativity to intentionally bring about f in o.*

For the remainder of the dissertation I will confine my discussion of cases in which *all* of the essential teleofunctional features of some teleofunctional object were brought about by a *single* designer rather than by a team of designers all the while recognizing that that object could

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that was designed by the designer of the machine is that of a computer that was designed to produce a specific kind of font for a document that has other features that were designed by some other agent. The font can be designed by the designer of the computer while other features of the document, such as the particular words typed on it, were produced by some agent *other than* the designer of the computer.

[264] If Nancy's act of "programming" the machine to produce this cell was similar to a person ordering an item from a long list of items in a catalog, then it does not appear as if she did any real designing at all. None of its features would have been designed by her. Some might even suggest that this is not an instance of her actually *programming* the machine but rather of her *choosing* one of the many options that the machine can run.

have been designed by such a team.

At the end of the previous chapter I suggested that non-sentient teleofunctional beings produced by a non-design etiology cannot be guaranteed to have indirect moral standing. But in this chapter I will argue that non-sentient living things produced by design are guaranteed to have indirect moral standing.

I have attempted to show in the previous chapter that all of the etiological accounts of interests considered up until this point are incapable of accounting for how non-sentient teleofunctional beings could have interests that are directly morally considerable. These other etiological accounts are incapable of doing this because the antecedent conditions of those accounts are not able to make it the case that the teleofunctional interests of all non-sentient beings provide a reason for why they should have direct moral standing.

However, as also I mentioned in the previous chapter, all non-sentient living beings can have indirect moral standing.

There is one way that all non-sentient living beings could get indirect moral standing in such a way that is not contingent on another person's preference interests. Non-sentient living beings would be guaranteed to have indirect moral standing if they were designed.

II. Can all Designed, Non-Sentient, Living Things be guaranteed to have Indirect Moral Standing?; (i) The Argument from Creativity

In this section I will argue that if all non-sentient living thing were designed then their indirect moral standing can be guaranteed.

At this point I want to argue that since creativity is a virtue that has intrinsic value, and since the exercise of a virtue is an intrinsically good thing, then all valuers have a reason to have a reason not to harm the object that was brought about by creativity independently of whether they realize the existence of such a reason. Moreover all valuers have this reason independently of whether they have a preference interest in the thing that was designed. In other words, if designed, then all non-sentient living things will be guaranteed to have indirect moral standing. It is guaranteed in the sense that their design etiology guarantees that there is a reason not to harm them. It is indirect, however, in the sense that they have their moral standing by recourse to their *etiology* not by recourse to any intrinsic properties or inherent goals of their own.

My argument is roughly the following:

1) For all x, if x is a DNSLT[265], then x's teleofunctional interests were brought about by creativity.
2) Creativity is an intrinsically good activity.
3) Thus, if x's teleofunctional interests were brought about by creativity, then x was brought about by an intrinsically good activity.
4) If x was brought about by an intrinsically good activity, then there is a reason why all valuers should have positive regard for the activity of bringing about x.
5) If there is a reason why all valuers should have positive regard for the activity of bringing about x then there is reason why all valuers should not harm x that is not based on any of x intrinsic properties.
6) If there is reason why all valuers should not harm x that is not based on any of x intrinsic properties then x has indirect moral standing.
7) Thus, for all x, if x is a DNSLT, then x has indirect moral standing.

At this point I want to defend the argument's premises.

Premise one simply falls out of the definition of design that I presented earlier in this chapter.

Premise two, however, needs to be defended. This premise claims that creativity is an intrinsically good thing. But why think that? G.E. Moore has made the observation that if someone asks the question of what make something that is good good then trying to provide an

[265]Here DNSLT means "designed, non-sentient living thing"

answer as to makes it good would be a futile endeavor. He writes,

> “What, then, is good? How is good to be defined?...What I want to discover is the nature of that object or idea, and about this I am extremely anxious to arrive at an agreement… But if we understand the question in this sense, my answer to it may seem a very disappointing one. If I am asked, ‘What is good?’ my answer is that good is good, and that is the end of the matter. Or if I am asked ‘How is good to be defined?’ my answer is that it cannot be defined and that is all I have to say about it…My point is that ‘good’ is a simple notion, just as ‘yellow’ is a simple notion; that just as you cannot, by any manner of means, explain to anyone who does not already know it, what yellow is, so you cannot explain what good is.” (Moore, 1948, pp. 6-7).

Well, some hold the view that creativity itself has *intrinsic*, value. On this view there simply would be *no* answer to the question of *why* creativity is good. It simply *is* good, in and of itself. But perhaps we can do a little bit better than that. Another way of looking at it is that creativity is regarded by some to be an admirable or *virtuous quality* which means to say that it is a *good* quality for a person to have.

As Berys Gaut writes,

> “...to establish that creativity is an excellence, we merely have to establish that it is a *valuable psychological quality* [my emphasis]. That is widely acknowledged: we praise and admire people for their creativity, we seek to foster it in various ways through educational and cultural projects, and so on. We also do not value creativity merely as a means, i.e. for its effects, but also value it as an end: that is, we think that it has final or *intrinsic value* [my emphasis].” (Gaut, 2014, p.188) 266

If this defense is sufficient, then creativity simply is a good thing and whenever someone is creative or is engaged in some creative activity then that person is at some level "doing a good thing". For the purposes of this dissertation I will assume that creativity, if it is a virtuous activity, would be a virtuous activity for any rational agent to engage in not just human beings.

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266 In other words, creativity is one excellence. It is one intellectual virtue. For an interesting discussion of creativity as an intellectual virtue see Linda Zagzebski’s 1996 book, *Virtues of the Mind: An Inquiry into the Nature of Virtue and the Ethical Foundations of Knowledge*, pp.123-125. See also Gaut, 2014.

There is, however, one rather simple argument that one could construct to show that creativity is a good thing. That is the following.

1) All virtues are good things.
2) Creativity is a virtue.
3) Thus, creativity is a good thing.

Some at this point, however, might object to premise 2 of the above argument. They might say that *if* some rational agent is engaged in a creative activity then that agent is not necessarily doing a good thing. This might not be an unreasonable thing to suppose. In fact there might exist *many* activities that involve a designer's creativity that are not *in the final analysis* good activities at all. There can be things that could have taken a designer's creativity to make yet *not* be something that we, in the final analysis, should care about. For instance, suppose that an extremely powerful, diabolical agent used his great creativity to design a bacterium capable of causing much suffering and death in the human population. This being is highly skilled at manipulating biological materials to make new forms of life. His creative abilities were put to use in the service of making something that was intended to bring about great harm to others. There was a malicious intent behind his creative genius. On the whole it seems reasonable to think that this bacterium is *not* something that would be appropriate for valuers to protect or promote.

But there is a response to the claim that a designer's creative activity is not a good thing.

Although our diabolical agent had the virtue of creativity, he did not exercise that particular virtue in a way consistent with the *other* virtues. He did not possess other virtues such as benevolence, caring or charity when he was constructing his deadly bacterium. The lack of these other virtues made his activity of designing this deadly bacterium an activity that was not on the whole not good. A very powerful, diabolical agent who designs a deadly pestilence is not on the whole acting virtuously even if his *creative* activity does involve that virtue. Creativity is but *one* virtue that a designer could have. But simply having *this* virtue is not enough to justify the claim that *anything* that was created by it must be, *in the final analysis*, worthy of being cared about non-instrumentally.

Even our diabolical, agent had at least *one* virtuous character trait, that of having creativity. It was a virtue that he had. As such, the exercise of *that* virtue does provide a reason for why his designed object should not be harmed. But this reason is, of course, *swamped* by many other reasons available for why it should be harmed, reasons pertaining to the designer's malicious intents. In the final analysis, we should destroy this designed pestilence, not because it was not made with a virtue, but because there is much more of a reason to destroy it than there is not to.

Or consider another example. Suppose that a team of engineers designed a highly sophisticated missile capable of exploding just two inches above ground. Such a missile would be a marvel of creative engineering. It takes a lot of technical proficiency and skill to design something with that level of precision. This level of technical proficiency and creativity is a virtue. But should that missile have been designed for the *malevolent purpose* of killing an entire village of innocent people, we should *not* think that the missile, *in the final analysis*, deserves to be protected from harm rather than destroyed.

If premises one and two are true then the conclusion at line three necessarily follows.

The following is a defense of premise four.

When someone *does a good thing* then there is a reason for us to *recognize* the value of the good thing that that person had done. In other words when someone does a good thing then all valuers have a reason to take up positive attitude toward the good activity in question.

For example, let us consider Michelangelo's *Pieta*.

Given that the *Pieta* was brought about by creativity, which is intrinsically valuable, we should have a positive attitude of value toward the goodness of Michelangelo's creative activity of bringing it about. This does not mean that we should value the *Pieta directly* or that we have direct obligations *to it*. Rather we should have an attitude toward the creativity that went into making it.

The following is a defense of premises five and six.

Let us consider the Pieta again.

All valuers have a reason not to harm the Pieta since it was brought about by an intrinsically good or virtuous activity. This does not mean that there is a reason to have a positive attitude toward it, or that all valuers would never have a reason to destroy it.[267] It just means that all valuers have a reason to treat it in a way consistent with the fact that it was brought about by a virtuous activity. So if non-sentient living things were designed by an agent, then that agent did a good thing which means that all valuers have a reason not to harm that designed object.

In this way the Pieta has indirect moral standing because there exists a reason not to harm it, a reason not based on any of its intrinsic properties.[268]

Or consider another example.

Let us suppose that a father receives a stick figure drawing that was lovingly made for him by his two-year-old daughter, that object would be something that the father has a reason not

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[267] For instance, valuers could have a reason to destroy a designed work if that work was meant to be destroyed or if this work is something that in the final analysis is something that should be destroyed. They would not, however, have a reason to *wantonly* destroy it that is to destroy it for no reason whatsoever or for very poor reasons.

[268] I am not here arguing that all valuers should have the *highest* positive regard toward a designer's work, only that all valuers have a reason for why they should not destroy it even if that reason is not *in the final analysis* enough for why all valuers should have an on balance positive regard toward a designer's work or even not to harm it.

to harm. He has a reason not to harm it because it was "made with love". Even if other valuers have *no relation* to the designer of this picture, the picture was still made with love even if the picture itself doesn't make the father *happy*. Although there is no *empirical* indication that it was made with love, the *etiology* of the object involved this girl's love. Her love, we might say, "went into" the making of it. This drawing, like the Pieta, has indirect moral standing because there exists a reason not to harm it that is not based on any intrinsic properties of it.

In like manner, if some non-sentient, teleofunctional being was brought about by creativity there would be reason for why all valuers should not harm it. Non-designed, non-sentient beings, on the other hand, things that were *not* brought about creativity, are not ones in which it is guaranteed that there is a reason not to harm them. They were not produced by an intrinsically good, virtuous activity and so being the products of creativity cannot be among one of the reasons available for why *those* beings should not be harmed.

At this point the biocentrist might have a complaint to make against this argument. Many biocentrists want to avoid any anthropocentric orientation towards value judgments about the natural world. In light of their concerns to avoid anthropocentrism they might say, "Living organisms should have value regardless of what we human beings believe about the world. What you are implying is that non-sentient living organisms should not be harmed so long as we believe that creativity went into the making of them. But the beliefs of human beings are not what justifies the claim that all non-sentient living organisms should not be harmed. They should not be harmed for reasons independent of what human beings think."

But this worry can be addressed.

While it is true that human beings might believe that creativity went into the making of some non-sentient living things, it is not true that our *thinking* that some non-sentient living thing was brought about by creativity is what makes it the case that they were brought about by creativity. Creativity, as I have defined it, is an attribute that agents can either possess or not possess. If they possess it then they possess an intellectual virtue that is good in and of itself. If they do not possess it then they do not possess that intellectual virtue and cannot engage in creative activity. If some agent exercises creativity in the making of some designed object, then the making of that object is a good thing independently of whether we think that it is a good thing. As such the reason why that designed thing should not be harmed exists independently or whether we believe that a virtuous activity went into the making of it or not.

If this argument is sound, then designed, non-sentient living things would be guaranteed to have indirect moral standing in that there would exist a reason for why those beings should not be harmed that is not based on any of their intrinsic properties. This reason would exist independently of whether human beings have a preference interest in their teleofunctional interests.

III. Can all Designed, Non-Sentient, Living Things be guaranteed to have Indirect Moral Standing?; (ii) The Argument from Teleofunctional Purposes

But there is another argument available for why designed, non-sentient living things would be guaranteed to have indirect moral standing.

As I have argued previously, the claim that *non-designed* teleofunctional structures can *malfunction* or *function correctly* is false.[269] These structures do not teleofunctional purposes. As such they cannot, properly speaking, be caused to malfunction.

But the proposition that *designed* teleofunctional structures are capable of malfunctioning

[269] See sections IV through VIII of chapter four.

is quite reasonable. When rational agents design various objects they design them to perform various functions. Should a non-sentient living thing be designed then it would have teleofunctional structures that have teleofunctional purposes. Rational agents can generate teleofunctional structures that have teleofunctional purposes because those agents can *consciously select* a teleofunctional structure *for a teleofunctional purpose*. And if so then those structures would have functional purposes. And if all non-sentient living beings in the actual world were designed then it would *literally* be true that their teleofunctional structures have teleofunctional purposes and are thus capable of malfunctioning.

In his book *Warrant and Proper Function*, Alvin Plantinga discusses how it is natural for us to speak of designed artifacts, as well as living organisms, as having proper functions[270]. He writes,

> “Our paradigm cases of design and proper function, therefore, are artifacts, things designed by conscious agents. This is the ancestral home of the notion; this is where they apply most naturally and easily. Still, we certainly do apply this whole family of concepts to the natural world. We think a hawk’s heart that beats only twenty-five times a minute is not functioning properly, that AIDS damages the immune system and makes it function poorly, that multiple sclerosis causes the immune system to malfunction in such a way that white blood cells attack the nervous system, and that the purpose or function of the heart is to pump blood, not to make that thumpa-thumpa sound. The notions of proper function, disease, and damage apply here and in a thousand other contexts; thinking in these terms is natural and apparently unavoidable for human beings” (Plantinga, 1993, p. 196).

Plantinga argues that the notion of proper function, although a common notion that we use all of the time, cannot ultimately be embraced by the strict naturalist because functional purposes themselves cannot be accounted for, in strictly naturalist terms.[271] In addressing the naturalist he writes,

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[270] By "proper function" Plantinga means functional *purposes*.

[271] To read Plantinga's argument see the section entitled 'Naturalistic Analyses of Proper Function' in the chapter "Naturalism versus Proper Function" in *Warrant and Proper Function*.

> "So suppose you are a naturalist, and are convinced that there is no way to make sense of the notion of proper function from a naturalistic perspective...you will have to reject the notion of proper function as well. If you are dead certain naturalism is true, you will have to accept the cost...[of] rejecting the very idea of proper function. A high cost, no doubt - but no more than what a serious naturalism exacts." (Plantinga, 1993, p. 214)

Likewise, should a naturalistically-minded biocentrist refuse to accept a design etiology for the existence of non-sentient teleofunctional beings, then he or she must reject the notion of proper function or functional purpose too. And, along with that, he or she must reject the notion of biological *malfunction* as well. If so then the existence of functional purposes for the teleofunctional structures of living things cannot be among the *reasons* that such a biocentrist can appeal to in her efforts to argue on behalf of the protection of all non-sentient living things.

If, on the other hand, a biocentrist does *not* endorse a non-design etiology, but instead a design etiology for all living beings, then making sense of the notion of functional purpose would be rather straightforward and uncomplicated for her. Designers routinely select structures *for functional purposes*. For example, spacecraft engineers can design a door hatch *for the functional purpose of* allowing astronauts access into and out of the cockpit. That purpose was given to the door hatch by its designer(s). The spacecraft engineers designed that structure for that functional purpose. Likewise, a designer of teleofunctional features can fashion those features for teleofunctional purposes. For example, should a scientist design the cell membrane of a teleofunctional cell for the teleofunctional purpose of selectively filtering matter, then that teleofunctional feature would have a teleofunctional purpose.

If someone were to puncture that membrane then such an action would result in causing it *to malfunction*. Since the membrane is for selectively filtering matter, any action that causes it to longer to do what it is *for* would be an action of causing it to malfunction. Causing it to malfunction would be an instance of causing it to function in a way contrary to what the designer *had intended it for*. The fact that such a teleofunctional structure was intended to perform a certain function provides a reason for why that structure should not be caused to malfunction.

Notice that the existence of this reason does not depend on the preference interests or evaluative attitudes of *other agents*.

This argument is meant to show four different things. 1) that if some teleofunctional feature was *not* designed then that feature would not have a teleofunctional purpose and hence would not be capable of malfunctioning, 2) that if those features are incapable of malfunctioning then there is no reason why someone should not cause them to malfunction, 3) that if some teleofunctional feature was designed then that feature would have a teleofunctional purpose and hence would be capable of malfunctioning and 4) that if that teleofunctional feature has a functional purpose then there is a reason why someone should not cause it to malfunction.

The naturalistically-minded biocentrist cannot appeal to functional purpose of the teleofunctional structures of non-sentient beings as providing a reason for why they should not be harmed. Non-designed objects do not have features with functional purposes. Hence, the prospect of malfunction cannot be among the reasons available for why those objects should not be harmed. These reasons, however, can be available to the biocentrist that accepts a design etiology for the existence of non-sentient teleofunctional beings and their teleofunctional features.

IV. Introduction to a Theistic, Design Etiology and Further Reasons Available for the Indirect Moral Standing of Designed, Non-sentient Beings

At this point I want to argue that if a certain kind of design etiology for the existence of non-sentient living things were true then those beings would have indirect moral standing for reasons beyond those given in the two previous arguments. The following arguments are meant to show that given a certain kind of design etiology that there would exist still other reasons for why the non-sentient living things produced by that etiology should not be harmed. The reasons cannot be available for why a similar, but non-designed, non-sentient being should not be harmed.

Consider the following, possible scenario for a certain kind of design etiology.

Let us imagine a world in which there exists God. This agent is a being that Richard Swinburne describes as "an omnipresent spirit who is perfectly free, creator of the Universe, omnipotent, omniscient, perfectly good..." (Swinburne, 1993, p. 291).[272] Let us further imagine that in this world God designed all of the non-sentient living beings that exist in it. These non-sentient living beings are exactly like the ones that exist in the actual world. These beings, however, were not brought about by a non-design etiology. They were designed. Let us imagine further that God not only *designed* the non-sentient teleofunctional beings that we witness in that world, but that because of his love for us God also intended for those beings to inspire us with a sense of awe and wonder at the beings that he designed.[273] In other words, let us imagine that God out of his love for us designed all non-sentient living beings as a means of inspiring beings like with a sense of awe and wonder. Let us further imagine that in this world God also has an interest *in observing* the self-maintaining capacities of these non-sentient beings and in taking some satisfaction in the *continued success* of his own creative efforts. In this world God has a preference interest in the *continued self-maintenance* of those non-sentient beings that he

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[272] I am not here, however, defending the proposition that such an agent exists.

[273] Some, however, might think that entertaining this possibility is entirely gratuitous or without merit. They might argue that God is the type of being that we cannot rationally comprehend and so on that basis it wouldn't be possible for us to make any approximation as to what God *would* do at all.

designed. In fact it might be best to describe the entire collection of interests pertaining to the designing of these non-sentient beings as God's *project*. A project, as I define it, is a collection of activities all of which are intended to bring about some goal or aim that involves the satisfaction of numerous preference interests. In explaining Bernard Williams' idea of what a project is Joseph Okumu writes that the projects of people are "things that count as important or meaningful in their lives" (Okumu, 2007, p. 20). So the production and enjoyment of the non-sentient beings that exist in this world is a project of God's because they count as important or meaningful in God's life. [274]

For the purposes of this dissertation I will refer to the above etiological story as the "theistic design etiology".[275]

As I mentioned previously the particular claim that all non-sentient teleofunctional beings have moral standing *in their own right* is very difficult to defend on the basis of the various naturalistic approaches that we have covered thus far. In fact it does not appear as if *any* non-sentient teleofunctional beings can have moral standing *in their own right*. Furthermore, *designed* non-sentient teleofunctional beings cannot have moral standing in their own right either. Nonetheless, I will argue that there would exists special reasons for why the non-sentient teleofunctional beings that were brought by the "theistic design etiology" should not be harmed. Reasons that do not exist for not harming non-designed, non-sentient living things.

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[274] The type of theism that I have in mind here is that of a *transcendent creator* who created the natural world but stands apart from it. There do exist various efforts put forward by some environmentalists to impute purposiveness, intentionality, spiritedness or other teleological characteristics directly onto non-sentient beings or to nature itself. In this way they claim that all non-sentient beings are just extensions of God or that the natural world *is* God. I will, for this dissertation, set aside such possibilities.

[275] There could, of course, exist many *other* ways in which God could have brought about all living things much different than the one being presented here.

Before I proceed, however, I would like to provide some background information on what other environmentalists have said about the place of God in environmentalist ethics and of what could motivate the argument that the existence and action of God in the world could provide a reason for why non-sentient living things should not be harmed.

V. Theism and Its Place in Environmental Ethics

Some philosophers have discussed the connection between religious belief and how it bears on the subject of environmental ethics including the moral standing of all living things.

For example, Scott Aikin appeals to the problem of evil as a means of suggesting that God's existence is *inconsistent* with the moral standing of all living things. He writes,

> "The perspective of environmental ethics attunes us to the moral significance of pointless destruction of non-human entities. There is considerably more suffering in the world than humans experience, but there is no other good to weigh that suffering against. Ecosystems and groves of trees cannot have free will, and so when they are degraded and destroyed, they are harmed in the service of goods they cannot have. That is unjust. Animals do not have souls made to emulate God, and so when they suffer, they are not improved and tooled in God's image. They merely suffer and die, and they do so for goods they cannot have. That is unjust...The lesson is that environmental ethics makes the problem of evil harder to solve. The moral considerability of animals and ecosystems is *inconsistent* [my emphasis] with God's capacity, justice, and in the end, his existence." (Aikin, 2014, pp. 38-39).

This argument might be taken to suggest that theism or religious belief cannot make a substantial contribution to environmental ethics because the existence of evil in the world is inconsistent with God's existence.

Other environmentalists hold the view that particular religious beliefs, such as Christianity, are not only unable to serve the environmentalist's cause but appear to do *damage* to it. They think that a particular kind of theistic belief, Christianity, is responsible for the presence of moral *disregard* for the natural world by humans, one that does not care about the living things on the planet and that only seeks to use up the resources of the natural world for human ends. They claim that only by the eradication of this kind of worldview will we be able to truly value and protect the natural world as we ought. For example, Lynn White's famous essay "The Historical Roots of Our Ecologic Crisis" argues that Christian religious belief, as opposed to other religious beliefs, has been detrimental to, rather than supportive of, a viable and long-term ethic of concern for the natural world. He writes,

> "Christianity, in absolute contrast to ancient paganism and Asia's religions (except, perhaps, Zoroastrianism), not only established a dualism of man and nature but also insisted that it is God's will that man exploit nature for his proper ends [my emphasis]. At the level of the common people this worked out in an interesting way.
> In Antiquity every tree, every spring, every stream, every hill had its own genius loci, its guardian spirit. These spirits were accessible to men, but were very unlike men; centaurs, fauns, and mermaids show their ambivalence. Before one cut a tree, mined a mountain, or dammed a brook, it was important to placate the spirit in charge of that particular situation, and to keep it placated. By destroying pagan animism, Christianity made it possible to exploit nature in a mood of indifference to the feelings of natural objects." (White, 1967, p. 1205).

Bernard Zaleha also points out how the "Lynn White Thesis" (the thesis that Christian religious belief is not supportive of a genuine environmental ethic) has not only galvanized the view that *real* environmentalism is secular, but also that religion in general tends to foster moral disregard toward the plight of the natural world. Zaleha writes,

> "Poet and environmentalist Wendell Berry has noted that largely because of White's argument, 'the culpability of Christianity in the destruction of the natural world, and the *uselessness of Christianity* [my emphasis] to any effort to correct that destruction, are now established clichés of the conservation movement' (Berry 1993: 93).
> The Lynn White Thesis finds an intense resonance among many secular environmental activists (Pope 1998: 14). Further, it continues to find anecdotal support. A Baptist church in Boise, Idaho, printed and distributed this large and wordy four-lined bumper sticker: 'Forget "Save the Earth"; What about your soul? The earth is going to burn, What about you?', evidencing a concern about a different sort of global warming (Zaleha 2008b: 217). When interviewed by Bill Moyers in his October 2006 PBS special, Is God Green?, a program exploring the emergence of various strands of evangelical Christian environmentalism, Calvin Beisner, a conservative Orthodox Presbyterian theologian and global warming

> denier, when asked whether he worried that he might be wrong about global warming, said that global warming, if real, is of little importance compared to how one is 'going to live [in either heaven or hell for] eternity'. In both these examples, no concern was expressed about the fate of Earth based on a conviction that soon, after 'his' judgment, the Christian god will either make a new Earth of send all humans to either heaven or hell, making planetary concerns unnecessary." (Zaleha, 2013, p. 138).

Still other environmentalists think that the existence of a transcendent God might actually *detract* from valuing the natural world as we ought.

Ned Hettinger, for example, defends the basic view that God, considered as a transcendent deity, might take our attention off of the natural world and the goodness that it contains. To him theism doesn't make a positive contribution to the moral standing of living things in the natural world because it shifts our focus away from the natural world and sets our eyes on other-worldly things. He writes,

> "At the most general level, I worry that the appeal to a transcendent God is likely to take the focus off valuing the earth and place it instead on valuing the transcendent creator. Why revere the proximate cause when we can revere the ultimate cause, especially when only the latter appreciates our attitude?" (Hettinger, 2007, p. 73)

The acceptance of these views does *not* entail the view that God's existence and action in the world provide *no* reason not to harm the environment. Nonetheless these views do *invite* the question of just what, if any, role the existence of God might play in providing *reasons* for why one should care for the natural world, reasons not available to a strictly naturalistic or secular approach. Given widespread acceptance of the "Lynn White Thesis", the observation of the problem of evil in the natural world, and the view that a transcendent God might take our focus off of valuing nature, some might be tempted to think that God's existence and action in the world cannot provide *any* reasons to value non-sentient living things and that a completely naturalistic approach is the only viable option for a biocentrism.

These views do not *prove* that some environmentalists hold the view that if God exists then his existence and action in the world provide no such reasons. Nonetheless these philosophical positions do *invite* such a question especially if such positions are based on the view that naturalistic approaches to securing the moral standing of all non-sentient teleofunctional beings are either the *only* or *best* available.

It is not my intention here to argue that Christianity, or any other religious belief, is useful to the environmentalist's efforts, nor to show that the problem of evil is not a problem for theism, nor to show that God actually exists. Rather it is my intention to argue that the theistic, design etiology mentioned in the previous section *would* make a substantial difference to the claim that there exists reasons for why all non-sentient living things have indirect moral standing and that these reasons cannot belong the naturalist. This etiology, if true, would provide certain kinds of reasons for why all non-sentient beings made by that etiology should not be harmed and should instead be positively regarded in some way. These kinds of reasons are not applicable to non-designed, non-sentient beings.

VI. Information and the Design of Non-Sentient, Teleofunctional Beings

So how, precisely, could there exist another reason not to harm a non-sentient living thing brought about by the theistic design etiology that is not available to the naturalist? A good place to begin is by recognizing the creative ingenuity that it would take for a designer to produce the non-sentient teleofunctional beings that exist in the natural world. If God designed those beings then beings like us would have quite a lot to admire about his creative abilities in comparison to our own. We should admire the designer's creative talents not because the beings produced by the designer are *instrumentally useful* for our purposes, but simply because those beings would show *evidence* of their designer's creative abilities. Things that show evidence of their designer's great creative abilities are ones in which there exists a reason not to harm them.

Designing a non-sentient, teleofunctional form of life, particularly those forms of life found on earth, would require the generation of massive amounts of genetic information and the integration of precisely controlled physiological processes for their self-maintenance. In a revealing passage in his article “Value in Nature and the Nature of Value” Holmes Rolston points out the central role that genetic information plays in the lives of all living things. Plants, according to Rolston, have interests that are facilitated by genetic information. He illustrates the nature of these interests by invoking the terminology of *information technology*. Rolston underscores the centrality of information to teleofunctional, life processes when he writes,

> “Plants make themselves; they repair injuries; they move water, nutrients, and photosynthate from cell to cell; they store sugars; they make tannin and other toxins and regulate their levels of defence against grazers; they make nectars and emit pheromones to influence the behavior of pollinating insects and the responses of other plants; they emit allelopathic agents to suppress invaders; they make thorns, trap insects. They can reject genetically incompatible grafts...A plant, like any other organism, sentient or not, is a spontaneous, self-maintaining system, sustaining and reproducing itself, executing its *program* [my emphasis], making a way through the world, checking against performance be means of responsive capacities with which to measure success. Something more than physical causes, even when less than sentience, is operating; there is *information* superintending the causes; without it the organism *would collapse into a sand heap* [my emphasis]. The information is used to preserve the plant identity.” (Rolston, 2003, p. 145).

Rolston's use of terms like "program" and "information" are not incidental. For starters, all species of living things, from viruses and protozoans to algae and human beings, contain genetic information. This information is the "program" that regulates and instructs biological processes. Their "program" is bound up in the genetic sequences of nucleotides found along the backbone of every DNA molecule of every species (see Figure 2 below). The sequences of nucleotides in DNA dictate the initiation, production and precise topographic shape of each and every protein manufactured in the cell. The protein's precise topographic shape allows it to participate in highly regulated, teleofunctional, biochemical reactions that are essential for life. The important thing to recognize is that the genetic information stored in an organism's DNA *determines* the precise structure and teleofunctional characteristics of every single protein found in every cell of every individual organism including non-sentient organisms.

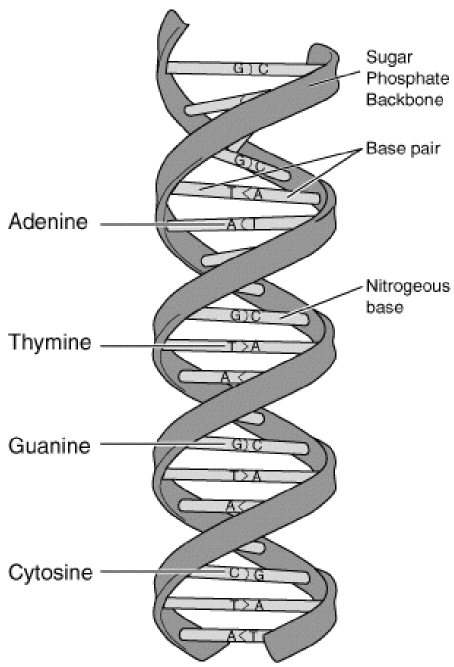

Figure 2. Structure of the DNA double-helix and its nucleotide base pairs.
(From: http://www.bristol.k12.ct.us/page.cfm?p=7097)

Enzyme regulation, physiological feedback loops, self-regulating metabolic processes and other tightly, integrated and regulated functions are teleofunctional processes that require genetic information to occur. None of the teleofunctional structures found in living organisms would exist, much less be able to perform their teleofunctions, without the genetic information found in their DNA.

When it comes to the existence of teleofunctional structures found in living organisms genetic information comes first. Teleofunctional processes that routinely occur in the lives of all living things proceed on the basis of whatever genetic information is found within their genomes.

Without this information there is no possibility for the existence of their teleofunctional interests. Genetic information is a necessary condition for the existence of the teleofunctional structures found in living organisms that we observe in the natural world.

Rolston seems to be very comfortable with using the language of information and information processing to describe what life processes are like. Also, for Rolston, this information exists objectively, independently of whether human beings think that such information exists or is important. He writes,

> “The *Picea* (spruce) and *Buteo* (hawk) genetic sets, for instance, are full of information. The information is long-lived, reproducing itself by means of amino acid replacement across millions of years, a kind of fire which outlasts the sticks that feed it…The self-maintaining know-how is there independently of our observation, unmodified by our sense perception, primary in Locke’s sense” (Rolston, 1982, p. 130).

Rolston also thinks that there is some proximity between our normal language concepts and informational concepts applicable to the biological realm. Living organisms are like *information systems*. He writes,

> "...living things are active information systems, as is proved by genetic and biochemical "linguistics." The purines and pyrimidines of the DNA and RNA helixes serve as an "alphabet," organized by codons, word units, into chains rather like sentences and paragraphs. The double helix can be unzipped and "read"; one stereospecific molecule can "recognize" another and by this "coded messages" are "communicated." Life continues by a steady "problem solving," and evolution accumulates a sophisticated "memory," as organisms are better programmed by natural selection to "deal with" their environment. The bio-*logical* chemistries have such a cybernetic power that, though it is precognitive, the information content roughly in every human cell is more than that in any human book" (Rolston, 1981, p. 122).

Perhaps one may think that the above example is merely an isolated case of someone comparing a living organism to an information system. After all, on the basis of the opinions of one person how could we be confident that this individual isn’t just giving vent to his own uninformed opinion? Accordingly someone could reasonably say, “Just because some environmental ethicist talks about living organisms as information systems doesn't mean that living organisms really are information systems. Rolston is just one figure and a philosopher at that. Are there any biologists that hold such a view?"

It turns out there are.

John Maynard Smith, the theoretical evolutionary biologist and geneticist, describes living systems in informational terms particularly those aspects of living systems that are cellular or molecular. In fact, he argues that this is common parlance. He writes,

> "The colloquial use of informational terms is all-pervasive in molecular biology. Transcription, translation, code, redundancy, synonymous, messenger, and editing, proofreading, library - these are all technical terms in biology. I am not aware of any confusions arising because their meanings are not understood. In fact, the similarities between their meanings when referring to human communication and genetics are surprisingly close" (Smith, 1999, p. 178).

Human-designed living artifacts would rely on the genetic information stored in their DNA just as much as their naturally-evolved counterparts do. When researchers produce synthetic organisms they may do so by either copying the original genetic information from an already-existing organism, inserting novel genetic information into an existing sequence or writing an entirely new genetic sequence from scratch.[276] This overlap between human contrivances and living organisms is informational in nature. Take the following passage from Nicholas Agar regarding the customization of the gene-bearer as being problematic for a common sense notion of life. The information content in genes is easily transposable with the *digital information* stored on a computer's hard drive. He compares human-designed, information technology to life when he writes,

> "…the emerging area of Artificial Life make a further demand on the commonsense concept [of life]. Many claim that the self-replicating, self-organizing structures generated in computers are more than just simulations of

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[276] See, Holm, 2012, pp. 532-535.

life. This claim requires a notion that abstracts away familiar ideas about how life is physically constituted" (Agar, 1997, p. 153).

Human contrivances such as 'Artificial Life' clearly contain genes and genes contain information. The 'self-replicating, self-organizing structures generated in computers also exhibit their own informational attributes. The only difference between the computer program and a synthetically-produced bacterial genome is that the information content of the program was coded into it by a magnetic medium as a sequence of zeros and ones. The information content of the synthetic bacterium's genome, on the other hand, was coded into it by inserting a precise sequence of nucleotides into its DNA. The key point is that they *both* contain information useful for the construction of functioning proteins.

In his book "Information and the Origin of Life" the biophysicist and philosopher Bernd-Olaf Küppers writes, "the problem of the origin of life is clearly basically equivalent to the problem of the origin of biological information" (Küppers, 1990, p. 170). And Francis Crick, one of the co-discoverers of the DNA double-helix structure regards genetic information to be the *set of instructions*[277] that "tells" the cell how to construct a properly-functioning protein. For him information, regarded as a set of instructions, is crucial to all living things. He writes, "By information I mean the specification of the amino acid sequence in protein…Information means here the precise determination of sequence, either of bases in the nucleic acid or of amino acid residues in the protein" (Crick, 1958, 32, p.144). The "precise determination of sequence" that he

[277] Some philosophical naturalists might object to the claim that DNA is a set of instructions. They might argue that instructions can only be brought about by an *instructor* as a being that has a mind and since there is no instructor that brought about DNA there really are no instructions to be found in DNA. Hence, for them DNA would not be a set of instructions. An example of usage of the term "instructions" to describe what DNA is can be found in the *Live Science* online article "Genes: The Instruction Manuals for Life" at http://www.livescience.com/10486-genes-instruction-manuals-life.html. (Binns, 2006).

is referring to here is a kind of genetic "message", one that "instructs" the protein-making equipment of the cell to produce the right kind of teleofunctional structures.[278]

As such I will use the term "genetic information" to refer to a *set of instructions* found in the genome of a living thing that dictates how it is to produce its own proteins as teleofunctional structures.[279]

The precise three-dimensional structure of all proteins is dictated by the precise sequence of nucleotides found in DNA. As Achuthsankar Nair puts it,

> “DNA, RNA and protein sequences are mere *text data* [my emphasis] (strings, more formally) that can be opened with a text editor” (Nair, 2007, p.3).

The three-dimensional structure of each protein coded by DNA participates in many integrated, biological processes such as metabolism, muscular contraction, digestion, energy production and energy storage just to name a few (see Figure 3 below). These structures catalyze thousands (if not hundreds of thousands) of different precise, teleofunctional reactions from osmoregulation and protein construction to tissue development and food digestion.

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278 Note that if all living things were not the product of some intentional design, then all living things would *appear* to be teleologically-organized systems but they would not be teleologically organized in a way that some future state of affairs could be obtained or that some "intended target" was reached.

279 This is not meant to serve as a definition of *information*. Rather it is a definition of *genetic information*. There can exist other kinds of information besides genetic information. In fact there are a variety of different definitions of information. I will not attempt to provide a complete definition of information here. Genetic information is instructive to our understanding of how designed, living things might be said to "contain information". The sequences of nucleotides found within a living thing's genome *is* the genetic information that enables it to be a teleofunctional thing.

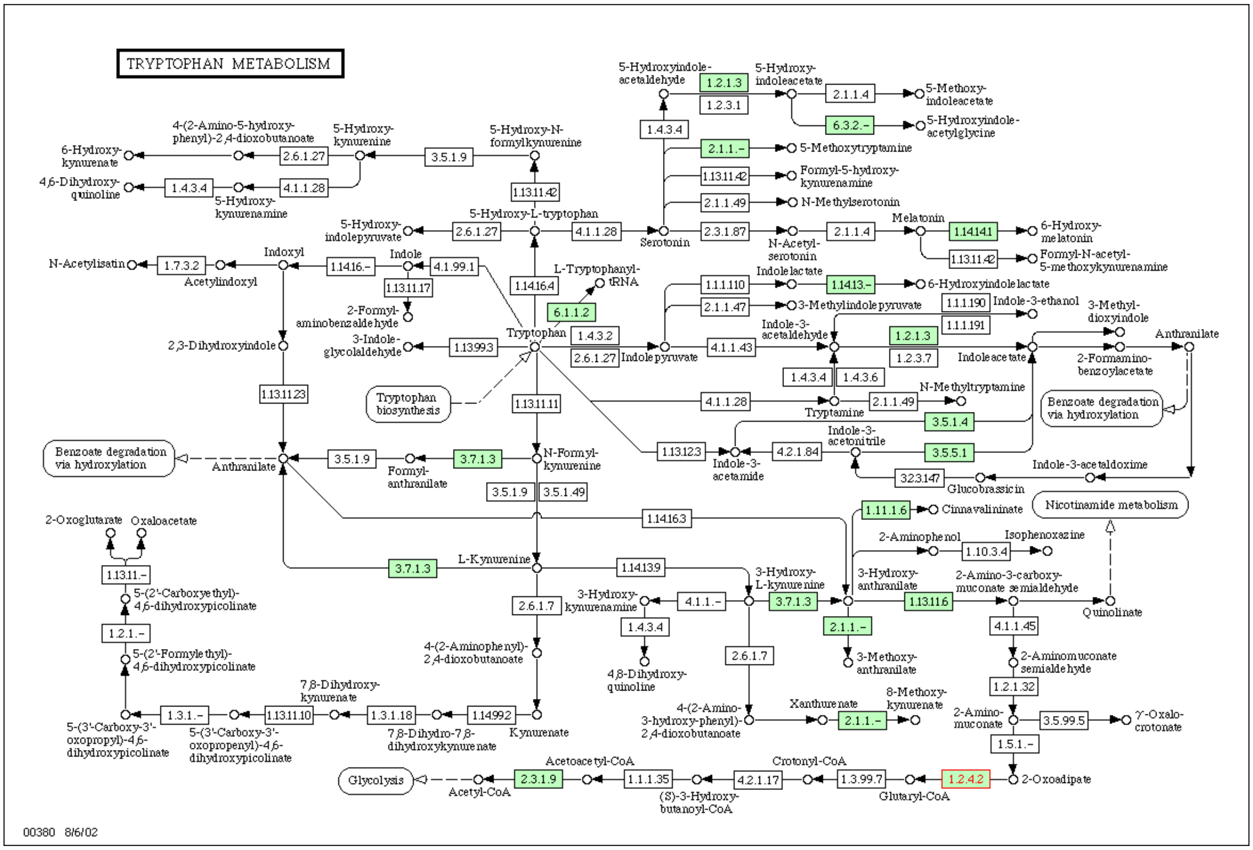

Figure 3. Metabolic diagram for tryptophan metabolism in yeast.
(From: http://www.bio.davidson.edu/courses/genomics/2002/cubre/project3.html)

Figure 3 above illustrates just one of the thousands of different metabolic processes that take place in living organisms. All of these processes require precise genetic information to be properly regulated. In all phases of life, proteins are at work maintaining and contributing to the self-regulation of the organism itself. The strings of genetic “text data” are what dictate the precise biochemical properties of all proteins. Thus, genetic information is quite necessary for an organism's ability to carry out its teleofunctional processes, processes that it has a teleofunctional interest in. Mossio et al. regard these kinds of metabolic systems as instances of complex, functional systems that possess organisational differentiation. This kind of differentiation is a hallmark feature of self-maintaining, teleofunctional systems. He writes,

> “…DNA (among other things) acts as a template for the synthesis of the proteins, which have to be continuously renewed due to their high rate of decay. In a word,

> the cell possesses different *parts* [their emphasis], produced within and by the system, that contribute differently to the maintenance of the system itself. In this way functional attributions to each part are grounded. The understanding of metabolic networks as organizationally closed and differentiated systems was put forward several decades ago by pioneers such...Beyond the specific (and sometimes simplistic) formulations of these authors, this approach is now increasingly accepted and has been developed in various scientific fields, including theoretical biology, biochemistry, and synthetic biology...” (Mossio et al., 2009, p. 827).

Some have suggested that the information that is found in living things is a *blueprint* of information for constructing an individual organism of a species. The information in DNA is a blueprint for constructing living things.

As Peter Medawar writes,

> "...in a professional vocabulary, 'information'[280] connotes structure or orderliness, especially of the kind that makes possible the transmission of a meaningful message or in the form of a communication that prescribes and confers specificity upon any structure or performance. Thus, the information structurally encoded in the huge molecule of deoxyribonucleic acid (DNA) is such as to specify the development of the particular organism and no other, and the wealth of information embodied in an architect's *blueprint* [my emphasis] specifies some one building and no other." (Medawar, 1984, p. 79)

Rolston also draws an analogy between species and other information systems designed by human beings. Living organisms are like teleofunctional artifacts produced on the basis of a blueprint or template that contains information. For example, in addressing the importance of protecting endangered species Rolston writes, “Destroying species is like tearing pages out of an unread book, written in a language humans hardly know how to read, about the place where they live” (Rolston, 1985, p. 718). A species, for Rolston, represents a unique form of information and in particular endangered species contain information that is in danger of being lost forever. In this case they are like “unread books” that are waiting to be read but highly susceptible to

[280] Medawar is talking about *genetic* information here.

being lost or destroyed. [281]

In short, a species' way of life is as unique as the genetic information that "directs" and "orchestrates" its life processes. Accordingly, Rolston adds,

> "A species is a coherent, ongoing form of life expressed in organisms, encoded in gene flow, and shaped by the environment…At this point, we can anticipate how there can be duties to species.[282] What humans ought to respect are dynamic life forms preserved in historical lines, vital *informational processes* [my emphasis] that persist genetically over millions of years, overleaping short-lived individuals…Though species are not moral agents a biological identity – a kind of value – is here defended. The dignity resides in the dynamic form" (Rolston, 1985, p. 721-722).

So just as books and architectural blueprints are a form of information, a species can also be a form of information.

But perhaps we shouldn't take this particular metaphor too far. After all organisms and their DNA cannot *literally* be read like books. But the metaphor is highly suggestive nonetheless in that a species has a unique "story" to tell about an organism's own way of life[283] as unique as

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[281] In addition to the instrumental role that information plays in the life of the organism, Rolston also thinks that the information content found in living organisms is good in itself independently of whether human beings may happen to use that information or even know about it. He writes, "It is not merely the loss of potential human information that is tragic, but the loss of biological information, present independently of instrumental human uses of it…duties to a species are not duties to a class or category, not to an aggregation of sentient creatures but to a *lifeline* [my emphasis]" (Rolston, 1985, p. 723). Species for Rolston represent 'lifelines' each unique and worthy of some protection out of their possession of unique information.

[282] At this point I do not wish to argue that whole species do have value based on their possession of teleofunctional interests. I only intend here to highlight the informational aspect of whole species in that they can be referred to as "information systems". The biocentric individualist would disagree with the idea that individual living things don't have value in themselves but that only species do.

[283] In a separate paper Rolston suggests that the chambered nautilus can be "read" in a certain kind of way. He writes,
"A book can be read, but so too can a chambered nautilus. The microscopic ribs, typically thirty in a chamber, seem to be secreted daily in relation to the lunar-tidal cycle, forming a logarithmic spiral known as the Fibonacci series…Nautilus is an intelligible organic system quite as impressive as the atomic submarine named for it, and the beauty of its pearly orange and white

its own genomic information. A species' way of life is largely determined by its specific metabolic requirements, physiological processes, behavioral strategies, and morphology. DNA and genetic information are the central factors that determine these biological processes as well as the organism's final form.[284]

A competent designer can certainly create "text data" in the form of genetic information as a means of providing instructions on how the structures of a living, teleofunctional system are to be produced and how those structures are to interact and coordinate with one another. Such a designer can use her creativity to intentionally conceive of these precise instructions, write out these instructions and then place them within a teleofunctional system so that it can *make its own* teleofunctional structures and hence be capable of governing its own self-regulation.

It would be reasonable for beings like us to be rather astonished at the level of creative genius and sophistication that it would take to produce such genetic information.

The amount of "text data" that it takes to produce the kinds of teleofunctional living beings that observe in the actual world is quite high. It is above and beyond what human beings are at present capable of designing. The information that human beings produce and which make up present-day computer software programs obviously requires *human ingenuity* to produce. But the information content of living organisms, if designed, would have taken a kind of ingenuity above and beyond the level of ingenuity that human beings have.

For example, Bill Gates has said that "Biological information is the most important information we can discover...Human DNA is like a computer program but far, far more

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spiral vault is greater. We congratulate Leonardo Fibonacci for discovering that series, but why not value the Nautilus for so exquisitely graphing it?" (Rolston, 1981, p. 122).

284 DNA doesn't just specify the precise structure of all proteins, it also determines how an organism will develop from a single, fertilized cell, to an embryo, to its adult form.

advanced than any software ever created" (Gates, 1996, p.228).[285] The genetic information found in living organisms is *analogous* to a computer program made by human beings, but *far more advanced* than any computer program currently conceived.

As I mentioned in chapter three synthetic biologists are already using *their* creativity to intentionally write genetic instructions in the form of nucleotide sequences. In fact synthetic biology is an active field of scientific inquiry at present. Many researchers in the field of artificial life are getting closer to creating forms of life that can carry out their own internal, self-regulation in the conditions in which they are found. In a footnote to their paper "Lessons from Environmental Ethics about the Intrinsic Value of Synthetic Life" Mark Bedau and Ben Larson point out,

> "An explicit goal of much of bottom-up synthetic biology is to make protocells that possess and can sustain an integrated and mutually supporting triad of chemical processes, specifically the processes of programmed control, metabolism, and compartmentation (Rasmussen et al. 2004; Rasmussen, Bedau, McCaskill, and Packard 2009). Such mutually supporting chemical triads exhibit many of the objective systemic properties characteristic of minimal chemical life, such as the properties of autonomy, self-regulation, and evolution (Bedau 2010)"

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[285] Much has happened in both molecular genetics and computer technology since 1996, but I maintain that it is still true that what we observe in DNA is in many ways like a digital code. For a more recent discussion of the association between DNA and computer technology (September 20, 2015) see the news article discussing "DNA computers" by Marta Kwiatkowska entitled "Organic 'computers' made of DNA could process data inside our bodies" from http://thenextweb.com/insider/2015/09/20/organic-computers-made-of-dna-could-process-data-inside-our-bodies/#gref. In it she writes,
"DNA molecules can be used to process information, using a bonding process between DNA pairs known as hybridisation. This takes single strands of DNA as input and produces subsequent strands of DNA through transformation as output...many DNA-based "circuits" have been proposed that implement computational methods such as Boolean logic, arithmetical formulas, and neural network computation. Called molecular programming, this approach applies concepts and designs customary to computing to nano-scale approaches appropriate for working with DNA...DNA molecules' many appealing features include their size (2nm width), programmability and high storage capacity – much greater than their silicon counterparts. DNA is also versatile, cheap and easy to synthesize, and computing with DNA requires much less energy than electric powered silicon processors." (Kwiatkowska, 2015)

(Bedau and Larson, 2013, p. 84)

But if we were to think that the production of these artificial forms of life took *human ingenuity* to produce, then it certainly seems reasonable to think that if the complex, teleofunctional beings that we observe in the natural world were also designed, then those things were produced by some kind of creative mind that is at least, if not more, creative than our own. Creating a new artificial form of life from scratch would require inventing and contriving thousands, if not tens of thousands, of new structures with novel functions capable of sustaining it. It would require the generation of massive amounts of genetic, instructional information. Artificial forms of life, just like their natural cousins, are teleofunctional systems of enormous complexity and self-maintenance. But human beings have yet to produce an *entirely new form of life*. Moreover the living things that are found in nature are *far more advanced* than any of the synthetic forms of life that human beings have currently produced. As such it would be entirely appropriate for us to think that if the non-sentient teleofunctional beings that we see in nature were designed that that designer would have creative abilities that surpass our own, creative abilities capable of generating billions of nucleotide "text data" needed for the making of the teleofunctional structures of all non-sentient living things.

Synthetic biology, however, is not the only field of interest to those attempting to create self-regulating teleofunctional beings. Scientists involved in *robotics* research are likewise trying to apply the standards of teleofunctional systems to inorganic systems. That is, designing sophisticated robots takes some creative genius are the part of us humans. For example, scientists have recently developed a robot that is capable of adapting to sustained damage by making adjustments in its own behavior. These robots can,

> "create a detailed map of the space of high-performing behaviours. This map represents the robot's prior knowledge about what behaviours it can perform and their value. When the robot is damaged, it uses this prior knowledge to guide a

> trial-and-error learning algorithm that conducts intelligent experiments to rapidly discover a behaviour that compensates for the damage." (Cully et al. 2015, p. 503).

Consider also Delancey's comment on the possibility of future, designed machines that could have their own teleofunctional capacities. He writes,

> *"I consider it acceptable that some future machine, with highly complex self-regulating capacities, may have teleofunctions* [my emphasis]. Furthermore, note that the criterion that appears to rule out artifacts in the evolutionary etiological account – the ability to self-reproduce – is one which future artifacts may have" (Delancey, 2004, p. 184)

Hence, we could reasonably think that a possible, designed future machine (as an *inorganic* system) or a possible, designed, future form of life (as an organic system) could exist that also had teleofunctions. This would then mean that the teleofunctional interests of these beings would have been brought about by our creative means.

Thus, it is reasonable for us to think that if all existing living things were designed, by God or any other being, then they were designed with a level of creative genius that *relative to beings like us* is rather astonishing. There would thus be a reason for *beings like us* not to harm the non-sentient living things produced by design. Evidence of the designer's creativity would be available in the form of the non-sentient living things that the designer had brought about, most notably the sophisticated set of instructions found in their DNA. Non-sentient living things that show evidence of their designer's great creativity are ones that beings like us have a reason not to harm.

VII. Is Natural Selection Creative or Brilliant?

Some at this point might object to the notion that God, or any other rational agent, is the *only* thing that can *design* things or be astonishingly creative. They might argue that natural selection itself can also design things with its astonishing creativity. They might say, "Naturally-selected teleofunctional interests are just as technologically sophisticated as designed ones are. The process of natural selection is just as creative and innovative as God, or any other rational agent, can be. It can produce everything from single cells all the way up to complex creatures such as human beings. What could be more astonishingly creative than that?"

The biocentrist that advances this line of argumentation relies on the claim that natural selection is capable of doing some rather creative things. Natural selection, they claim, is rather clever and amazingly ingenious at building teleofunctional systems. For example, Daniel Dennett has advocated this kind of understanding of the creative nature of Darwinian, natural selection. He writes,

> "There is simply no denying the breathtaking *brilliance of the designs* [my emphasis] to be found in nature. Time and again, biologists baffled by some apparently futile or maladroit bit of bad design in nature have eventually come to see that they have underestimated the ingenuity, the sheer *brilliance*, the depth of insight to be discovered in one of Mother Nature's creations. Francis Crick has mischievously baptized this trend in the name of his colleague Leslie Orgel, speaking of what he calls "Orgel's Second Rule: Evolution is cleverer than you are." (Dennett, 1995, p. 74).

It might be urged that Dennett is too smart to suggest that natural selection itself has a mind by using terms such as *brilliant*, *ingenuity* or *clever* to describe it. However, those that happen to read Dennett's claim above might be misled into thinking that natural selection has a mind even if that was not his intention. One of the definitions that Merriam-Webster has for the term "brilliant" is that of being "very smart or clever". But it takes a mind to be "brilliant" *in this sense*. So when Dennett uses of the term "brilliant" to describe natural selection it might be a little difficult to discern just what he is actually up to. The same thing goes for the term "ingenuity". People can be described as being "ingenious" in the sense of having "an unusual aptitude for discovering, inventing, or contriving" things. But natural selection cannot be described as "ingenious" *in this same sense*. Natural selection cannot discover, invent, or contrive anything. Minds can. Natural selection cannot be "very smart or clever". Minds can.

When Dennett uses the term 'design' to describe what natural selection can do he is using that word in a sense different than what I have defined the term "design" to mean. On my definition something is designed if some agent "employed her creativity to intentionally bring it about". But natural selection cannot "employ its creativity to intentionally bring something about". Natural selection has no intention and so it cannot intend to bring anything about.

Tom Bethell points out a tension that exists between efforts to describe the process of natural selection in teleological terms and the understanding that natural selection is actually a completely blind process that involves no intentionality at all. He writes,

> "The geneticist Theodosius Dobzhansky compared natural selection to "a human activity such as performing or composing music." Sir Gavin de Beer described it as a "master of ceremonies." George Gaylord Simpson at one point likened selection to a poet, at another to a builder. Ernst Mayr, Lewontin's predecessor at Harvard, compared selection to a sculptor. Sir Julian Huxley topped them all, however, by comparing natural selection to William Shakespeare."
>
> "Life on Earth, initially thought to constitute a sort of prima facie case for a creator, was, as a result of Darwin's idea, envisioned merely as being the outcome of a process and a process that was, according to Dobzhansky, "blind, mechanical, automatic, impersonal," and, according to de Beer, was "wasteful, blind, and blundering." But as soon as the criticisms were leveled at natural selection, the "blind process" itself was compared to a poet, a composer, a sculptor, Shakespeare - to the very notion of creativity that the idea of natural selection has originally replaced. It is clear, I think, that there is something very, very wrong with such an idea." (Bethell, 1976, p. 75).

Likewise, Denis Walsh has commented on the regrettable fact that many evolutionary biologists continue to *invoke* teleological concepts in their explanations of biological phenomena invoking natural selection all the while knowing that such concepts *do not really belong* within the field of evolutionary biology itself. Teleology is a kind of "mistress" that evolutionary biologists use for their purposes but whom they will not be seen in public with. Walsh writes,

> "...even committed Darwinians continue to feel the Kantian tension between the requirement of teleology and its unavailability. J.B.S. Haldane is said to have

> quipped that teleology, to a biologist, is like a mistress. He can't be without her, but he is ashamed to be seen with her in public. The claim is as apt as it is inappropriate. Biology seems to be inexorably drawn to teleology, and yet its credentials as a science in good standing appear to require that either it renounce its dalliance with teleology or make a legitimate partner of it. Biology, it seems, can't live with teleology, and it can't live without it." (Walsh, pp. 115-116)

The point I want to make here is that natural selection is not like the creative processes of actual designers including God. Composers, poets and sculptors are all conscious agents that make intentional plans to create the things that they do and they employ their creativity to intentionally bring those things about. Natural selection, on the other hand, cannot employ its creativity to intentionally bring anything about.

As such there cannot be anything truly "astonishing" about natural selection's *cleverness*. There is no cleverness there to be astonished by. The living things that natural selection leaves behind might *astonish* us. But we should not be astonished *at its cleverness* per se. Should someone *believe* that naturally-selected living things are the result of a *clever designer* their belief would *not* be justified. Natural selection, as Dobzhansky himself describes it, is "blind, mechanical, automatic, impersonal". But blind, mechanical, automatic, and impersonal processes are not really clever.

Evolution by natural selection tells us that there really are no overarching teleological goals or purposes inherent in the processes that give rise to life. Butterfly wings are not made *for* flight. They just happen to be structures capable of flight by a process that did not have flight as an end goal for them in mind. Butterfly wings are useful structures in the spreading of butterfly genes because flight is conducive to the spreading of butterfly genes but they have no functional purposes as such. Matthew Wheeler underscores this when he writes, “By way of this Darwinization, teleological concepts are underwritten historically, and are thereby made to behave themselves in relation to a physics that has discarded teleology altogether” (Wheeler, 2005, p. 274).

If the non-sentient teleofunctional beings that we observe in the natural world were designed by God, then he would, relative to beings like us, be a rather remarkable kind of creator. He *would* be a rather *clever designer*. We can't attribute *that* kind of ability to nature because nature itself is of course blind and has no mind.

VIII. The Argument from Awe, Wonder and Thankfulness to God

I have suggested that if God had designed the non-sentient teleofunctional beings that we observe in the world then his level of creative ingenuity would be much greater than our own.[286] Non-designed, non-sentient beings cannot be *evidence of* their designer's creativity because they were not made with creativity at all. However, designed, non-sentient beings can be evidence of their designer's creativity.[287]

Right now I want to argue that there would be yet another reason for us to not harm all non-sentient living beings that were brought about by the "theistic design etiology".

Consider these comments from Katie McShane.

> "John Fowles and John Muir compare the awe, wonder, and reverence that nature inspires to that which cathedrals and temples are *meant to inspire* [my emphasis]. Fowles even goes so far as to claim, "...I am certain that all sacred buildings, from the greatest cathedral to the smallest chapel, and in all religions, derive from the natural aura of certain woodland or forest settings. In them we stand among older, larger, and infinitely other beings, remoter from us than the most bizarre other

286 Many theologians might suggest that God's intelligence is in a *different league altogether* from our own.

287 This argument would also apply to a case of design in which the designer is not God. There might exist some other non-theistic rational agent that could be the designer for non-sentient living things that are either exactly like, or much like, the non-sentient living things that we observe *in the actual world*. If *those* beings were designed, then the designer of those beings would have, relative to beings like us, great creative ingenuity. Such a designer, however, would not *necessarily* have to be God.

> nonhuman forms of life: blind, immobile, speechless..., waiting..."[288] (McShane, 2007, p. 54)

If the trees that Fowles is referring to were *designed* by God in the manner described in the theistic design etiology, then God also intended for those non-sentient living beings to inspire beings like us with awe and wonder[289]. For the purposes of this argument, I will grant that not *all* rational beings would be struck with a sense of awe and wonder at the non-sentient living things that God designed in the theistic design etiology. Agents much more creative or powerful than beings like us might not regard God's creative genius as particularly incredible or remarkable. And so there would not, *for them*, necessarily be anything to be "wowed" about, nothing to be in awe over. Rational agents are *more or less* inspired (or even not at all) by some designed artifacts depending on various characteristics that they have. For *beings like us*, however, it is hard to imagine how *we* could design such things as the non-sentient living beings that exist in this world. And so if those things were designed and God intended for those things to inspire us with a sense of awe and wonder, then it seems reasonable to think that we should be thankful to God for designing such beings, beings that strike us as particularly awesome examples of his great creative abilities. So the kind of awe or wonder that I am speaking about here is an awe or wonder relative to beings like us and a kind of awe and wonder that we should be thankful *to* God for inspiring in beings like us.

Human beings routinely design things for the purpose of inspiring other human beings with a sense of awe, wonder or amazement. For instance, architects often attempt to inspire a sense of awe or wonder in observers of their work. As Katie McShane points out in the above

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288 McShane enters the following footnote here: John Fowles, *The Tree* (New York: Ecco Press, 1983), p. 58. See also John Muir, *My First Summer in the Sierra* (New York: Penguin Books, 1987), p. 49.

289 God might intend to reveal other things to us as well.

quote, some "sacred buildings, from the greatest cathedral to the smallest chapel" (structures produced by human designers) were "meant to inspire" observers of their work. These structures were not produced by some accident on the part of the architect that made them. The architect *intended* for *beings like us* to be awed and amazed by that work.[290]

Having feelings of admiration, awe, reverence, amazement and the like are not uncommon emotions for beings like us to have when confronted with many of the non-sentient living things that we encounter in the natural world. Things that we have these kinds of feelings toward are things that we think shouldn't be harmed. But more to the point if these kinds of things were intended by a designer to inspire beings like us with a sense of awe and wonder then that provides are a reason for why we should be thankful to the designer of those things. Observers of an architect's awe-inspiring "sacred building" have a reason to be thankful to the architect for designing that structure.

Nonetheless, other environmentalists think that we can have an attitude of awe and wonder toward the natural world but *without* having to resort to transcendent theism, without thinking that those beings exist *for the purpose* of inspiring beings like us with a sense of awe and wonder. They think that we can still have religious-type attitudes directed at the natural world, attitudes of thankfulness *toward it*. For example, Ned Hettinger writes,

> "Some will object to naturalistic spirituality because they think the religious attitudes involved require an intentional or conscious being as an appropriate object, something nature spirituality purports to do without. Talk of the earth as our creator, or of being thankful to earth, would seem to treat the earth as a conscious intentional being. If life on earth is a gift, it might be argued, this requires a giver to whom we can be thankful. How can one revere and be devoted to something that is not kindly or lovingly disposed towards us?
> Some religious attitudes are, however, perfectly legitimate when directed at non-intentional, non-conscious entities. That this spectacular planet and the natural

[290] If so, then why not think that a designed woodland could not likewise have been brought by God for the purpose of inspiring a sense of awe and wonder in beings like us too?

history that underlies it were unplanned and not created by an intelligent designer does not lessen our ability or duty to love or defend it. Nor does it entail that we should be any less thankful. It is true that such attitudes will differ in some of their details when they are not directed at a personal, loving deity. Reverence for earth is not likely to be the identical type of attitude as reverence for a personal God. Love and thankfulness when directed at beings that cannot be aware of these attitudes are different than are love and thankfulness directed at a person. In the latter sense, one expects some kind of response; one expects that these attitudes will make a difference to their object. The earth will not respond to those who love it and are thankful for it any differently than to those who fear and denigrate it. Nevertheless, for nature spirituality, these are appropriate attitudes and they make a difference in the lives of those who are so disposed and in how they respond to and treat the earth." (Hettinger, 2007, p. 72).

Hettinger seems to suggest that our *thankfulness* can be directed at the natural world even if the natural world was not designed. But there is a problem for this view. The problem with this claim rests, I think, on an equivocation of what it means to be *thankful*.

In some cases we often talk about being "thankful to" someone for something good that they had done for us. For instance we might say something like, "I am thankful *to* Nathan for preparing the meal today." But on other occasions we talk about being "thankful for" something that has happened to us. In cases such as these we say things like, "I am thankful *for* the rain today." or "I am thankful *that* there is less traffic today."

The kind of thankfulness that I am envisioning that a naturalistically-minded environmentalist can have toward nature and that Hettinger is suggesting is that of thankfulness *for* or thankfulness *that*, but not thankfulness *to*. Thankfulness *for* or thankfulness *that* is roughly the same kind of thankfulness that one can have when a cloud brings rain. The cloud itself has no aim or plans to produce rain. Nor does the cloud have an aim to please other beings by bringing them rain. Clouds *produce* rain, but being thankful *for* the rain that they produce does not mean that we should be thankful *to* them for producing the rain.

So we cannot, as Hettinger seems to suggest, be thankful *to* nature and as such nature is not something that on that basis we should think *deserves our thankfulness*.

The naturalistically-minded biocentrist can be thankful *for* the non-sentient living beings that she encounters in the natural world, but she cannot be thankful *to* nature for bringing those beings about. Nature does not *deserve* our thankfulness even though some of the things that it produces happen to be good for us. If the naturalistically-minded biocentrist happens to find some utilitarian value in the non-sentient beings produced by natural selection, then she too might be thankful *for* those utilitarian benefits. But she cannot be thankful *to* nature itself for producing those things. To do so would be a category mistake. Nature can neither love others nor creatively express any love to others and so we shouldn't think that we can be thankful *to* nature for bringing about something *on our behalf* and hence think that nature *deserves* our thankfulness.

Darwin's theory and modern reductionist science has done much to weaken the view that nature is spirited or that it intentionally aims to be benevolent toward others, as such some environmentalists believe that environmental ethics should be *distanced* from evolutionary biology because of its implication that nature is not something that has benevolent intentions. These environmentalists want to find some kind of accommodation between the reality of Darwinism on the one hand and the need to keep nature "sacred" and viewed through a spiritual or religious lens on the other.

As Lisa Sideris writes,

> "...some environmental ethicists and theologians actively distance their enterprise from evolutionary science, which is seen...to operate on the principles of the "old" Baconian, despotic, mechanical model that dominates and controls nature. Darwin's theory is not seen as passing the ecological litmus test." (Sideris, 2007, p. 64)
> "Dawkins and others of his ilk (particularly sociobiologist E.O. Wilson and, at times, philosopher Daniel Dennett) have undertaken the greatest reductionist move[291] of all by rendering everything that is connoted by Darwinism - good,

[291] The "reductionist move" that I think Sideris is talking about here is the move of explaining

> bad, and indifferent - down to one rather narrow and dogmatic interpretation. This move has undoubtedly given greater urgency to *the search for alternatives* [my emphasis], for something that appears to be a legitimate middle ground between biology and religious belief." (Sideris, 2007, p.74-75)

Evolutionary biology and its associated scientific reductionism has "disenchanted" the natural world to such an extent that we don't have much of a reason to think that it has intentions *for* anything.

Still there are some environmentalists who think that nature really *is* a kind of being that does things *on our behalf* and to that extent deserves our thankfulness. They claim that there might exist some religious way of "reenchanting" nature.

In the wake of the scientific reductionism of biological phenomena that Darwin's theory has ushered in, these environmentalists insist on bringing an intentionalist interpretation back to nature where nature is interpreted to have some kind of spiritedness or to be an extension of God's being. The "desacrilization" of the natural world, as a result of Darwinism, has compelled some biocentrists to rescue nature from such an interpretation through various "religious" means of viewing nature as having some kind of spirit or intentionality. These individuals attempt to "resacrilize" nature and view it as either spirited in some way or perhaps a part of God himself. According to Lisa Sideris,

> "A number of liberal Christian theologians, including Sallie McFague (1993), Rosemary Radford Ruether (1992), Mark I. Wallace (2005), Leonardo Boff (1997), Thomas Berry (1988)[292], and Matthew Fox (1988), continue to carry forward Hartshorne's resacralization project (Zaleha 2008a: 58-77). The possible

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all biological phenomena by recourse to random mutations and natural selection an explanation that seems to leave no ground for religious belief.

[292] Thomas Berry speaks of the *compassionate nature* of the universe when he writes, "...we might consider our intimate and compassionate presence to the earth as originating ultimately in the curvature of space, as it is presented in modern science. The entire earth community is infolded in this compassionate curve whereby the universe bends inwardly in a manner sufficiently closed to hold all things together and yet remains sufficiently open so that compassion does not confine, but fosters, the creative process." (Berry, 1988, p. 20).

significance of this trend in liberal Christian thought is that if the planetary environment is not merely God's property, but actually *part of God* [my emphasis], then environmental protection becomes *even more important* [my emphasis] and urgent, because humanity becomes capable in this view of at least partial deicide (Fox 1988: 17)." (Zaleha, 2015, p. 139)

"One antidote to an overly literal reading of Darwinism is a more literary one. A secular version of enchanted Darwinism has recently been put forward by George Levine. In *Darwin Loves You: Darwinism and the Re-enchantment of the World*, Levine—an English professor—argues that critics of the Darwinian worldview overlook the deeply Romantic view of nature that pervades Darwin's writing. He correctly notes that Darwin inhabited, and wrote about, a natural world densely layered with value, wonder, even mystery, not a mechanical, inert, insensitive one...It is, after all, Darwin's theory, more so than any other scientific theory we have, that connects us with a primordial past and with all other life forms, past and present[293]...For those who choose to embrace it, theology plays an explanatory role in "formaliz[ing] the intuitions of this depth that first erupt in metaphor and religious symbol" (Haught 2003:102)...Interestingly, Levine, like Haught, sometimes characterizes this misunderstanding as a too literal reading of Darwin. Neo-Darwinists follow Darwin in letter, perhaps, but not in spirit. Yes, Darwin attempted to explain the human species—physical, mental, and moral evolution—exclusively from the side of natural history, as he characterizes his project in *The Descent of Man*. And yes, Darwin believed that his theory would shed light on other disciplines that seek to explain human behavior. Therein lies a certain type of reductionism. But it is an oddly expansive kind of reductionism that remains compatible with a sense of wonder, because the recognition of our biological nature, our ties to lower animals and a distant evolutionary past, was, in Darwin's view, utterly ennobling..." (Sideris, 2007, p.76-78).

But Sideris *also* recognizes that efforts to "reenchant" the natural world are *at odds* with what the science of natural selection has revealed to us about the natural world itself. She recognizes that nature construed as a benevolent being is quite counterintuitive with the view that all living things arose by the undirected, brutal process of natural selection. Natural selection does not seek to express love or care for others. Teleofunctional interests, produced by natural selection, like all other aspects of living things operate in the context of a blind process that itself

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[293] Siders inserts the following footnote here: "I confess to finding none of the vital warmth and beauty and tragedy of the Darwinian worldview in the theories of the new physics. Quite possibly, I do not understand them well enough, given that physicist Richard Feynman is reputed to have said that no one understands quantum theory." (Sideris, 2007, p. 77)

has no concern for virtue at all or to inspire beings like us with a sense of awe and wonder. It's only "concern" is with the replication of genes. She writes,

> "...what Darwinism contributed to the study of nature was a clear counterpoint to the impression of a benevolent communal interdependence in nature...With the advent of Darwinism the suspicion that the natural world was the arena of a war of all against all appeared to be confirmed." (Sideris, 2003, p. 27).

> "Evolution [is] a fierce, competitive struggle for food, shelter, and mates. The processes of evolution are described with such words as blind, random, and purposeless. Natural selection, we are told, operates according to "chance"; in fact, some recent evolutionists have begun to highlight the aspects of evolution that reveal its deeper connection to chaos theory. The picture of nature is one that is already as disturbed as it is disturbing..." (Sideris, 2003, p. 22).

In other words, if we observe the teleofunctional interests of *naturally-selected* living things, we will not find the work of a benevolent being. Rather we will be witnessing the pursuit of interests that take place within the brutal struggle for life. Darwin's theory has undermined the claim that nature contains within itself some principle of benevolence or a spirit worthy of some worship, a spirit that we should somehow be thankful *to*.

If this is true then how can we maintain the view that naturally-selected, and thus non-designed, non-sentient teleofunctional beings are the kinds of things that we should be thankful *to* nature for producing or that we have an *obligation* to nature to be thankful to it? Being thankful *for* the existence of naturally-selected, non-sentient living things *can* be a reason for why we should not harm those beings. Some might even argue that we have an obligation to be thankful for the existence of all non-sentient living things regardless of their etiology. We can have *that* obligation with regard to designed, non-sentient living things as we can for non-designed, non-sentient living things. We do not, however, have an obligation to be thankful *to* nature for producing non-sentient living things. As such that obligation cannot be among the reasons available for why we should not harm naturally-selected, non-sentient living things.

While it may be true that Darwin himself expressed some *feelings* of wonder toward the natural world, that does not mean that nature is something that we should be *thankful to*. And just because Darwin had a romantic view of nature that does not mean that nature does things *on our behalf* or that *we* should hold a romantic view of nature or that nature has some spirit that makes it worthy of our thankfulness.

As I have been arguing here the best that an environmentalist can hope for is some form of *indirect* moral standing for non-sentient teleofunctional beings. But projecting intentionality onto naturally-selected, non-sentient, teleofunctional beings or seeking other ways to "reenchant" nature through "metaphor and religious symbols" is simply a way putting an intentionalist gloss on what otherwise is actually a mindless state of affairs. As such that state of affairs isn't anything that we actually *can be*, let alone *must be* thankful *to* much less *have an obligation* to be thankful to. If all non-sentient teleofunctional beings were not designed, then the naturalistically-minded biocentrist cannot possibly appeal to the claim that we should be thankful *to* nature for producing some non-sentient teleofunctional beings or that such thankfulness provides a reason for why non-designed, non-sentient living things should not be harmed.

If, on the other hand, some of the non-sentient teleofunctional living things that we observe in the world *were* intentionally brought about by a God who had aims or purposes to produce those beings in order to inspire beings like us with a sense of awe and wonder, then we do have an obligation to be *thankful to* God for bringing those beings about. God would *deserve our thankfulness* in that case.[294]

Note that if the theistic design etiology were true, then God's purpose would exist

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[294] If, on the other hand, God designed some non-sentient teleofunctional beings *for the purpose* of giving human beings something to *despise*, then *those* designed beings would *not* be ones that we have an obligation to be thankful *to* God for bringing about. Some might argue that we have an obligation to despise those things, if our despising those things was God's purpose.

independently of our anthropomorphic tendencies to *project* intentionality onto nature or to enchant it with some kind of spirit. Some biocentrists might find that implication favorable because they think that *our* attitudes about the natural world should not be the deciding factor in whether non-sentient teleofunctional beings have moral standing. They think that all living things have moral standing independently of *human* interests. Although it is true that under the "theistic design etiology" all living things would have moral standing that is independent of *human* interests, the reason not to harm them would be *dependent* on God's purposes. If the biocentrist is willing to accept *that* limitation, then all of God's designed non-sentient teleofunctional beings would have indirect moral standing by recourse to his purposes for them. But this purpose would exist independently of whether human beings are inspired with a sense of awe and wonder by those things or not or whether human beings believe that they have an obligation to God for bringing those beings about. Those things would exist for a divinely appointed purpose whether human beings find moral value in God's purpose or even recognize the *existence* of that purpose.

Since indirect moral standing is the only kind of moral standing that remains for non-sentient teleofunctional beings, the biocentrist who embraces a non-design etiology for all non-sentient teleofunctional beings cannot appeal to the claim that we should be, or have an obligation to be, thankful *to* some *agent* for bringing those beings about. However, a biocentrist that embraces a design etiology for all non-sentient teleofunctional beings *can* appeal to such a claim. If non-sentient teleofunctional beings were brought about for the purpose of inspiring beings like with a sense of awe and wonder then we should be thankful to the designer for the non-sentient teleofunctional beings that she brought about. That thankfulness can further motivate us to treat that designer's creation with care. The naturalistically-minded biocentrist, however, cannot be motivated to protect non-sentient living things in *that* way.

IX. The Argument from Projects

If all non-sentient living beings were brought about by the theistic design etiology then there would exist still *other* purposes that God has for the non-sentient teleofunctional beings that he created, purposes as being a part of his *project*.

I want to make the "argument from projects" by considering an analogy between a case of design that involves a human being's project and a case of design instead that involve a project of God's.

Let us assume that there is a scientist that designs a sophisticated, teleofunctional robot which contains tens of thousands of essential teleofunctional features that all work together for its self-regulation and maintenance. In order for our scientist to bring about this kind of teleofunctional system, he must carefully consider how each structure of the robot will interact with every other structure so that its self-regulation is achieved. Our scientist must have some technical savvy in doing this. He must have substantial knowledge of electronics, circuitry, physics, chemistry, computers, etc. and be able to bring his knowledge of these subjects to bear in bringing about his novel idea which is the design plan for the robot. The construction of this robot relies on the satisfaction of *numerous* preference interests or desires of the scientist, a desire to obtain knowledge of physics, a desire to become proficient in designing efficient mechanical devices, a desire to successfully arrive at the local electronics store in order to purchase a calculator, a desire to build each of the robot's part, a desire to put each part together, a desire to get enough sleep so that the project might continue the next day, etc. We could imagine a seemingly endless number of preference interests here.

To say that this scientist "has an interest" in this robot would be more than to simply say that he "likes" it, or that he "has an interest in it functioning correctly". This robot is the scientist's *project*. It is something that "counts as important or meaningful" in his life.

Should someone destroy this robot *before completion* for no morally compelling reason, then that person would be harming the scientist without cause by frustrating the completion of his project, a project that involves numerous desires and meaningful pursuits that the scientist has. Many creative endeavors are ones in which the designer intends to bring about some completed end goal. If a designer intends or desires to bring about some created object, then that means that she has a preference interest in her designed object coming into existence. She *prefers* for that designed object to *exist*. And so should someone destroy that designed object, without some overriding consideration before it is completed, such an act would be in violation of her preference for that designed object to exist.

But now let us suppose that this same scientist not only has an interest in *designing* the robot but also an interest in its *continued self-maintenance*. When designers create things, they usually not only *intend* for those things to be brought about, they also intend for those things to have a certain kind of future. The scientist not only takes satisfaction in the *completion* of the robot, she also takes satisfaction in observing its ability to routinely maintain itself in the midst of varying environmental circumstances. Should someone destroy this robot *after completion* for no morally compelling reason then we must also deal with the frustration of her interests in its continued self-maintenance *and* in her interests in observing its successful self-maintenance. Her interest in observing the self-maintenance in something that was designed by her includes among other things her interest in her designed robot having a certain kind of future, her interest in some future instances of its teleofunctional structures functioning properly, her interest in it not being harmed by others in the future, etc.

The scientist's desires and preferences should be "taken into account" by others when it comes to the question of how it should be treated. Evan Williams defines "taking a preference into account" in the following way.

> "I shall say that an agent “takes a preference into account,” if, finding himself making a decision between an action which frustrates someone’s preference and an action which fulfills it, he regards the preference as giving a *pro tanto* moral reason for acting in the way that fulfills it." (Williams, 2016, p. 213)

In other words, to take this scientist's preference interests in her robot into account means to regard her preference interests as giving a *pro tanto* moral reason for acting in way that does not harm it. This means that the scientist's preference interests in her robot provide a reason for why it should not be harmed that is not based on any intrinsic properties of the robot. The robot is guaranteed then to have indirect moral standing.

It seems reasonable to suppose that a person's projects, plans or goals matter from an ethical point of view. We can draw upon various ethical theories to support this basic claim. Consider the following from Evan Williams. He writes,

> "While I do not wish to endorse any particular theory of why preferences are morally significant, I do think that it is worth observing that on many different theories—e.g. contractarian theories which tell us to help others get what they want in exchange for their help getting what we want, and universalization-type theories which have us regard others’ desires as giving us reason to help them because we wish that others would regard our desires as giving them reason to help us[295] - what matters is how we want our own desires to be treated; and, of course, by definition we care more about the fulfillment of our stronger desires than about the fulfillment of our weaker desires, regardless of their respective degrees of externality." (Williams, 2016, p. 220)

Here I will argue that human beings in some worlds in which there exists a designer of a non-sentient teleofunctional being (what I call a "design world") would have reasons, in the form

[295] Here Williams inserts the following footnote: e.g. Hare, *Moral Thinking*, pp. 87–116.

of the designer's *preference interests*, not to harm that being than they would have not to harm the same being that was brought about by a non-design etiology.

There could be numerous preference interests at stake in the proper treatment of some designed objects. But these same preference interests would not be at stake regarding the proper treatment of the same non-designed object.

Consider the following contrasting cases.

Case 1:

> Seth, a lover of flowers, takes up a preference interest in a wild violet that is growing in his backyard. Seth enjoys this plant and obtains much personal satisfaction by observing how it is able to maintain its own self-maintenance through the utilization of its own numerous, essential teleofunctional features. Seth also brings it about that the plant is watered properly, fertilized properly and protected from herbivorous predators. This plant was brought into existence by the process of natural selection.

Case 2:

> Seth, a lover of flowers, not only *likes* the violet that is growing in his backyard, but he *designed* it. Seth used his skillful creativity to intentionally bring this flower and its essential teleofunctional features about. This plant is a *project* of Seth's in that Seth put his own creativity and skill into making it. Seth planted the violet in his backyard where it grows amongst the other violets that were not designed by anyone. Seth cares for all of these plants and brings it about that they are watered properly, fertilized properly and protected from herbivorous predators.

I want to argue that in case 2 there are certain reasons available for why the plant should not be harmed that are not available for why any of the non-designed plants should not be harmed. Rational agents have reasons, in the form of another person's preference interests as well as their own, to refrain from harming a designed non-sentient living thing. These reasons are available for why Seth's designed violet should not be harmed. But these reasons are not available for why the violet in case 1 should not be harmed, a violet that Seth did *not* design.

In case 1 Seth did nothing to bring about the self-maintenance of the violet growing in his backyard. He had a variety of preference interests associated with its self-maintenance, preference interests associated with its well-being and the like. Furthermore, he took pains to sustain the plant's well-being by making sure that it was watered properly, etc. But in case 2 Seth is not only able to *observe* his designed violet and acquire the satisfaction of many interests in the plant's well-being, he can also acquire satisfaction from knowing that this plant is capable of surviving on its own *because of* his own creativity. Seth can, on the occasion of observing his designed violet, *remember* the pains that it took for him to design it, remember the previous successes of *those* efforts and take *further satisfaction* in knowing that those efforts were successful in bringing about the self-maintaining capacities that he currently witnesses. On this occasion Seth can enjoy still further satisfaction in knowing that his previous efforts to design the violet were not only successful *in the past* but are *currently* successful and, if no harm is brought to the plant, would probably be successful in the future.[296] In case 1 Seth is unable to have these kinds of preference interests because he had nothing to do with bringing about any of the essential teleofunctional features of the violet in his backyard. In case 1 Seth cannot have the satisfaction of knowing what is it like to successfully design a violet, nor can he have the satisfaction of observing the current success of any previous creative activity to bring it about. In case 1 Seth did not bring about the self-maintaining *capacity* of the violet. He may have brought about an *enhancement* or *sustenance* of the violet's self-maintenance by watering it, fertilizing it,

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[296] Some might argue that Seth's *efforts* (construed as "hard work" and the like) are not analogous to God's efforts in the theistic design etiology because either God is so powerful that he did not have to work *hard* to bring non-sentient living things about or that we simply cannot *know* how much hard work it took, if any, for him to bring non-sentient living things about. Some, however, think that there is a biblical reason for thinking that God expended considerable effort or hard work in bringing about non-sentient living things by pointing to Genesis 2:2 which points out the God "rested on the seventh day from all his work that he had done" (ESV translation).

etc., but he did not *design* the violet's *ability* to maintain itself in the first place. In case 1 Seth can *admire* the ability of the violet to maintain itself, but he cannot take credit for that capacity. Other valuers cannot *congratulate* him for bringing the flower about. In case 1 Seth also cannot have the satisfaction of knowing that his act of bringing about of the violet's self-maintaining capacities was successful.

If the plant, and all other non-sentient living things were brought about by the theistic design etiology then there would be other preferences at stake, preferences that cannot be at stake if those living things were not designed it. These preference interest would serve as further reasons for why those beings should not be harmed.

An act of killing a plant designed by God would be more than just an act of killing it and an act of disregarding God's preferences *in its well-being*. It would, in addition to those things, be an act of disregarding God's preferences *in enjoying the success of his own project*, an action which would violate all of the preference interests involved in his designing of the plant and in his desire to be satisfied by his own creative efforts. It is not simply that the plant was important to God. After all even a non-designed plant can be important to God. It is that this plant would be *more important* to God for reasons pertaining to his preferences associated with own creativity.[297]

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[297] An additional argument for how a design etiology could provide a reason not to harm non-sentient teleofunctional beings is the argument that designed, non-sentient living beings are some designer's intellectual property. The owner has certain rights and privileges associated with the proper use and distribution of her intellectual property. These rights and privileges provide a reason why her intellectual property should not be harmed.
Since destroying another person's property is prima facie wrong, and since a designed, non-sentient living thing is instance of someone's property, then destroying that property is prima facie wrong. To destroy or degrade an organism that is a designed work, would *prima facie* be wrong precisely because it is a designer's property, in this case her intellectual property.
As Ricardo Pozzo writes,
"*Corpus mysticum, opus mysticum, propriété incorporelle, proprietà letteraria, geistiges*

X. Conclusion

In this dissertation I have argued that all living things have interests regardless of their etiology. How a living, teleofunctional being was brought about is irrelevant to whether it has interests. But etiology *can* make a difference to whether a non-sentient living being has indirect

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Eigentum. All these terms mean intellectual property, the existence of which is intuitively clear because of the unbreakable bond that ties the work to its creator. The book *belongs to* [my emphasis] whomever has written it, the picture to whomever has painted it, the sculpture to whomever has sculpted it; and this independently from the number of exemplars of the book or of the work of art in their passages from owner to owner. The initial bond cannot change and it ensures the author authority on the work." (Pozzo, 2006).

The proposition that all living things are a designer's intellectual property has one rather interesting implication regarding gene patents and genes as intellectual property. The question of who can obtain a patent on a gene or some other biological product, or even if anyone has the right to such a patent, is a hotly contested issue in environmental ethics. Many environmentalists argue that only the indigenous peoples of the land that cultivate a naturally-occurring living organism have exclusive ownership rights to the use of that organism and its genetic resources. They claim that it is unjust for any outside entity, be it a corporation, a visiting research scientist or another country, to attempt to patent a biological product or harvesting procedure from the land that these native people have cultivated and invested with their own capital. This amounts to what environmentalists call "biopiracy" or the using of the knowledge of indigenous peoples pertaining to nature but without fairly compensating those indigenous peoples for that knowledge.

Many naturally-occurring biological resources including genes and the products of genes are very useful to human beings.

For example the neem tree, *Azadirachta indica*, produces a wide array of biopesticide molecules that can be used to control many pests and pathogens of crop plants. One such compound, azadirachtin, has been isolated from the oil of neem tree seeds and is a genetic product known to control some arthropod pests (Veitch et al., 2007). Snake venom also contains an array of biologically useful proteins and enzymes that scientists believe can treat blood clots, strokes, cancers and neurological disorders. These are but two examples of the many beneficial uses of genes and proteins from plant and animal sources.

Since the gene products of the neem tree are beneficial, the ownership of them as intellectual property might seem quite appealing.

But if the genes of all living things are the intellectual property of their designer, it would be improper to claim that the genetic information found within any of those living things is the intellectual property of any other rational agent. In that case, the genes of the neem tree, if designed, would not belong to native the people that had cultivated or harvested that tree. Nor would they belong to any outside research scientist or corporation hoping to profit from its genes. These genes would be the intellectual property of the neem tree's designer.

moral standing, the only kind of moral standing available for them.

First, designed non-sentient living thing are guaranteed to have indirect moral standing by recourse to the fact that they were brought about by an intrinsically good activity, creativity. Being produced by an intrinsically good or virtuous activity provides a reason for a non-sentient living thing should not be harmed. Non-designed, non-sentient living things cannot be guaranteed to have indirect moral standing. And since they were not brought about by an intrinsically good activity then being brought about by an intrinsically good activity cannot be one of the reasons available for why those beings should not be harmed.

Second, designed non-sentient living things are also guaranteed to have indirect moral standing by recourse to the fact that they have teleofunctional structures that have teleofunctional purposes. Their teleofunctional structures were intended by their designer to have the functions that they do. A designer's intention for a structure to have a functional purpose is another reason why a designed, non-sentient living thing should not be harmed. To damage a designed teleofunctional structure is to cause it to malfunction. Causing these structures to malfunction goes against their designer's intention. Hence, designed non-sentient living things are guaranteed to have indirect moral standing by recourse to the existence of their teleofunctional purposes.

But non-designed, teleofunctional structures cannot malfunction. They might be caused to function *differently*, but not to malfunction per se. As such having the ability to malfunction cannot be among the reasons available for why one should not harm a non-designed, non-sentient living things or its teleofunctional structures.

A design etiology is capable of explaining how there could be normative functional purposes for all non-sentient living things. This etiology at least gives the biocentrist a way out of the quandary of explaining how non-sentient living things could have normative, functional purposes.

This means that the biocentrist is faced with either accepting some non-design etiology and not having the ability to explain the existence of functional purposes for living things or accepting a design etiology and having the ability to explain the existence of functional purposes for living things.

If she accepts a design etiological view for the existence of all non-sentient living things then she will be also be able to claim that all living things have indirect moral standing independently of human preferences or desires. If she accept a non-design etiological view for the existence of all non-sentient living things then she must be willing to live with the claim that those beings will not be guaranteed to have indirect moral standing.

I, however, maintain that if indirect moral standing is the only kind of standing left non-sentient living things, then if those beings were brought about by the theistic design etiology she would have *further* reasons not to harm those beings, reasons that would exist independently of her preference interests or desires.

If God had designed all non-sentient living thing for the purpose of inspiring beings like us with a sense of awe and wonder then all valuers would have another reason not to harm those beings. Our obligation to be thankful to God for bringing those beings about would be a reason not to harm those beings. But since we cannot have an obligation to be thankful to nature for bringing about any non-sentient living beings then having that obligation cannot be reason for why non-designed, non-sentient living things should not be harmed.

Furthermore, if all non-sentient living things were God's project then God would have numerous preference interests in how those beings were brought about and in how those beings are treated over time. These preference interests provide further reasons for why non-sentient living beings produced by the theistic design etiology should not be harmed. But since no such preference interests are involved in bringing about a non-designed, non-sentient living thing, the biocentrist cannot appeal to those preference interests as providing a reason for why non-designed, non-sentient living things should not be harmed.

If all non-sentient living beings and their teleofunctional interests were brought about by the theistic design etiology then there would be some purpose for the existence of all non-sentient living things not associated merely with genetic replication. They would have been brought about for a variety of morally-good purposes, purposes that were given to them by their designer and not based on whether rational agents such as ourselves happen to value them or impute our purposes to them. One such purpose could be to exhibit or illustrate their designer's remarkable creativity, to inspire beings like us with a sense of awe and wonder or to simply please God himself.

REFERENCES CITED

Aikin, Scott F. (2014). "Environmental Ethics and the Expanding Problem of Evil." *Think*, 13: 33-39.

Agar, Nicholas (1997). "Biocentrism and the Concept of Life." *Ethics*, 108: 147-168.

Alberts, B., D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson (1989). *The Molecular Biology of the Cell*, second edition. New York, NY: Garland.

Amundson, Ron and George V. Lauder (1998). "Function without purpose: The uses of causal role function in evolutionary biology." *Biology and Philosophy*, 9: 443-469.

Anderson-Gold, Sharon (2003). "Objective Value in Environmental Ethics: Towards a Reconstituted Anthropocentric Ethic." *Social Philosophy Today*, 18: 111-124.

Arbor, J.L. (1986). "Animal chauvinism, plant-regarding ethics and the torture of trees." *Australasian Journal of Philosophy*, 64: 335-339.

Aristotle (1941). *Physics*, Translated by R.P. Hardie and R.K. Gaye. In *The Basic Works of Aristotle*, edited by Richard McKeon (New York, NY: Random House): 213-394.

Attfield, Robin (1981). "The Good of Trees." *Journal of Value Inquiry*, 15: 35-54.

Attfield, Robin (2012) "Biocentrism and Artificial Life." *Environmental Values*, 21: 83-94.

Ayala, Francisco (2007). "Darwin's greatest discovery: Design without designer." *Proceedings of the National Academy of Sciences*, 104: 8567-8573.

Baertschi, Bernard (2012). "The Moral Status of Artificial Life." *Environmental Values*, 21: 5-18.

Basl, John (2012). "Nothing Good Will Come from Giving Up on Aetiological Accounts of Teleology." *Philosophy & Technology*, 25: 543-546.

Baxter, W. (1974). *People or penguins: The case for optimum pollution*. New York: Columbia University Press.

Bedau, M. A. (2010). "An Aristotelian account of minimal chemical life." *Astrobiology*, 10: 1-10.

Bedau, M. and E. Parke (2009). *The Ethics of Protocells: Moral and Social Implications of Creating Life in the Laboratory.* Cambridge, Mass: MIT Press.

Bedau, Mark and Ben Larson (2013). "Lessons from Environmental Ethics about the Intrinsic Value of Synthetic Life." In *Synthetic Biology and Morality: Artificial Life and the Bounds of Nature*, edited by G. E. Kaebnick (Cumberland, RI: MIT Press): 69-87.

Berry, Thomas Mary (1988). *The Dream of the Earth*. San Francisco: Sierra Club Books.

Berry, Wendell (1993). *Sex, Economy, Freedom & Community: Eight Essays*. New York, NY: Pantheon Books.

Bethell, Tom (1976). "Darwin's Mistake." *Harper's Magazine*, 252 (1509): 70-75.

Binns, Corey (2006). "Genes: The Instruction Manuals for Life", Live Science, from: http://www.livescience.com/10486-genes-instruction-manuals-life.html.

Boff, Leonardo (1997). *Cry of the Earth, Cry of the Poor, Ecology and Justice*. Maryknoll, NY: Orbis Books.

Boorse, Christopher (1976). “Wright on Functions.” *The Philosophical Review*, LXXXV: 70-86.

Boyle, Robert (1666). “The Origin of Form and Qualities.” in *The Works of the Honourable Robert Boyle*. London. t. 3.

Bridge, A. P., R. W. Elwood and J. T. A. Dick (2000). "Imperfect assessment and limited information preclude optimal strategies in male–male fights in the orb-weaving spider *Metellina mengei*." *Proceedings of the Royal Society of London, Series B*, 267, 273–279.

Burge, Tyler (2010). *Origins of Objectivity*. New York, NY: Oxford University Press.

Cahen, Harley (1988). "Against the Moral Considerability of Ecosystems." *Environmental Ethics*, 10: 195-216.

Callicott, J. Baird (1980). “Animal Liberation: A Triangular Affair.” In *In Defense of The Land Ethic: Essays in Environmental Philosophy*, by J. Baird Callicott (Albany, N.Y.: State University of New York Press): 15-38.

Callicott, J, Baird (1992). "Rolston on Intrinsic Value: A Deconstruction." Environmental Ethics, 14: 129-143.

Callicott, J. Baird (1995). “Intrinsic Value in Nature: a Metaethical Analysis.” *http://ejap.louisiana.edu/EJAP/1995.spring/callicott.1995.spring.html*

Carafo, Philip (2001). “For a Grounded Conception of Wilderness and More Wilderness on the Ground”, *Ethics and the Environment*, 6:1-17

Christensen, Wayne and Mark H. Bickhard (2014). “Function as Design versus Function as Usefulness.” from: http://www.lehigh.edu/~mhb0/funcdesignfuncuseful.pdf.

Clements, Colleen D. (1976). “Stasis: The Unnatural Value.” *Ethics*, 86: 136-144.

Clewell, Timothy J. (2011). The Promise and Limits of Natural Normativity in a Neo-Aristotelian Virtue Ethics. Master's Thesis, Georgia State University, Department of Philosophy. From: http://scholarworks.gsu.edu/cgi/viewcontent.cgi?article=1081&context=philosophy_theses

Council of Europe (1998). “Additional Protocol to the Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine, on the Prohibition of Cloning Human Beings.” Paris, December 1st, 1998. From: *http://conventions.coe.int/Treaty/en/Treaties/Html/168.htm*

Coyne, Jerry (2012). “What’s the problem with unguided evolution?” From: https://whyevolutionistrue.wordpress.com/2012/07/17/whats-the-problem-with-unguided-evolution/ (Accessed April 15, 2014).

Crick, Francis (1958). “On Protein Synthesis.” Symposium for the Society of Experimental Biology, 12:138-63.

Crisp, Roger (1998). "Animal liberation is not an environmental ethic: A response to Dale Jamieson." *Environmental Values*, 7: 476-478.

Cropley, Arthur J. (1999). “Creativity and cognition: Producing effective novelty”. *Roeper Review*. 21: 253-261.

Cully, Antoine, et al. (2015). “Robots that can adapt like animals.” *Nature*, 521: 503-507.

Dabrock, P. (2009). “Playing god? Synthetic biology as a theological and ethical challenge.” *Systems and Synthetic Biology*, 3: 47-54.

Davidson, Donald (1987). “Knowing One’s Own Mind.” *Proceedings and Addresses of the American Philosophical Association*, 60: 441-458.

Davies, Paul Sheldon (2000). “The Nature of Natural Norms: Why Selected Functions are Systemic Capacity Functions.” *Noûs*, 34: 85-107.

Davies, Paul Sheldon (2001). *Norms of Nature: Naturalism and the Nature of Functions*. Cambridge, Mass.: MIT Press.

Davies, Paul Sheldon (2009). *Subjects of the World: Darwin’s Rhetoric and The Study of Agency in Nature*. Chicago: University of Chicago Press.

Dawkins, Richard (1986). *The Blind Watchmaker*. New York: Norton Press.

Dawkins, Richard (1999). *The Selfish Gene*. Oxford: Oxford University Press.

de Vriend, H. (2006). *Constructing Life. Early social reflections on the emerging field of synthetic biology*. The Hague, the Netherlands: Rathenau Institute. Working Document 97.

Delancey, Craig (2004). "Teleofunctions and Oncomice." *Environmental Ethics*, 26: 171-188.

Delancey, Craig (2006). “Ontology and Teleofunctions: A Defense and Revision of the Systematic Account of Teleological Explanation.” *Synthese*, 150: 69-98.

Dennett, Daniel (1995). *Darwin's Dangerous Idea: Evolution and the Meanings of Life*. New York, NY: Simon and Schuster.

Dewey, John (2009). "The Influence of Darwinism on Philosophy." In *Philosophy after Darwin: Classic and Contemporary Readings*, edited by Michael Ruse (Princeton: Princeton University Press), 55-62.

Dyke, James G. and Iain S. Weaver (2013). "The Emergence of Environmental Homeostasis in Complex Ecosystems." *PLoS Computational Biology*, 9: 1-9.

Elliot, Robert (1982). "Faking Nature." *Inquiry*, 25: 81-93.

Elwood, Robert W. and Mirjam Appel (2009). "Pain experience in hermit crabs?" *Animal Behaviour*, 77: 1243-1246.

ETC Group (2007). *Extreme Genetic Engineering: An Introduction to Synthetic Biology*. From: http://www.etcgroup.org/sites/www.etcgroup.org/files/publication/602/01/synbioreportweb.pdf

Findlay, Roger D. (2004). "Mycorrhizal fungi and their multifunctional roles." *Mycologist*, 18: 91-96.

Fisher Jun, F. M. and R. C. Sanborn (1962). "Production of Insect Juvenile Hormone by the Microsporidian Parasite *Nosema*." *Nature*, 194: 1193.

FitzPatrick, William J. (2000.) *Teleology and the Norms of Nature*, New York, N.Y.: Garland Publishing Inc.

Fodor, Jerry (2007). "Why Pigs Don't Have Wings", *London Review of Books*, 29: 19-22.

Fodor, Jerry (2008a). "Against Darwinism", *Mind & Language*, 23: 1-24.

Fodor, Jerry (2008b). "Against Darwinism" From: http://ruccs.rutgers.edu/images/personal-jerry-fodor/fodor_against_darwinism.pdf

Foot, Philippa (2001). *Natural Goodness.* Oxford: Oxford University Press.

Fox, Matthew (1988). *The Coming of the Cosmic Christ: The Healing of Mother Earth and the Birth of a Global Renaissance*. San Francisco: HarperSanFrancisco.

Gates, Bill (1996). *The Road Ahead*. Revised Ed., London: Penguin.

Gaut, Berys (2014). "Mixed Motivations: Creativity as a Virtue." Royal Institute of Philosophy Supplement, 75: 183-202.

Gibson, Daniel G., John I. Glass, Carole Lartigue, Vladimir N. Noskov, et al. (2010). "Creation of a Bacterial Cell Controlled by a Chemically Synmthesized Genome." *Science*, 329: 52-56.

Goodpaster, Kenneth E. (1980). "On Stopping at Everything: A Reply to W. M. Hunt." *Environmental Ethics,* 2: 281-284.

Gould, Stephen J. (1989). *Wonderful Life*. New York, N.Y.: W.W. Norton and Company, Inc.

Gutmann, Amy (2011). "The Ethics of Synthetic Biology: Guiding Principles for Emerging Technologies." *Hastings Center Report*, 41: 17-22. From: http://muse.jhu.edu/journals/hcr/summary/v041/41.4.gutmann.html.

Hack, M.A., J.D. Thompson and D.M. Fernandes. (1997). "Fighting of males of the autumn spider, Metellina segmentata: the effects of relative body size, prior residency and female value on contest outcome and duration." *Ethology*, 103: 488-498.

Hagen, Edward H (2005). "Controversial issues in evolutionary psychology". In *The Handbook of Evolutionary Psychology*, edited by D. Buss (Hoboken, NJ: Wiley): 145-176.

Hansson, Bengt, Staffan Bensch and Dennis Hasselquist (1997). "Infanticide in Great Reed Warblers: Secondary Females Destroy Eggs of Primary Females." *Animal Behavior*, 54: 297-304.

Hargrove, Eugene. (1989). *The Foundations of Environmental Ethics*. Englewood Cliffs, N.J.: Prentice Hall.

Hargrove, Eugene (1992) "Weak Anthropocentric Intrinsic Value", *Monist*, 75:183-207.

Haught, John (2003). *Deeper than Darwin*. Boulder, CO: Westview Press.

Hettinger, Ned (2007). "Religion in Rolston's Environmental Ethics." In *Nature, Value, Duty: Life on Earth with Holmes Rolston, III*, edited by C.J. Preston and W. Ouderkirk (Dordrecht: Springer), 63-76.

Hettinger, Ned and Bill Throop (1999). "Refocusing ecocentrism: De-emphasizing Stability and defending wildness." *Environmental Ethics* 21: 3-21.

Holm, Sune (2012). "Biological Interests, Normative Functions, and Synthetic Biology." *Philosophy and Technology*, 25: 525-541.

Holm, Sune (2013). "The Capacities, Interests, and Organisation of Artifactual Organisms." In *Designer Biology: The Ethics of Intensively Engineering Biological and Ecological Systems*, edited by R.L. Sandler and J. Basl (Lanham, MD: Rowman and Littlefield): 233-252.

Hull, David L. (1976). "Are species really individuals?" *Systematic Biology*, 25: 174-191.

Hume, David (1799). *Essays on suicide and the immortality of the soul. By the late David Hume, Esq. With remarks by the editor. To which are added, two letters on suicide, from Rousseau's Eloisa.: A New Edition*: Basil. Eighteenth Century Collections Online.

Hursthouse, Rosalind (1999). *On Virtue Ethics*. New York, N.Y.: Oxford University Press.

Jablonka, Eva and Marion J. Lamb (2005). *Evolution in Four Dimensions: Genetic, Epigenetic, Behavioral, and Symbolic Variation in the History of Life*. Cambridge, MA: MIT Press.

Jamieson, Dale. (1998). "Animal liberation is an environmental ethics." *Environmental Values*, 7: 41–57.

Jamieson, Dale. (2008). *Ethics and the Environment: An Introduction*. Cambridge, New York: Cambridge University Press.

Joppa L.N., et al. (2011a). "How many species of flowering plants are there?" *Proceedings of the Royal Society of London B*, 278: 554–559.

Joppa L.N., et al. (2011b). "Biodiversity hotspots house most undiscovered plant species." *Proceeding of the Royal Society of London B*, 108: 13171-13176.

Kant, Immanuel (1790). *Critique of Judgement*, Second Edition, Revised, Trans. by J.H. Bernard, 1914. London: Macmillan and Co., Limited.

Katz, Eric (1992). "The Call of the Wild: The Struggle Against Domination and the Technological Fix of Nature." *Environmental Ethics*, 14: 265-273.

Katz, Eric (2003). "Is There a Place for Animals in the Moral Consideration of Nature?" In *Environmental Ethics: An Anthology*, edited by A. Light and H. Rolston III (Malden, Mass.: Blackwell Publishing): 85-94.

Kitcher, Philip (1993). Function and Design. *Midwest Studies in Philosophy*, XVIII: 379-97.

Kricher, John (2009). *The Balance of Nature: Ecology's Enduring Myth*. Princeton, NJ: Princeton University Press.

Korsgard, Christine M. (1983). "Two Distinctions in Goodness." *The Philosophical Review*, 92: 169-195.

Küppers, Bernd-Olaf (1990). *Information and the Origin of Life*. Cambridge, MA: MIT Press.

Kwiatkowska, Marta (2015). "Organic 'computers' made of DNA could process data inside our bodies." From: http://thenextweb.com/insider/2015/09/20/organic-computers-made-of-dna-could-process-data-inside-our-bodies/#gref.

Kwiatkowska, Teresa (2008). "The Natural: So Ambiguous A Word." *Dialogue and Universalism*, 18: 87-99.

Lee, Keekok (1999). *The Natural and the Artificial: The Implications of Deep Science and Deep Technology f or Environmental Philosophy*. New York, N.Y.: Lexington Books.

Leopold, Aldo (2003). "The Land Ethic." In *Environmental Ethics: An Anthology*, edited by A. Light and H. L. Rolston III (Malden, MA: Blackwell Publishing): 38-46.

Leopold, Aldo (2013). *A Sand County Almanac*, edited by Curt Meine. Oxford: Oxford University Press.

Light, Andrew (2002). "Contemporary Environmental Ethics from Metaethics to Public Philosophy." *Metaphilosophy*, 33: 426-449.

Link, Hans-Jürgen (2013). "Playing God and the Intrinsic Value of Life: Moral Problems for Synthetic Biology." *Science and Engineering Ethics*, 19: 435-448.

Lo, Y.S. (2006). "Making and Finding Values in Nature: From a Humean Point of View." *Inquiry*, 49: 123-147.

Lott, Micah (2012). "Have Elephant Seals Refuted Aristotle? Nature, Function, and Moral Goodness." *Journal of Moral Philosophy*, 9: 353-375.

Lunger, Frank (2000). "Anthropocentrism vs. Cosmocentrism: Groping Towards a Paradigm Shift", *The Newsletter of the Philosophical Discussion Group of British Mensa*, 102, (http://theotodman.com/c10208.htm)

Lupisella, M.L. (2010). "Cosmocentrism and the Active Search for Extraterrestrial Intelligence", *Astrobiology Science Conference 2010: Evolution and Life: Surviving Catastrophes and Extremes on Earth and Beyond*, held April 26-20, 2010 in League City, Texas. LPI Contribution No. 1538, p.5597.

Marrieta, Jr. Don E. (1979) "The Interrelationship of Ecological Science and Environmental Ethics." *Environmental Ethics*, 1: 195-207.

Martin, Mike W. (2007). *Albert Schweitzer's Reverence for Life: Ethical Idealism and Self-Realization.* Burlington, VT: Ashgate Publishing Company.

May, Robert M. and R.J.H. Beverton (1990). "How Many Species? [and Discussion]." *Philosophical Transactions: Biological Sciences*, 330: 293-3-4.

Mayr, Ernst (2001). *What Evolution Is.* New York, NY: Basic Books.

McDonald, Hugh P. (2003). "Environmental Ethics and Intrinsic Value." In *John Dewey and Environmental Ethics, SUNY Series in Environmental Philosophy and Ethics,* (Albany, NY: State University or New York Press) 1-56.

McFague, Sallie (1993). *The Body of God: An Ecological Theology*. Minneapolis: Fortress Press.

McKibben, Bill (2006). *The End of Nature*. New York: Random House.

McShane, Katie (2007). "Why Environmental Ethics Shouldn't Give Up on Intrinsic Value." *Environmental Ethics*, 29: 43-61.

Mill, John Stuart (1885). "On Nature." in *Three Essays on Religion*, 3rd edition. London: Longman, Green & Co.

Millikan, Ruth (1984). *Language, Thought, and Other Biological Categories*, Cambridge, MA: The MIT Press.

Millikan, Ruth (1989). "In Defense of Proper Functions." *Philosophy of Science*, 56: 288-302.

Millikan, Ruth (1991). "Speaking up for Darwin." In *Meaning in Mind: Fodor and His Critics*, edited by Barry M. Loewer and Georges Rey (Cambridge, MA: Blackwell Publishing) 151-164.

Millikan, Ruth (2002). *Biofunctions: Two Paradigms*, Available online at: http://philosophy.uconn.edu/wp-content/uploads/sites/365/2014/02/Biofunctions-Two-Paradigms.pdf

Millikan, Ruth (2004). *Varieties of Meaning: The 2002 Jean Nicod Lectures*, Cambridge, MA: The MIT Press.

Moore, G.E. (1948) *Principia Ethica*. Cambridge, MA: Cambridge University Press.

Morgan, D. N. (1953). "Creativity today". *Journal of Aesthetics*, 12: 1-24.

Morito, Bruce (2003) "Intrinsic Value: A Modern Albatross for the Ecological Approach." *Environmental Values*, 12: 317-336

Mossio, Matteo, Cristian Saborido and Alvaro Moreno. (2009). "An Organizational Account of Biological Functions." *British Journal for the Philosophy of Science*, 60: 813-841.

Muraca, Barbara. (2011). "The Map of Moral Significance: A New Axiological Matrix for Environmental Ethics", *Environmental Values*, 20: 375-396.

Naess,Arne (1973). "The Shallow and the Deep Ecology Movement", *Inquiry*, 16:95-100.

Naess, Arne (1984). "A Defense of the Deep Ecology Movement", *Environmental Ethics*, 6: 265-270.

Nair, Achuthsankar S (2007). "Computational Biology & Bioinformatics: A Gentle Overview", Communications of the Computer Society of India, January: 1-13.

Nagel, Ernest (1977). "Teleology Revisited: Goal-Directed Processes in Biology." *The Journal of Philosophy*, 74: 261-279.

Neander, Karen (1991). "Functions as Selected Effects: The Conceptual Analyst's Defense." *Philosophy of Science*, 58: 168-184.

Nelson, Gabe, Aaron Saunders, Neil Neville, Ben Swilling, Joe Bondaryk, Devin Billings, Chris Lee, Robert Playter and Marc Raibert. (2012). "PETMAN: A Humanoid Robot for Testing Chemical Protective Clothing.", *Journal of the Robotics Society of Japan*, 30 (4): 372-377. 2012.

Newman, S.W. (1999). “The Medial Extended Amygdala in Male Reproductive Behavior: A Node in the Mammalian Social Behavior Network.” *Annals of the New York Academy of Sciences*, 877: 242-257.

Nicholson, Daniel J. (2013). "Organisms ≠ Machines." *Studies in History and Philosophy of Biological and Biomedical Sciences*, 44: 669-678.

Nissen, Lowell (1997). *Teleological Language in the Life Sciences*, New York, NY: Rowman & Littlefield Publishers Inc.

Nolt, John (2009). “The Move from Is to Good in Environmental Ethics.” *Environmental Ethics*, 31: 135-154.

Norton, Bryan (ed). (1986). *The Preservation of Species: The Value of Biological Diversity*. Princeton: Princeton University Press.

Norton, Bryan (1987) *Why Preserve Natural Variety?* Princeton: Princeton University Press

O'Brien, Lilian (2015). *Philosophy of Action*. New York, NT: Palgrave Macmillan.

Odenbaugh, Jay (2015). “Nothing in Ethics Makes Sense Except in the Light of Evolution? Natural Goodness and Evolutionary Biology.” *Synthese*: Published Online February 20, 2015.

Okumu, Joseph and K.U. Leuven (2007). "Personal identity, projects, and morality in Bernard Williams' earlier writings." *Ethical Perspectives: Journal of the European Ethics Network*, 14: 13-28.

O’Neill, Jonathan (1992). “The Varieties of Intrinsic Value.” *The Monist*, 75: 119-37.

Ott Paul (2010). "Value as Practice and the Practice of Value: Dewey’s Value Theory for Environmental Ethics." *Environmental Ethics*, 32: 285-304.

Palmer, Clare (2003). “An Overview of Environmental Ethics.” in *Environmental Ethics: An Anthology*. Malden, MA: Blackwell Publishing.

Patten, Bernard C. and Eugene P. Odum (1981). "The Cybernetic Nature of Ecosystems." *The American Naturalist*, 118: 886-895.

Petersen, John E. (2001). “Adding artificial feedback to a simple aquatic ecosystem: the cybernetic nature of ecosystems revisited.” *Oikos*, 94: 533-547.

Pinchot, G. (1914). *The training of a forester*. Philadelphia, PA: J.B. Lippincott Company.

Plantinga, Alvin (1993). *Warrant and Proper Function*. Oxford: Oxford University Press.

Pope, Carl (1998). "Reaching Beyond Ourselves: It's Time to Recognize Our Allies in the Faith Community." *Sierra* (November/December): 14-15.

Pozzo, Ricardo (2006). "Immanuel Kant on Intellectual Property." *Trans/Form/Ação*, 29: 11-18.

Prenter, John, Robert W. Elwood and Ian Montgomery. (2003). "Mate-guarding, competition and variation in size in male orb-web spiders, *Metellina segmentata*: a field experiment." *Animal Behaviour*, 66: 1053-1058.

Preston, Christopher (2008). "Synthetic Biology: Drawing a Line in Darwin's Sand." Environmental Values, 17: 23-39.

Preston, Christopher (2013). "Synthetic Bacteria, Natural Processes, and Intrinsic Value." In *Basic Bioethics: Synthetic Biology and Morality: Artificial Life and Bounds of Nature*, edited by G. E. Kaebnick and T. H. Murray (Cumberland, RI: The MIT Press): 107-128.

Rasmussen, S., et al. (2004). "Transitions from nonliving to living matter." *Science*, 303: 963-965.

Rasmussen, S., M.A. Bedau, J.M. McCaskill, and N.H. Packard (2009). "Roadmap to protocells." In *Protocells: Bridging Nonliving and Living Matter* (Cambridge, Mass.: MIT Press): 71-100.

Regan, Tom (1981). "The Nature and Possibility of an Environmental Ethic." *Environmental Ethics*, 3: 19-34.

Rifkin, Lawrence (2013). “Is the Meaning of Your Life to Make Babies?” *Scientific American* Blogs, http://blogs.scientificamerican.com/guest-blog/is-the-meaning-of-your-life-to-make-babies/

Rolston, Holmes III (1979). "Can and Ought We to Follow Nature?" *Environmental Ethics*, 1: 7-30.

Rolston, Holmes III (1981). “Values in Nature.” *Environmental Ethics*, 3: 113-128.

Rolston, Holmes III (1982). "Are Values in Nature Subjective or Objective?" *Environmental Ethics*, 4: 125-151.

Rolston, Holmes III (1988). *Environmental Ethics*. Philadelphia: Temple University Press.

Rolston, Holmes III (2003). “Value in Nature and the Nature of Value.” In *Environmental Ethics: An Anthology*, edited by A. Light and H. L. Rolston III (Malden, MA: Blackwell Publishing): 143-153.

Rolston, Holmes III (2009). "Converging versus Reconstituting Environmental Ethics" In *Nature in Common? Environmental Ethics and the Contested Foundations of Environmental Policy*, edited by Ben A. Minteer (Philadelphia: Temple University Press): 97-117.

Rosenberg, Jay F. (2007). "Comments on Ruth Garrett Millikan's *Varieties of Meaning*." *Philosophy and Phenomenological Research*, LXXV: 692-700.

Rousseau, Jean-Jacques (2007). *Emilie*. Teddington: The Echo Library.

Ruether, Rosemary Radford (1992). *Gaia & God: An Ecofeminist Theology of Earth Healing*. San Franciso: HarperSanFransisco.

Salvi, Maurizio (2001). "Transforming Animal Species: the Case of 'Oncomouse'." *Science and Engineering Ethics*, 7: 15-28.

Samuelson, Lars (2010). "Reasons and Values in Environmental Ethics." *Environmental Values*, 19: 517-535.

Sandler, Ronald (2012a). "Is artefactualness a value-relevant property of living things?" *Synthese*, 185: 89-102.

Sandler, Ronald (2012b). "Intrinsic Value, Ecology, and Conservation." *Nature Education Knowledge,* 3: 4.

Sandler, Ronald (2012c). "Artifactual species." In *The Ethics of Species* (New York: Cambridge University Press).

Schmidt, Markus, Malcolm Dando and Anna Deplazes (2011) "Dealing with the Outer Reaches of Synthetic Biology Biosafety, Biosecurity, IPR, and Ethical Challenges of Chemical Synthetic Biology" in *Chemical Synthetic Biology*, edited by P. L. Luisi and C. Chiarabelli (UK: John Wiley & Sons): 321-342.

Schmidt, Markus, et al., (2008). "SYNBIOSAFE e-conference: online community discussion on the societal aspects of synthetic biology." *Systems and Synthetic Biology,* 2: 7-17.

Schweitzer, Albert. (1969). *Reverence for Life*. Broadway, NY: Irvington Publishers.

Shellenberger, Michael and Ted Nordhaus (2004). "The Death of Environmentalism: Global Warming Politics in a Post-Environmental World." From: *http://thebreakthrough.org /archive/the_death_of_environmentalism*

Sideris, Lisa (2003). *Environmental Ethics, Ecological Theology and Natural Selection*. New York, NY: Columbia University Press.

Sideris, Lisa (2007). "Evolving Environmentalism: The Role of Ecotheology in Creation/Evolution Controversies." *Worldviews*, 11: 58-82.

Simmons, Scott (2013). "How to Evolve a Good of Your Own." In *Designer Biology: The Ethics of Intensively Engineering Biological and Ecological Systems* (Blue Summit Ridge, PA: Lexington Books).

Simpson, Robert (2015). "Intrinsic Value and Intrinsic Valuation." Unpublished manuscript.

Singer, P. (1975). *Animal liberation*. New York: The New York Review.

Smith, Jane A. (1991). "A Question of Pain in Invertebrates." *The ILAR Journal*, 33: 25-31.

Smith, John Maynard (1999). "The Concept of Information in Biology." *Philosophy of Science*, 67: 177-194.

Sober, Elliot (1980). “Evolution, Population Thinking, and Essentialism.” *Philosophy of Science,* 47: 350-383.

Sober, Elliot (1984). *The Nature of Selection: Evolutionary Theory in Philosophical Focus*, Chicago, IL: University of Chicago Press.

Sober, Elliot (1986). “Philosophical Problems for Environmentalism.” In *The Preservation of Species: The Value of Biological Diversity*, edited by Bryan G. Norton (Princeton: Princeton University Press): 173-194.

Specter, Michael (2009). "A Life of Its Own: Where will synthetic biology lead us", Annals of Science, September 28. *The New Yorker*. From: http://www.newyorker.com/magazine /2009/09/28/a-life-of-its-own

Sperry, R.W. (1974), "Science and the Problem of Values", *Zygon*, 9: 7-21.

Steadman, Ian (2014). “Is a worm's brain in a Lego robot alive, or just creepy?”, *The NewStatesman*, Future Proof blog, From: http://www.newstatesman.com/future-proof/2014/12/worms-brain-lego-robot-alive-or-just-creepy.

Sterba, J. (1998). “A Biocentrist Strikes Back”, *Environmental Ethics*, 20:361-376.

Sterba, J. (2001). *Three challenges to ethics: Environmentalism, feminism, and multiculturalism*. Oxford, UK: Oxford University Press.

Sterelny, Kim and Paul E. Griffiths (1999). *Sex and Death: An Introduction to Philosophy of Biology*, Chicago, IL: University of Chicago Press.

Swinburne, Richard. (1993). *The Coherence of Theism, Revised Edition*. New York: Oxford University Press.

Sylvan, Richard (2003). “Is There a Need for a New, an Environmental, Ethic?” In *Environmental Ethics: An Anthology*, edited by A. Light and H. Rolston III (Malden, Mass.: Blackwell Publishing): 47-52.

Tabaczek, Mariusz (2014). "An Aristotelian Account of Evolution and the Contemporary Philosophy of Biology." in *Proceedings of the Conferences on the Dialogue between Science and Theology*, Volume 1. (Ovidius University of Constanta, Romania: Research Center on the Dialogue between Science and Theology): 57-69.

Taylor, Paul (1986). *Respect for Nature: A Theory of Environmental Ethics.* Princeton, NJ: Princeton University Press.

Tennyson, Alfred (1900). *In Memoriam A.H.H.* London: The Bankside Press.

Trojan, Przemysław (1983). *Ecosystem homeostasis* (The Hague: Dr. W. Junk Publishers).

Uhl, Christopher (2013). *Developing Ecological Consciousness: The End of Separation*, second edition. Lanham, MD: Rowman and Littlefield.

van den Belt, Henk (2009). “Playing God in Frankenstein’s Footsteps: Synthetic Biology and the Meaning of Life.” *Nanoethics*, 3: 257-268.

Varner, Gary (1990). “Biological Functions and Biological Interests.” *The Southern Journal of Philosophy*, XXVIII: 251-270.

Varner, Gary (1998). *In Nature's Interests?* New York, NY: Oxford University Press.

Veitch Gemma E., et al. (2007). "Synthesis of Azadirachtin: A Long but Successful Journey." *Angewandte Chemie International Edition*, 46: 7629-7632.

Vesterby, Vincent (2008). “Are Ecosystems Alive?” In *The Proceedings of the 52nd Annual Meeting of the ISSS*.

Viegas, Jennifer (2013). "Blobfish Wins Ugliest Animal Mascot Contest: Photos." Discovery.com. From: http://news.discovery.com/animals/endangered-species/ugly-animals-need-saving- 130618.htm

Vogel, Steven (2002). "Environmental Philosophy after the End of Nature." *Environmental Ethics*, 24: 23-39.

Wallace, Mark I. (2005). *Finding God in the Singing River: Christianity, Spirit, Nature*. Minneapolis: Fortress Press.

Walsh, Denis (2008). "Teleology" in *The Oxford Handbook of Philosophy of Biology*, edited by Michael Ruse (New York: Oxford University Press): 113-137.

Weston, Anthony (1987). “Forms of Gaian Ethics.” *Environmental Ethics*, 9:217-230.

Weston, Anthony (1996) “Beyond Intrinsic Value: Pragmatism in Environmental Ethics.” In *Environmental Pragmatism*, edited by Andrew Light and Eric Katz (London: Routledge): 285-306.

Wheeler, Michael (2005). “Under Darwin’s Cosh? Neo-Aristotelian Thinking in Environmental Ethics.” In *Philosophy, Biology and Life: Royal Institute of Philosophy Supplement*, edited by Anthony O’Hear (Cambridge, MA: Cambridge University Press).

White Jr., Lynn (1967). "The Historical Roots of Our Ecologic Crisis." *Science*, 155: 1203-1207.

Williams, Evan (2016). "Preferences' Significance Does Not Depend on Their Content." *Journal of Moral Philosophy*, 13: 211-234.

Wright, Larry (1976). *Teleological Explanations: An Etiological Analysis of Goals and Function*. Berkeley, Calif: University of California Press.

Yong, Ed (2009). "The suicide plasterers – aphids that repair their homes with their own bodily fluids." *Not Exactly Rocket Science* blog (Ed Yong, 02/25/09) From: http://blogs.discovermagazine.com/notrocketscience/2009/02/25/the-suicide-plasterers-aphids-that-repair-their-homes-with-their-own-bodily-fluids/#.U-pubvldWSo

Zagzebski, Linda (1996). *Virtues of the Mind: An Inquiry into the Nature of Virtue and the Ethical Foundations of Knowledge*. Cambridge: Cambridge University Press.

Zaleha, Bernard Daley. (2008a). "'The Paradise We Ever Need': An Investigation into Pantheism's Sacred Geography in the Writings of Edward Abbey, Thomas Berry, and Matthew Fox, and a Preliminary Survey of Signs of Emerging Pantheism in American Culture." (MA diss., University of Florida).

Zaleha, Bernard Daley (2008b). "Review of John Hart's "Sacramental Commons: Christian Ecological Ethics." *Environmental Ethics*, 30: 217-220.

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